Draft Environmental Impact Statement (DEIS) for the Bering Sea and Aleutian Islands (BSAI) Halibut Abundance-Based Management (ABM) of Amendment 80 Prohibited Species Catch (PSC) Limit
September 2021[1]

This document analyzes a proposed management measure to link the Pacific halibut prohibited species catch (PSC) limit for the Amendment 80 commercial groundfish trawl fleet in the Bering Sea and Aleutian Islands (BSAI) groundfish fisheries to halibut abundance. The objectives of linking the PSC limit are to minimize halibut PSC to the extent practicable under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) National Standard 9 and to continue achieving optimum yield in the BSAI groundfish fisheries on a continuing basis under MSA National Standard 1. This would also be expected to provide incentives for the Amendment 80 fleet to minimize halibut mortality at all times. Achievement of these objectives could result in additional harvest opportunities in the commercial halibut fishery.

This document is a draft Environmental Impact Statement (DEIS). An EIS provides assessments of the environmental impacts of an action and its reasonable alternatives as well as the economic benefits and costs of the action alternatives and their distribution. This DEIS addresses the statutory requirements of the MSA, the National Environmental Policy Act, and Presidential Executive Order 12866. A DEIS is a document produced by the North Pacific Fishery Management Council and the National Marine Fisheries Service Alaska Region to provide the analytical background for decision-making.

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List of Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
ABM	Abundance-based management
ADF&G	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AKFIN	Alaska Fisheries Information Network
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COAR	Commercial Operators Annual Report
Council	North Pacific Fishery Management Council
CP	catcher/processor
CV	catcher vessel
DPS	distinct population segment
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FMP	fishery management plan
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRFA	Final Regulatory Flexibility Analysis
ft	foot or feet
GOA	Gulf of Alaska
IPHC	International Pacific Halibut Commission
lb(s)	pound(s)
LLP	license limitation program
LOA	length overall
m	meter or meters
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MSE	Management Strategy Evaluation
mt	tonne, or metric ton
NEPA	National Environmental Policy Act
NMFS	National Marine Fishery Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
Observer Program	North Pacific Observer Program
OMB	Office of Management and Budget
O26	Over 26" halibut
PBR	potential biological removal
PSC	prohibited species catch
PSEIS	Programmatic Supplemental Environmental Impact Statement
RFA	Regulatory Flexibility Act

Acronym or Abbreviation	Meaning
RFFA	reasonably foreseeable future action
RIR	Regulatory Impact Review
RPA	reasonable and prudent alternative
SAFE	Stock Assessment and Fishery Evaluation
SAR	stock assessment report
SBA	Small Business Act
SSC	Science and Statistical Committee
Secretary	Secretary of Commerce
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpbacks
SPR	Spawning Potential Ratio
TAC	total allowable catch
TCEY	Total constant exploitation yield
U.S.	United States
USFWS	United States Fish and Wildlife Service
VMS	vessel monitoring system

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Executive Summary

This document analyzes proposed management measures to link the Amendment 80 commercial groundfish trawl fleet's (Amendment 80 sector) Pacific halibut prohibited species catch (PSC) limit in the Bering Sea and Aleutian Islands (BSAI) groundfish fisheries to halibut abundance. The Amendment 80 sector comprises trawl catcher/processor vessels in the BSAI that target groundfish species other than pollock. The North Pacific Fishery Management Council (Council) is considering a program that links the Amendment 80 sector PSC limit to halibut abundance and provides incentives for the fleet to minimize halibut mortality at all times. This action promotes conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery.

Roadmap for understanding EIS structure and RIR and MSA requirements

This document is a draft Environmental Impact Statement (DEIS). A DEIS provides assessments of the environmental impacts of an action and its reasonable alternatives as well as the economic benefits and costs of the action alternatives and their distribution. This DEIS addresses the statutory requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the National Environmental Policy Act (NEPA), and Presidential Executive Order 12866. A DEIS is a document produced by the Council and the National Marine Fisheries Service (NMFS) Alaska Region to provide the analytical background for decision-making.

This DEIS is being prepared using the 1978 Council on Environmental Quality (CEQ) NEPA Regulations. NEPA reviews initiated before the effective date of the revised CEQ regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. A Notice of Intent to publish an Environmental Impact Statement (EIS) for the proposed management measures was published in the **Federal Register** on December 12, 2017 (82 FR 58374). This review began on that date, and the agency has decided to proceed under the 1978 regulations.

The document is structured to streamline information required in a DEIS and to organize it to be most easily understood by the reader. **Chapters 1 and 2** contain a description of the purpose and need for the action, followed by a description of the alternatives. **Chapters 3 and 4** of this DEIS contain background information on the BSAI Amendment 80 groundfish fishery and the Individual Fishing Quota (IFQ) and Community Development Quota (CDQ) commercial halibut fisheries in International Pacific Halibut Commission (IPHC) Regulatory Area 4 ("Area 4") that consists of five subareas (ABCDE) that together largely coincide with the BSAI management area. Those sections characterize the fisheries as they exist under status quo management and provide the context within which the alternative management measures should be considered. **Chapter 5** contains the impact analysis on the groundfish fishery and halibut fishery from these alternatives as well as the methodology for estimating these impacts, along with a summary of potential social/community impacts and environmental justice considerations. **Chapter 6** contains information and impacts to other affected resources. Appended separately (**Appendix 1**) is a social impact assessment (SIA).

Relative Authorities of the Council, the National Marine Fisheries Service and the International Pacific Halibut Commission

The Council manages the groundfish fisheries of the BSAI under the authority of the MSA (16 U.S.C. 1801-1884), and through a Fishery Management Plan for the Groundfish of the BSAI Management Area (BSAI FMP). National Standard 9 of the MSA requires that fishery conservation and management measures shall, to the extent practicable: (1) minimize bycatch; and (2) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. Bycatch, as defined by the MSA, "means fish which are harvested in a fishery, but which are not sold or kept for personal use and includes economic discards and regulatory discards." 16 U.S.C. 1802(2). The term "regulatory discards" means "fish harvested in a fishery which fishermen are required by regulation to discard whenever caught, or are required by regulation to retain, but not sell." 16 U.S.C. 1802(38). In the BSAI FMP, the Council has designated Pacific halibut, along with several other fully utilized species such as salmon, herring, and crab, as "prohibited species" in the groundfish fisheries. Under this designation, their capture is required to be avoided, and their retention is prohibited except when retention is required or authorized by other applicable law, such as for the Prohibited Species Donation Program. Unintended removals of prohibited species are separately monitored and controlled under the BSAI FMP.

The Council and NMFS have established limits on removals of halibut, called halibut PSC limits, in the BSAI groundfish fisheries to minimize halibut bycatch and bycatch mortality. The BSAI FMP specifies that when a halibut PSC limit is reached in an area, further groundfish fishing with specific types of gear or modes of operation is prohibited by those who take their halibut PSC in that area. In other words, halibut PSC limits impose an upper limit on bycatch. In the context of the BSAI FMP, "halibut PSC" refers to the total mortality of halibut in the groundfish fisheries. This analysis primarily addresses halibut PSC, i.e., the subset of halibut bycatch that is assumed to be dead because of interactions with the groundfish fisheries. Mortality calculations are made for all halibut bycatch in the groundfish fisheries to estimate halibut PSC, using discard mortality rates adopted annually by the Council as part of the harvest specifications process. Halibut PSC limits, and halibut PSC estimates in the groundfish fisheries, are specified in terms of metric tons, round weight, of halibut mortality.

The International Pacific Halibut Commission (IPHC) is responsible for the overall biologic assessment and conservation of Pacific halibut off the coasts of Alaska, British Columbia, and the western United States. The IPHC refers to halibut "bycatch" to describe the mortality of all sizes of halibut caught in the commercial groundfish fisheries that are managed by the Council and NMFS (hook-and-line sablefish and Pacific cod; trawl Pacific cod, pollock, flatfish, and rockfish, and pot Pacific cod), and minor amounts in commercial shrimp trawl and crab pot fisheries. The IPHC uses the term "wastage" to describe halibut killed, but not landed by the commercial halibut fisheries. Causes can be due to lost and abandoned gear, and mortality of fish released due to the minimum commercial size limit of 32 inches in length. Wastage is not included in IPHC estimates of "bycatch" but is reported annually. The IPHC manages and reports on halibut removals in pounds, net weight, of halibut mortality, and assumes that net weights are 75 percent of round weights.

The Council and NMFS have the authority to set and adjust halibut PSC limits in the BSAI groundfish fisheries. However, only the IPHC can make determinations on annual catch limits for halibut in the directed fisheries. As such, though this action may result in changes to PSC usage by the BSAI groundfish fishery, there is no guarantee that this will translate to increased opportunities for halibut in the directed fishery since the IPHC is not obligated to alter their harvest strategies based on the outcome of this action. This analysis uses the term "halibut PSC" in the context of the proposed action (e.g., halibut PSC limits and halibut PSC in the groundfish fisheries), except where appropriate to describe the IPHC catch limit process, or their research or stock assessment information.

The Council has set other PSC limits (crab, herring) based upon abundance of the stock in the BSAI. However, this action was complicated by consideration of how to index the BSAI portion of the coastwide halibut stock. In October 2017, the Science and Statistical Committee (SSC) recommended, and the Council selected two abundance indices to track Pacific halibut abundance and guide setting halibut PSC limits in the BSAI groundfish fisheries. These indices are derived from the NMFS Alaska Fisheries Science Center (AFSC) eastern Bering Sea (EBS) shelf bottom trawl survey and from the IPHC setline survey covering IPHC Areas 4ABCDE. Both indices represent the best available scientific information on halibut abundance.

Purpose and Need

The Council's purpose and need statement for this action is taken from its motion of October 13, 2020 and set forth below:

> *Halibut is an important resource in the Bering Sea and Aleutian Islands (BSAI), supporting commercial halibut fisheries, recreational fisheries, subsistence fisheries, and groundfish fisheries. The International Pacific Halibut Commission (IPHC) is responsible for assessing the Pacific halibut stock and establishing total annual catch limits for directed fisheries and the North Pacific Fishery Management Council (Council) is responsible for managing prohibited species catch (PSC) in U.S. commercial groundfish fisheries managed by the Council. The Amendment 80 sector is accountable for the majority of the annual halibut PSC mortality in the BSAI groundfish fisheries. While the Amendment 80 fleet has reduced halibut mortality in recent years, continued decline in the halibut stock requires consideration of additional measures for management of halibut PSC in the Amendment 80 fisheries.*
>
> *When BSAI halibut abundance declines, PSC in Amendment 80 fisheries can become a larger proportion of total halibut removals in the BSAI, particularly in Area 4CDE, and can reduce the proportion of halibut available for harvest in directed halibut fisheries. The Council intends to establish an abundance-based halibut PSC management program in the BSAI for the Amendment 80 sector that meets the requirements of the Magnuson-Stevens Act, particularly to minimize halibut PSC to the extent practicable under National Standard 9 and to achieve optimum yield in the BSAI groundfish fisheries on a continuing basis under National Standard 1. The Council is considering a program that links the Amendment 80 sector PSC limit to halibut abundance and provides incentives for the fleet to minimize halibut mortality at all times. This action could also promote conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery.*

Consistent with the MSA's National Standard 1 and National Standard 9, the Council and NMFS use halibut PSC limits to minimize halibut bycatch in the groundfish fisheries to the extent practicable, while achieving, on a continuing basis, optimum yield from the groundfish fisheries. The groundfish fisheries cannot be prosecuted without some level of halibut interception. Although fishermen are required by the BSAI FMP to avoid the capture of any prohibited species in groundfish fisheries, the use of halibut PSC limits in the groundfish fisheries provides an additional constraint on halibut bycatch and promotes conservation of the halibut resource. Halibut PSC limits provide a regulated upper limit to mortality resulting from halibut interceptions, as continued groundfish fishing is prohibited once a halibut PSC limit has been reached for a particular sector and/or season. This management tool is intended to balance the optimum benefit to fishermen, communities, and U.S. consumers that depend on both halibut and groundfish resources.

The halibut resource is fully allocated. The IPHC accounts for halibut mortality in the groundfish fisheries, recreational and subsistence, and other sources before setting commercial halibut catch limits each year. Specifically, the IPHC uses the use the three-year average of recent non-directed discard mortality to establish the following year's commercial halibut fishery catch limit. For several years, there have been concerns raised by stakeholders and the Council about the levels of halibut PSC in the commercial groundfish sectors. The spawning biomass of Pacific halibut in the 1990's was the highest seen in many decades, but has been declining since the 2000s. The declining biomass from those unusually high levels resulted in lower Pacific halibut catch limits set by the IPHC for the BSAI commercial halibut fisheries (Area 4), especially in 2013 and 2014 for the commercial halibut fishery in the northern and eastern Bering Sea (Area 4CDE). The Council addressed this initial concern by reducing trawl, non-trawl, and CDQ sectors' halibut PSC limits for the BSAI groundfish fisheries, implemented in

2016 by Amendment 111 to the FMP and continues to consider further management changes for the Amendment 80 sector PSC limit with this action.

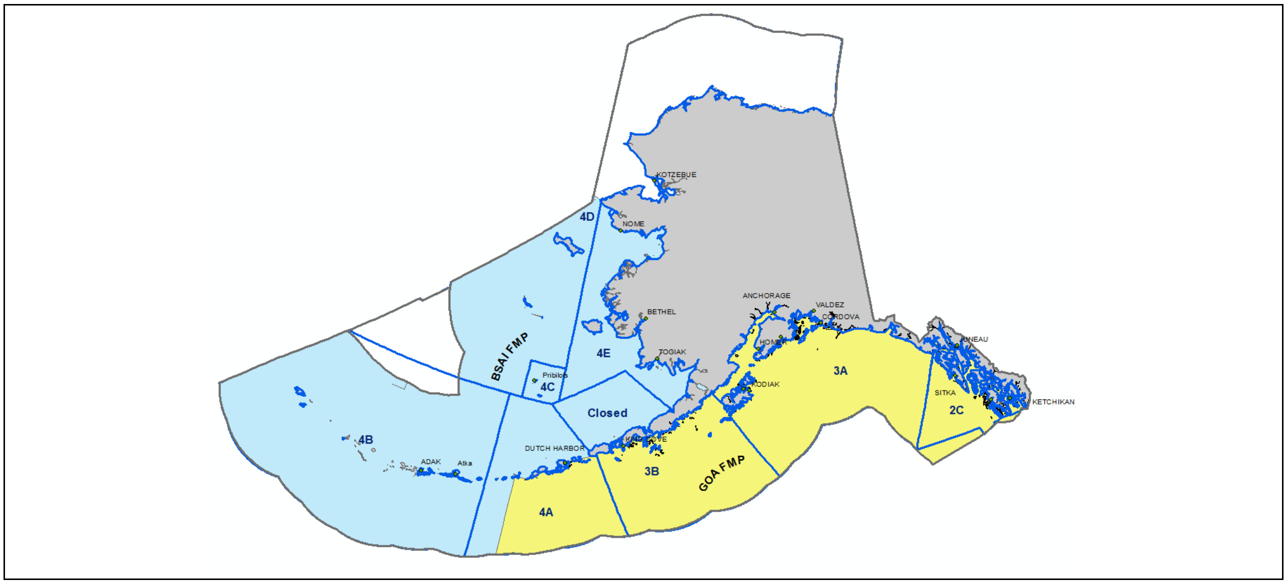


Figure ES- 1 Map of IPHC Regulatory Areas (outlined in dark blue) and BSAI FMP (shaded in light blue) and GOA FMP (shaded in yellow) areas.

Declines in the exploitable biomass of halibut since the late 1990s, and decreases in the Pacific halibut catch limits set by the IPHC for the BSAI commercial halibut fisheries (Area 4;Figure ES- 1), especially beginning in 2012 for the commercial halibut fishery in the northern and eastern Bering Sea (Area 4CDE), raised concerns about the levels of halibut PSC by the commercial groundfish trawl and hook-and-line (longline) sectors and led to the development and implementation of Amendment 111. Since then, the Council has been pursuing abundance-based measures to scale the halibut PSC limit for Amendment 80 to the abundance of halibut (Figure ES- 2). Previous iterations of this analysis have considered modifying the halibut PSC limits for all sectors, but the Council in October 2020 chose to focus this action only on the Amendment 80 PSC limits given that the Amendment 80 sector comprises the majority of halibut PSC mortality in the BSAI (52% of halibut PSC on average from 2015-2020). The intent of indexing the Amendment 80 sector's PSC limit to levels of abundance is to minimize the impact from the Amendment 80 sector when, due to a decrease in BSAI halibut abundance, PSC in Amendment 80 fisheries becomes a larger proportion of total halibut removals in the BSAI, particularly in Area 4CDE, and can reduce the proportion of halibut available for harvest in directed halibut fisheries. Further a program that links the Amendment 80 sector PSC limit to halibut abundance may provide incentives for the fleet to minimize halibut mortality at all times. Finally, this action could also promote conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery.

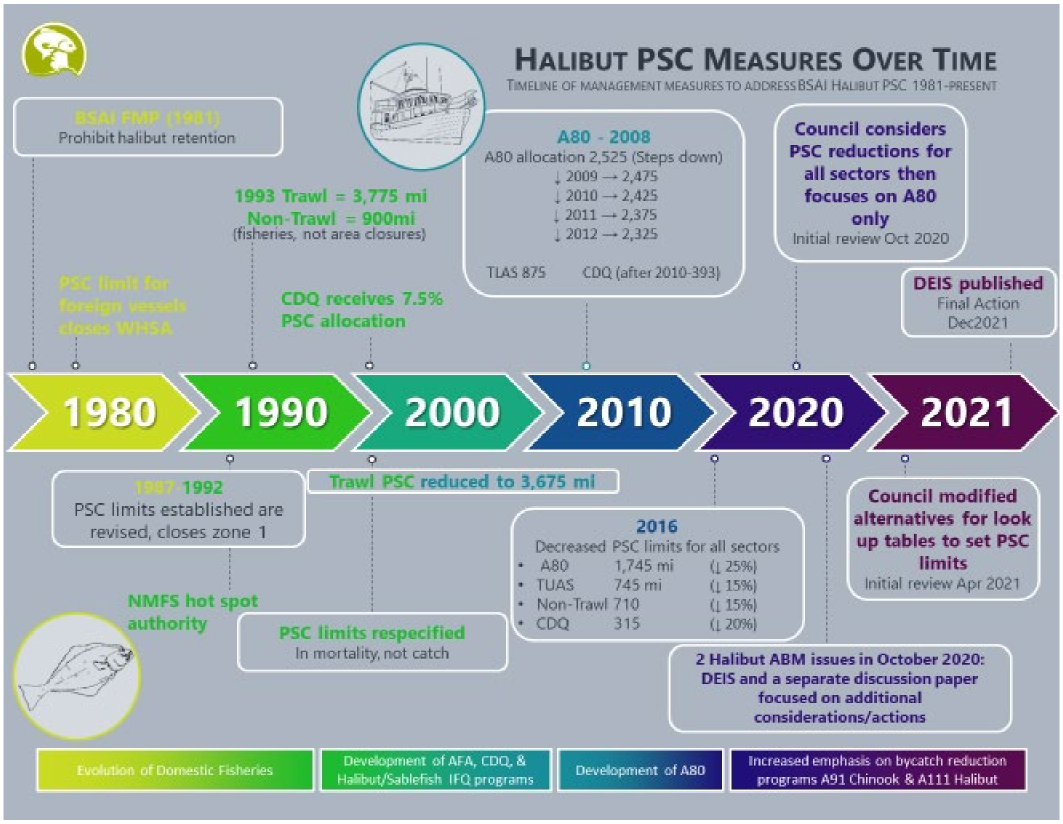


Figure ES- 2 Historical overview of BSAI halibut PSC measures 1981-present.

The Council recognizes efforts by the Amendment 80 sector to reduce total halibut PSC in the BSAI. Concerns persist, however, about continuing low levels of halibut biomass that result in reduced directed fishery catch limits in Area 4. Based on the IPHC management objectives as well as recent projections of halibut biomass and estimates of PSC mortality, directed fishery stakeholders remain concerned that catch limits will be insufficient to provide for a directed fishery in the BSAI at the PSC limits implemented under Amendment 111. The Amendment 80 sector fisheries account for the majority of halibut bycatch mortality in the BSAI. Therefore, the Council is considering the new approach described here to link the Amendment 80 PSC limit to halibut abundance.

The Council does not have authority to set catch limits for the commercial halibut fisheries, and halibut PSC in the groundfish fisheries is only one of the factors that affects harvest limits for the commercial halibut fisheries. Nonetheless, halibut PSC in the groundfish fisheries are a significant portion of total mortality in BSAI IPHC areas and have the potential to affect catch limits for the commercial halibut fisheries in Area 4 under the current IPHC harvest policy. While the impact of halibut PSC reductions on catch limits for commercial halibut fisheries is dependent on IPHC policy and management decisions, reductions to current halibut PSC limits in the BSAI could provide additional harvest opportunities in the BSAI commercial halibut fishery.

Under National Standard 8, the Council must provide for the sustained participation of and minimize adverse economic impacts on fishing communities. BSAI coastal communities are affected by reduced catch limits for the commercial halibut fishery, especially in IPHC Area 4CDE. The Council must balance these communities' engagement in and dependence on halibut with community engagement in and dependence on the groundfish fisheries. Additionally, the Council is guided by National Standard 4, which states that management measures shall not discriminate between residents of different states.

National Standard 4 also requires allocations of fishing privileges to be fair and equitable to all fishery participants.

The proposed action would link halibut PSC limits for the Amendment 80 sector to halibut abundance. Currently halibut PSC limits for groundfish fisheries are set in the BSAI Groundfish FMP at a fixed amount of halibut mortality, in metric tons (mt). When halibut abundance declines, halibut PSC becomes a larger proportion of total halibut removals and can result in lower catch limits for directed halibut fisheries. While other groundfish sectors are also subject to PSC limits, this action is limited to the Amendment 80 sector because that sector is responsible for the majority of BSAI halibut mortality in the groundfish fisheries. Both the Council and the IPHC have expressed concern about impacts on directed halibut fisheries under the status quo in light of the continued decline in the halibut stock and identified abundance-based halibut PSC limits as a potential management approach to address these concerns.

Overall halibut PSC limits can be modified only through an amendment to the BSAI FMP and Federal regulations, although seasonal and some target fishery apportionments of those PSC limits would continue to be set annually through the BSAI groundfish harvest specifications process. The purpose of the proposed action is to establish an abundance-based halibut PSC management program in the BSAI for the Amendment 80 sector that meets the requirements of the Magnuson-Stevens Act, particularly to minimize halibut PSC to the extent practicable under National Standard 9 and to maintain optimum yield in the BSAI groundfish fisheries on a continuing basis under National Standard 1. The premise of abundance-based management of halibut PSC is that the PSC limit is set based on the surveyed abundance of halibut. Halibut PSC relative catch rates in the groundfish fisheries depend on a variety of factors and may correlate poorly with halibut abundance as indexed by surveys. A lack of correlation between surveyed abundance and Amendment 80 encounter does not discount the underlying assumption of abundance-based management of halibut PSC limits, however it may affect the potential impacts. The proposed action aims to minimize halibut PSC to the extent practicable in consideration of the regulatory and operational management measures currently available to the groundfish fleet, and the desire to ensure that catch in the trawl fisheries contributes to the achievement of optimum yield in the groundfish fisheries. Minimizing halibut PSC to the extent practicable is necessary to maintain a healthy marine ecosystem, ensure long-term conservation and abundance of the halibut stock, provide optimum benefit to fishermen, communities, and U.S. consumers that depend on both halibut and groundfish resources, and comply with the MSA and other applicable Federal law.

The proposed action may provide additional harvest opportunities in the commercial halibut fishery, especially in Area 4CDE for western Alaska and Pribilof Island coastal communities. Under the current IPHC harvest policy for establishing commercial fishery catch limits, reductions in halibut mortality that could result from reducing halibut PSC below current levels may provide additional harvest opportunities to the commercial halibut fisheries in both the near term and long term. Additional near term harvest opportunities for the commercial halibut fisheries could result from mortality reductions of halibut that are over 26 inches in length (O26). Under current IPHC policy, these O26 halibut would likely be made available to the commercial halibut fishery in the area the PSC related mortality reductions occurred (historically in Area 4CDE), in the year following the PSC reductions, or when the fish reach the legal size limit for the commercial halibut fishery (greater than or equal to 32 inches in total length). Additional long-term harvest opportunities for the commercial halibut fisheries could accrue throughout the range of the halibut stock from a reduction of halibut PSC from fish that are less than 26 inches (U26). Benefits from reduced mortality of these smaller halibut could occur both in the Bering Sea and elsewhere as these halibut migrate and recruit into the commercial halibut fisheries.

Alternatives

Preferred Alternative (PA) (to be completed after Council final action and selection of a PA)

Alternative 1: No Action (Status Quo). The Amendment 80 sector PSC limit is set at 1,745 mt.

Alternative 2: A 3X2 look up table with PSC limits that range from current PSC limit to 20% below current limit. PSC limit is determined annually based on the most recent survey values (Table ES-1).

Alternative 3: A 4X2 look up table with PSC limits that range from 15% above current PSC limit to 30% below current limit. PSC limit is determined annually based on the most recent survey values (Table ES-1).

Alternative 4: A 4X2 look up table with PSC limits that range from current PSC limit to 45% below current limit. PSC limit is determined annually based on the most recent survey values (Table ES-1).

Figure ES-1-3 shows the survey states for the EBS shelf trawl survey and the IPHC setline survey from 1998 – 2019 to show how historical values have related to the breakpoints identified in Alternatives 2 through 4. To determine what the PSC limit would have been in a given year under the approach being considered by the Council, the reader should simply match the EBS trawl and IPHC setline survey values from a given year and plot them on the individual Alternative look up tables.

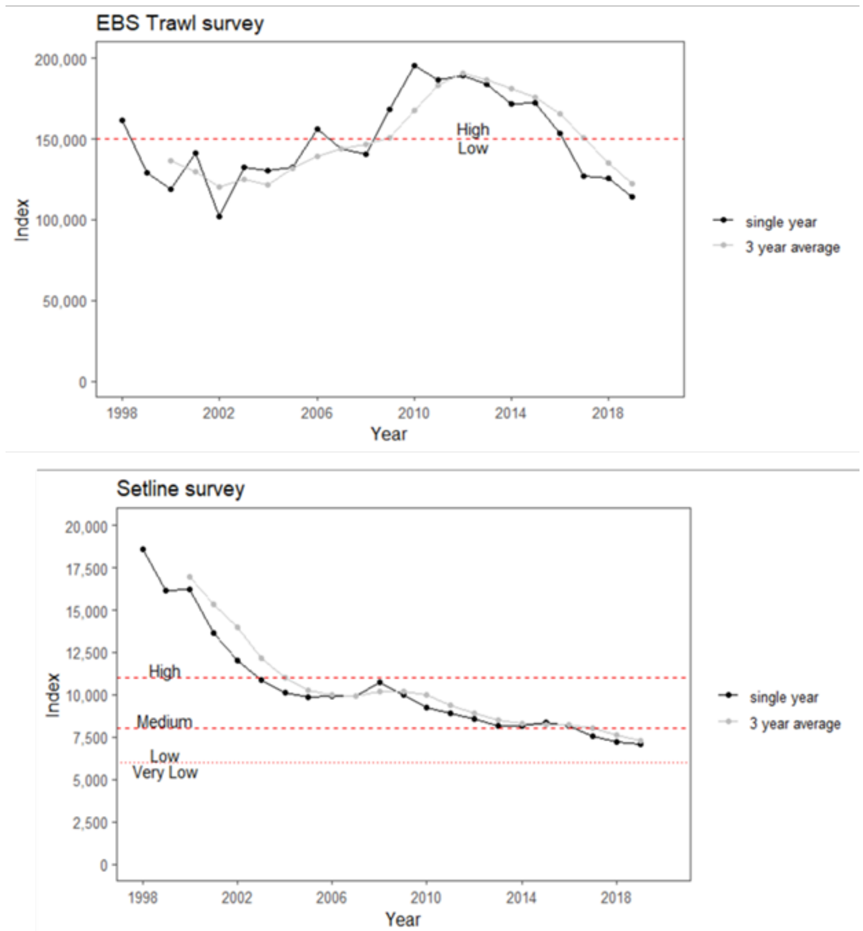


Figure ES- 3 **Survey states for Alternatives 2, 3, and 4. Top panel: EBS trawl survey (1998-2019) with ‘survey state’ delineation (dotted line) between ‘High’ and ‘Low” at 150,000 mt. Bottom panel: IPHC Setline survey 1998-2019 WPUE with ‘survey’ state delineations for ‘High’, ‘Medium’, ‘Low’ and ‘Very low’. Both single within year data (black line) as well as the rolling three-year survey average (grey line) are shown.**

Table ES- 1 **Look up tables for use in setting PSC limits based upon PSC limits associated with the intersection of different states of the EBS trawl survey and the IPHC setline survey. Alternatives 2, 3, and 4.**

Alternative 2

		EBS shelf trawl survey index (t)	
		Low < 150,000	High ≥ 150,000
IPHC setline survey index in Area 4ABCDE (WPUE)	High ≥ 11,000	1,571 mt (10% below current)	1,745 mt (current limit)
	Medium 8,000 – 10,999	1,483 mt (15% below current)	1,571 mt (10% below current)
	Low < 8,000	1,396 mt (20% below current)	1,483 mt (15% below current)

Alternative 3

		EBS shelf trawl survey index (t)	
		Low < 150,000	High ≥ 150,000
IPHC setline survey index in Area 4ABCDE (WPUE)	High ≥ 11,000	1,745 mt (current limit)	2,007 mt (15% above current)
	Medium 8,000 – 10,999	1,396 mt (20% below current)	1,745 mt (current limit)
	Low 6,000-7,999	1,309 mt (25% below current)	1,396 mt (20% below current)
	Very Low < 6,000	1,222 mt (30% below current)	1,309 mt (25% below current)

Alternative 4

		EBS shelf trawl survey index (t)	
		Low < 150,000	High ≥ 150,000
IPHC setline survey index in Area 4ABCDE (WPUE)	High ≥ 11,000	1,396 mt (20% below current)	1,745 mt (current limit)
	Medium 8,000 – 10,999	1,222 mt (30% below current)	1,396 mt (20% below current)
	Low 6,000-7,999	1,047 mt (40% below current)	1,222 mt (30% below current)
	Very Low < 6,000	960 mt (45% below current)	1,047 mt (40% below current)

Options (May apply to all action alternatives):
Option 1: PSC limit is determined using a 3-year rolling average of survey index values instead of the most recent survey value.
Option 2: In the first year of implementation, the PSC limit varies no more than (i: 10% or ii: 15%) from the status quo limit (1,745 mt).
Option 3: Establish an annual limit of (i: 80% or ii: 90%) of the PSC limit generated by the look up table. In 3 of 7 years, the Amendment 80 sector may exceed the annual limit up to the PSC limit generated by the look up table. If the Amendment 80 sector has exceeded the annual limit in 3 of the past 7 years, then the annual limit is a hard cap for the following year.

Comparison of Alternatives

In recent years, the EBS trawl survey has been in a ‘Low’ state (Figure ES- 3) under all Alternatives. Despite the distinction between ‘Low’ and ‘Very low’ in Alternatives 2-4 the setline survey is in the ‘Low’ state currently under all three alternatives based on the 2019 survey estimates (and not including the Option 1 rolling three-year average). A comparison across alternatives grouped by the relative combination of survey states and their resulting PSC limits by alternatives is shown in Table ES-2.

Table ES-2 Combination of survey states and the PSC limits that result from those across alternatives

EBS		Setline		PSC limits		
State	Index	State	Index	Alt 2	Alt 3	Alt 4
low	<150,000	very low	<6,000	NA	1222	960
low	<150,000	low	6,000-7,999	1396	1309	1047
low	<150,000	medium	8,000-10,999	1483	1396	1222
low	<150,000	high	≥11,000	1571	1745	1396
high	>150,000	very low	<6,000	NA	1309	1047
high	>150,000	low	6,000-7,999	1483	1396	1222
high	>150,000	medium	8,000-10,999	1571	1745	1396
high	>150,000	high	≥11,000	1745	2007	1745

Amendment 80 background information

The Council recommends annual catch limits, allocations, and PSC limits for the federally managed commercial groundfish fisheries in the BSAI. This document focuses on the Amendment 80 sector from among the several BSAI groundfish fisheries due to the narrowed scope of the proposed action alternatives. A brief overview of the Amendment 80 sector management and operational characteristics is included here.

Amendment 80 to the BSAI Groundfish FMP facilitated the formation of fishery cooperatives for trawl CPs that are not eligible under the American Fisheries Act (AFA) to participate in directed pollock fisheries. Amendment 80 originally allocated five BSAI non-pollock trawl groundfish species to permit holders that formed a cooperative within the non-AFA trawl CP sector. The Amendment 80 sector is allocated a portion of the TAC for Pacific ocean perch in the AI, Atka mackerel, yellowfin sole, rock sole, and flathead sole in the BSAI, as well as an allowance of PSC quota for halibut and crab.

Beginning in 2011, the Amendment 80 sector has been prosecuted solely by vessels operating in a cooperative. From 2011 to 2017 there were two cooperatives. Since 2017 all active Amendment 80 vessels are part of the Alaska Seafood Cooperative. Though the single-cooperative model creates an environment for highly organized fishing and shared investment in bycatch avoidance research, the analysts note that the cooperative is still made up of five independent for-profit companies. Industry reports indicate that intra-cooperative in-season transfers of quota for constraining species – i.e., halibut PSC or Pacific cod – occur very rarely, if ever.

Figure ES- 4 illustrates the contrast between the five Amendment 80 fishing companies that are operating in 2020 in terms of the species mix upon which they rely. The vertical axis expresses the percentage that a species or species group comprises of a company’s total catch or gross wholesale revenue over the entire 2010 through 2019 time period. The figure defines companies by the historical catch of the vessels for which they claim current ownership in the most recent Amendment 80 Cooperative Report provided to

NMFS and the Council. Data are obscured to preserve confidentiality; the purpose of the figure is to show that the Amendment 80 sector includes companies with different levels of dependence on flatfish and roundfish, and thus different degrees of exposure to expected PSC rates when bycatch is constraining as well as a different set of options in terms of how they might continue their operation in the context of an effective halibut limit.

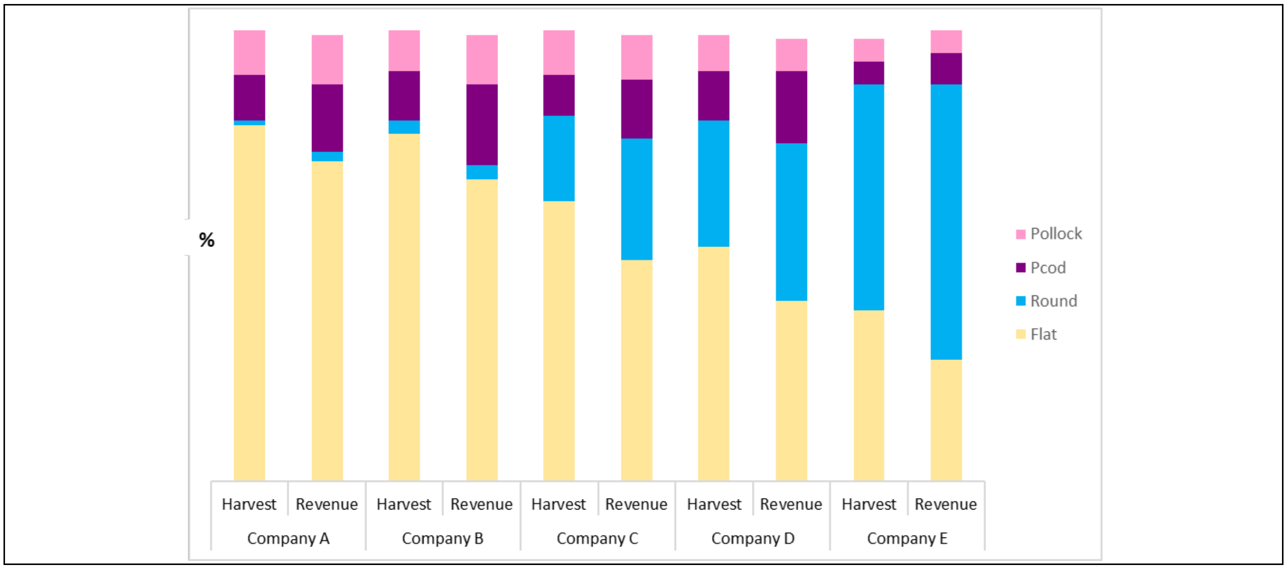


Figure ES- 4 Aggregate 2010-2019 percentage of Amendment 80 harvest (mt) and gross wholesale revenue ($) by species group for fishing company fleets as comprised in 2020 (Sources: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; Vessel company affiliations taken from Alaska Seafood Cooperative Reports). Round(fish) includes Atka mackerel, rockfish, Pacific Ocean perch, and sablefish. Flat(fish) includes yellowfin sole, rock sole, flathead sole, Kamchatka flounder, Greenland turbot, arrowtooth flounder, and Alaska plaice

Table 3-13 reports the total gross revenues and catch by all Amendment 80 sector vessels during the 2010 through 2020 period; dollar values are standardized to 2018 values to better isolate productive value without the effect of inflation across the broader economy. Revenue data for the 2020 fishing year are not available at the time of publication. Typically, the highest grossing species for the sector in terms of cumulative gross value are YFS, Atka mackerel, and rock sole.

Table ES-3 Amendment 80 gross first wholesale revenue (2018 dollars) and catch (metric tons), 2010 through 2020. Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

Year	Revenue (2018$)	Total Harvest (t)
2010	323,787,060	305,192
2011	385,153,549	302,157
2012	397,530,330	307,406
2013	307,582,132	306,775
2014	316,928,372	308,022
2015	290,450,269	289,169
2016	306,495,840	298,443
2017	359,357,539	278,771
2018	379,443,654	290,173
2019	335,260,125	288,302
2020		290,382

Halibut PSC is more prevalent in flatfish targets relative to other targets (Figure ES- 6), and fishing patterns amongst flatfish target vary throughout the year, for example, northern rock sole tend to be targeted earlier in the year for valuable roe content.

The sector-wide reduction in halibut PSC beginning in 2016 which is generally attributed to the investment of time and resources in halibut avoidance and mortality rate mitigation (i.e. deck sorting) can be seen in Figure ES- 6 and Figure ES- 5. Lower gross levels of halibut PSC in the later months of the year might also be attributable to the sector's Halibut Avoidance Plan that requires vessels to maintain a certain rate-performance standard regardless of where the sector stands in relation to the annual limit of 1,745 mt.

Examining trends in Amendment 80 halibut PSC catch and mortality is complicated by the fact that many variables that affect these metrics have changed in recent years.[2] PSC limits, discard mortality rate (DMR) estimation methods, and halibut handling procedures have all changed to varying degrees since 2010. PSC limits have decreased multiple times since 2010, most significantly in 2015 with the implementation of Amendment 111. Figure ES- 5 illustrates that Amendment 80 sector annual halibut mortality has declined since 2014 and, more notably, has declined relative to total halibut catch since 2015. Halibut catch – sometimes referred to as encounter – is the weight of halibut caught before the DMR is applied. The ratio of estimated halibut PSC mortality to halibut catch is defined here as "effective mortality rate." Effective mortality in the Amendment 80 sector declined from 2015 to 2019, breaking from a consistent relationship between catch and mortality. The effective mortality rate increased slightly in 2020, but that is largely an artifact of the greatly reduced encounter rate.

[2] In 2015, the first year of implementation of the deck sorting exempted fishing permit (EFP), deck sorted PSC was reported only on the final exempted fishing permit report and is not available in the usual specificity of observer data. As a result, PSC data in 2015 is available only as a total metric. Any tables and figures of the overall total annual PSC of Amendment 80 from 2015 are correct, however for tables and figures that include PSC in more discrete categories (i.e. target species, monthly totals), 234 mt of total PSC is not included. This does not apply to any year other than 2015.

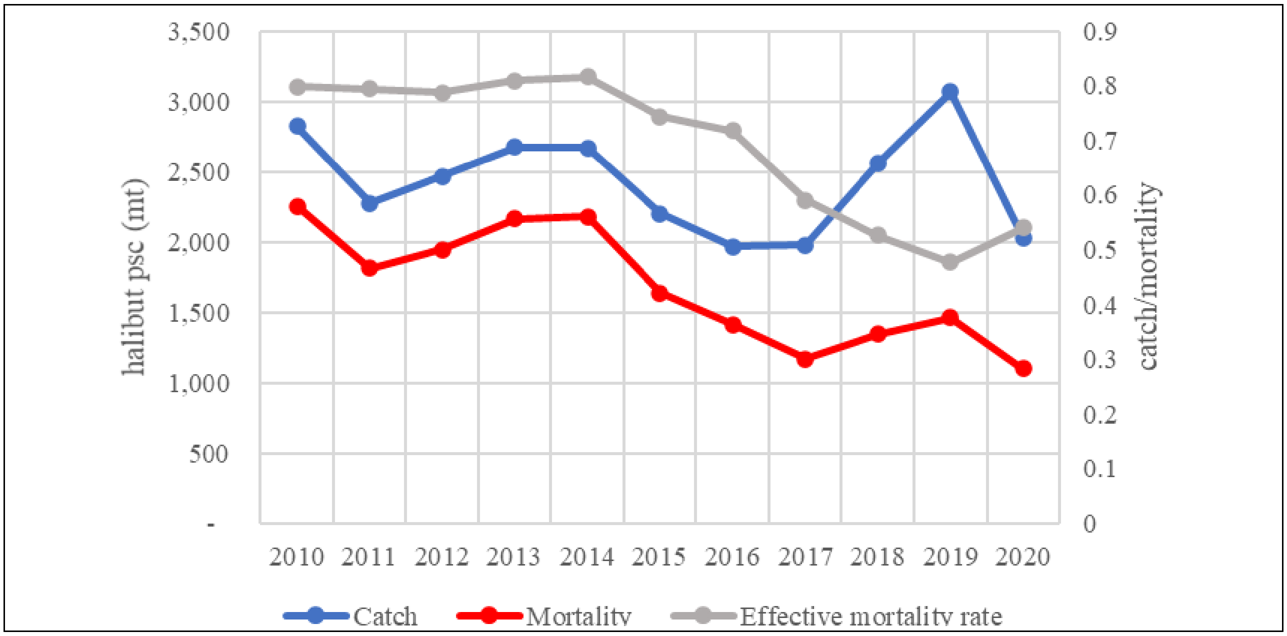


Figure ES- 5 Amendment 80 sector effective mortality rate: function of halibut catch and mortality (2010 – 2020)

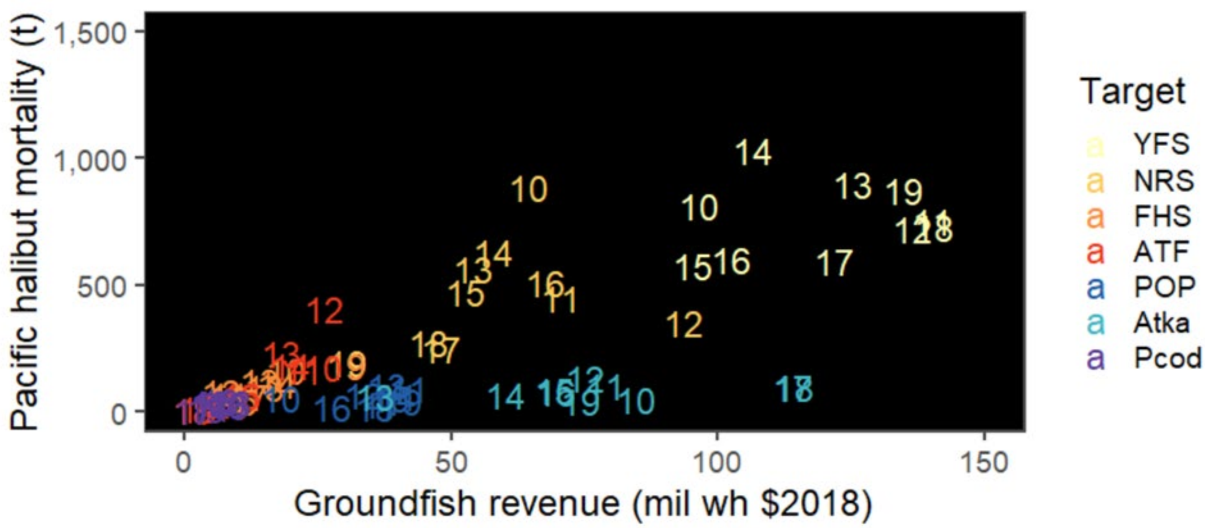


Figure ES- 6 Amendment 80 Pacific halibut PSC mortality (mt) versus groundfish revenue (2018$ millions in wholesale) by target and year, 2010 through 2019.

Pacific halibut assessment, management and directed fishery background

The IPHC conducts an annual stock assessment for the coastwide halibut stock. Currently, the stock assessment for halibut uses four integrated age-structured models in an ensemble to account for parameter and structural uncertainty (Stewart & Martell 2015) resulting in a single value for the entire coast (U.S. and Canada). Migration between areas is not modeled.

The estimated spawning stock biomass has been stable since 2010 following a considerable decline since the late 1990s (Figure ES- 7). In recent years, the spawning biomass has been predicted to slightly decrease, even at low fishing levels, due to recent below average recruitment. Weight-at-age is also a contributing factor to this decline because the average weight-at-age of Pacific halibut has been declining over this same period.

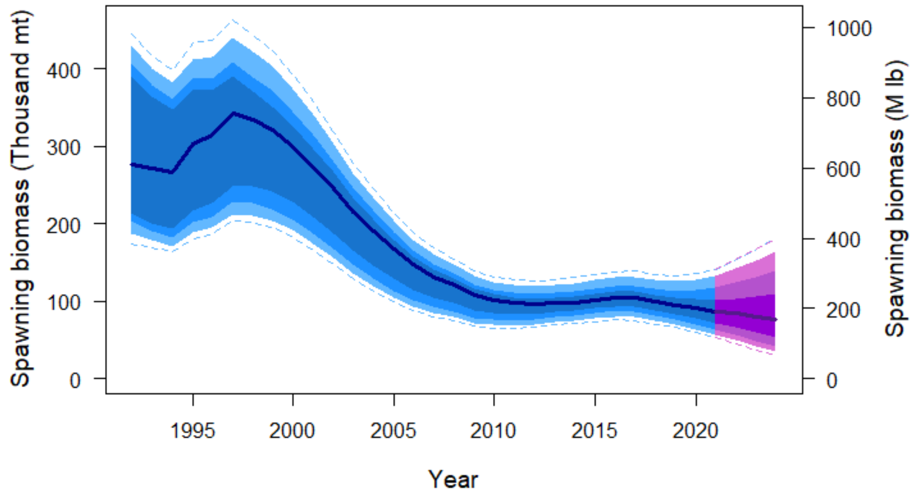


Figure ES- 7 Estimated spawning biomass from the 2020 stock assessment ensemble (from Stewart & Hicks 2021) with a three-year projection (purple) based on a fishing intensity of FSPR=43% (TCEY=39.0 million pounds, ~17,690 mt).

The advice from the stock assessment ensemble is presented to the Commission as a risk-based decision table with different catch levels as columns and various performance metrics as rows. In 2017, the previous IPHC harvest policy paradigm was replaced with an interim Spawning Potential Ratio (SPR) based[3] harvest strategy policy (Figure ES-1-8) while a management strategy evaluation (MSE) process is underway. This new paradigm sets a coastwide mortality limit (scale) and then distributes the mortality limits (distribution) across IPHC Regulatory Areas (Figure ES-1-1, Hicks & Stewart 2017).

This new harvest strategy policy considers mortality from all sources and sizes when setting a coastwide mortality limit but still uses estimates of stock distribution from the IPHC fishery independent setline survey and relative harvest rates to distribute the mortality limits across IPHC Regulatory Areas.

[3] An SPR-based harvest policy defines a default or reference level of fishing intensity (**$F_{xx\%}$**, the level of fishing that would reduce the lifetime spawning output per recruit to xx% of the unfished level given current biology, fishery characteristics and demographics where lower values indicate higher fishing intensity) to determine mortality limits.

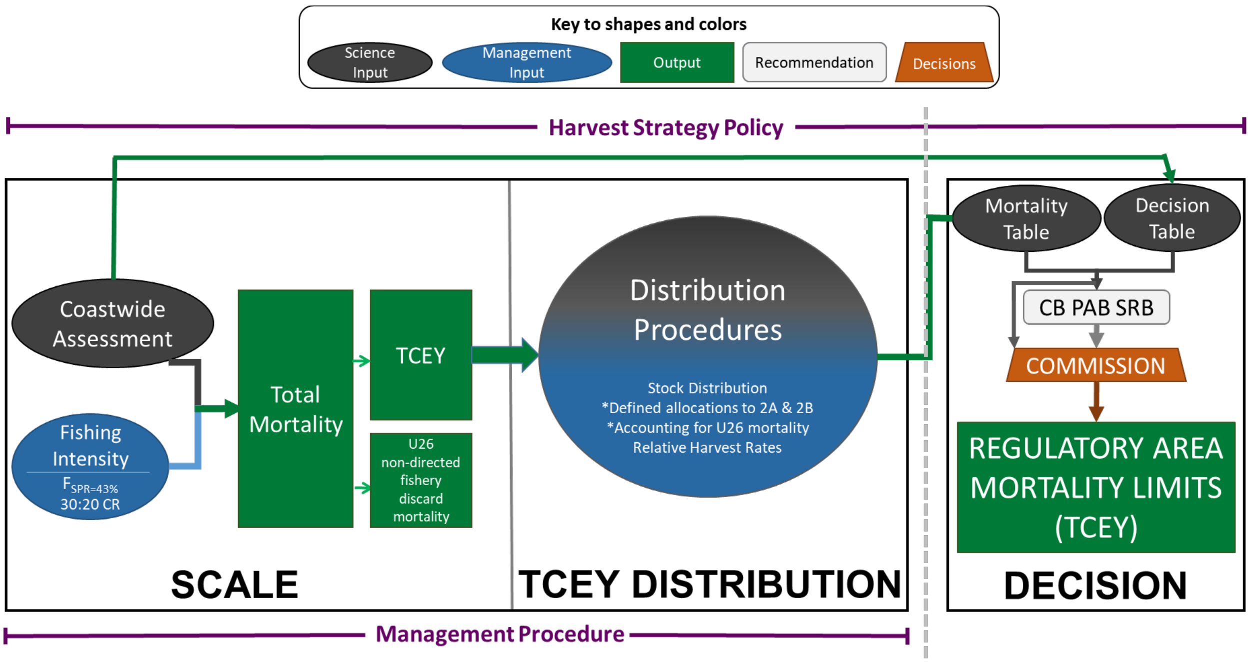


Figure ES- 8 Illustration of the Commission interim IPHC harvest strategy policy (reflecting paragraph ID002 in IPHC CIRCULAR 2020-007) showing the coastwide scale and TCEY distribution components that comprise the management procedure. Items with an asterisk are three-year interim agreements to 2022. The decision component is the Commission decision-making procedure, which considers inputs from many sources.

The Total Mortality is split into two components: U26 non-directed commercial fishing (i.e., U26 bycatch) mortality and all other mortality which is called the Total Constant Exploitation Yield (TCEY) and consists of mostly O26 halibut. The IPHC delineates U26 and O26 differently because U26 Pacific halibut are highly mobile and much less likely to occur in the same IPHC Regulatory Area in the upcoming year in which mortality limits would apply, the setline survey captures almost exclusively O26 Pacific halibut, there is currently no reliable tool for describing the annual distribution of U26 across the entire convention area, and the mortality of U26 Pacific halibut has a differing effect on the Spawning Potential Ratio than O26 fish (they are not entirely exchangeable).

U26 non-directed discards (including U26 Amendment 80 PSC) are accounted for in the stock assessment with respect to total mortality on the halibut stock but are not part of the TCEY, although it is accounted for in the calculation of the coastwide TCEY by subtracting it from the coastwide total mortality limit. O26 non-directed discards are subtracted from the TCEY within each IPHC area when calculating the Fishery Constant Exploitation Yield (FCEY). The default projection for non-directed discards is to use the three-year average of recent non-directed discard mortality to avoid some of the interannual variability of annual discard estimates.

The TCEY is distributed among IPHC Regulatory Areas based on estimates of biomass from the setline survey and relative harvest rates. Unlike the MSA, the Halibut Act does not include specific provisions that require Commissioners to allocate quotas within, for example, an overfishing threshold; their broad mandate is the conservation of the halibut stock. Decisions for Area-specific TCEY's are made considering all the input received; they may differ from the harvest policy output.

Due to a combination of changing harvest policies and Commission decisions that depart from harvest policy recommendations, the IPHC has adopted coastwide catch limits of varying fishing intensities in recent years. The Commission has adopted TCEYs above those recommended by the harvest policy in three of the last five years (Table ES-4). Estimates of fishing intensity are highly uncertain and change in subsequent years based on actual mortality and new runs of the stock assessment. The specific formula used by the IPHC Commissioners to distribute catch limits among Regulatory Areas has been different for each of the past three years.

Table ES-4 Comparison of reference TCEY and SPR based on the Interim harvest policy and those adopted by the IPHC commissioners

	Interim Harvest Policy (reference)		Adopted	
Year	TCEY	SPR	TCEY	SPR*
2021	39.00	43	39.00	43
2020	31.90	46	36.60	42
2019	40.00	46	38.61	47
2018	31.00	46	37.21	41
2017	39.10	46	40.74	45

*As estimated at the time of adoption (in the decision table presented at the IPHC annual meeting)

The FCEY is the Regulatory Area specific amount of yield for most directed Pacific halibut fisheries dependent upon allocation agreements for each IPHC Regulatory Area. The FCEY forms the basis of the directed fishery catch limits, although may not include all components of the directed fishery mortality for some Regulatory Areas. The FCEY includes commercial fishery landing limits in all areas, and other sectors in any area subject to Catch Sharing Plans (CSPs) for allocation of the halibut harvest. The CSPs are developed by the responsible fishery management organizations in each IPHC Regulatory Area. Non-FCEY removals include catches which either have no explicit limits on the amount of harvest (unguided sport harvest in Alaska, subsistence/personal use harvest in Canada and Alaska, and wastage from the commercial halibut fishery, except where this is explicitly included in catch-sharing plans) or catches which the IPHC has no authority to manage (bycatch mortality, such as halibut PSC in Alaska). The FCEY is determined by subtracting all other removals of O26 halibut from the TCEY.

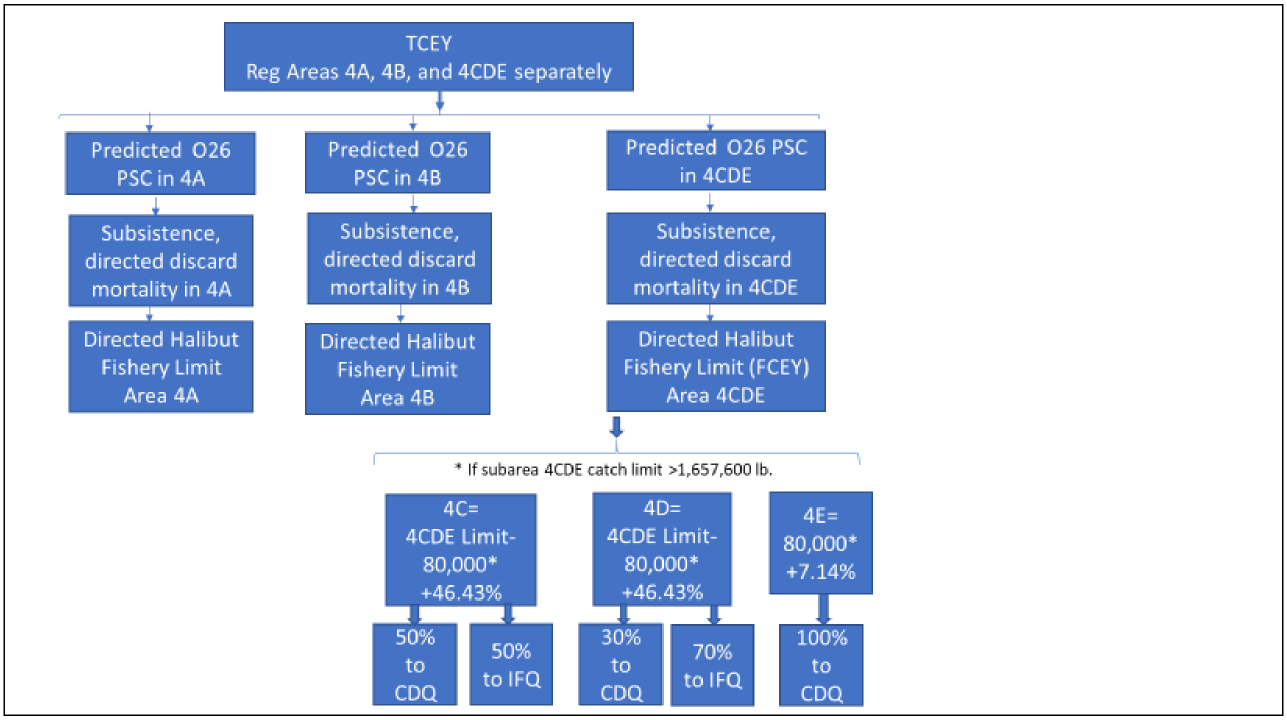


Figure ES- 9 Distribution of TCEY to directed fishery users in IPHC Area 4 when the 4CDE catch limit is greater than 1,657,600 lbs.

Figure Notes: CSP: Area 4 Catch Sharing Plan; TCEY: Total Constant Exploitation Yield = Total mortality minus U26 bycatch mortality; FCEY in Area 4CDE = commercial catch limit (TCEY minus subsistence and O26 non-directed commercial discard mortality ("bycatch) and directed commercial discard mortality)

While Area 4 generally covers the BSAI groundfish FMP area, a portion of Area 4A overlaps the GOA FMP area. Figure ES- 9 illustrates the distribution of TCEY to the Area 4 subareas and the Area 4 CSP that is described in the following subsection. Areas 4C, 4D, and 4E are considered as a unit by IPHC when harvest policy analyses are conducted. Note that the figure is incorporating a provision that is in place when the catch limit for that combined area is above a certain threshold. If that threshold is not met, the FCEY for those combined areas is distributed by the percentages shown with no adjustment applied.

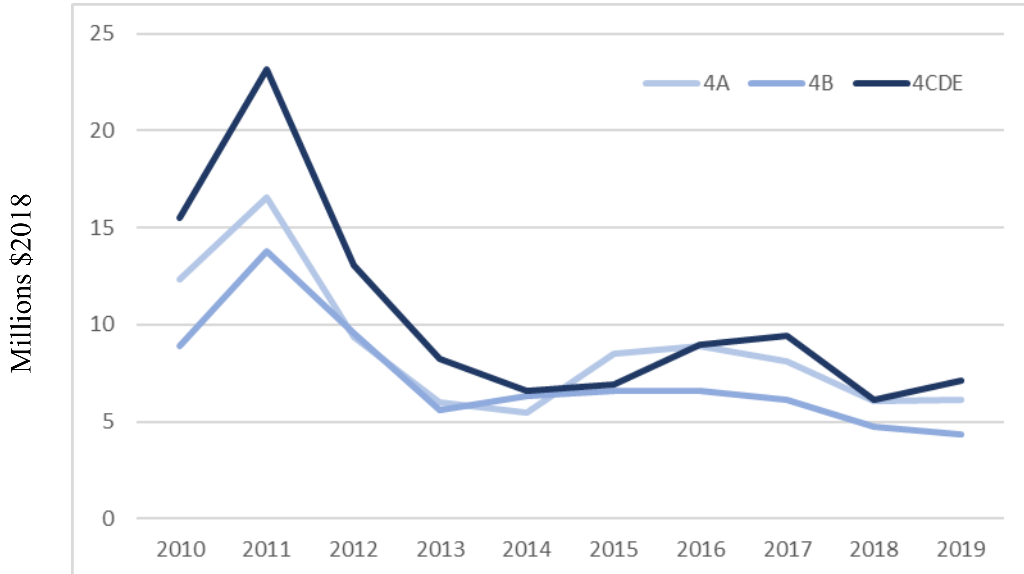
Catch and processing data for all halibut IFQ and CDQ harvest that occurred in Area 4 ABCDE are shown in Table ES-5. IPHC management areas are depicted in Figure ES- 9. To compare Area 4 to Alaska statewide commercial halibut catch, Table ES-5 shows IFQ landings in metric tons (round weight, or "CFEC whole pounds") for each area from 2010 through 2020. Values are shown in round weight tons to better put commercial harvest in the context of PSC limits for the groundfish fisheries. During that period, Area 4 accounted for 21 percent of statewide catch on average, ranging from 18 percent in 2010 to 24 percent in 2011. Area 4 accounted for 23 percent of catch in both 2019 and 2020.

Table ES-5 Alaska commercial IFQ and CDQ halibut catch (mt) by IPHC area, 2010 through 2020

IPHC Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
2C	2,627	1,416	1,565	1,766	1,991	2,202	2,345	2,412	2,049	2,027	1,936
3	18,432	13,277	10,310	9,152	6,385	6,435	6,216	6,406	5,789	6,056	5,483
4	4,534	4,710	3,409	2,567	1,982	2,205	2,398	2,379	2,214	2,409	2,207
Total (t)	25,593	19,403	15,284	13,485	10,358	10,842	10,959	11,197	10,052	10,492	9,625
Total (M lbs.)	56.4	42.8	33.7	29.7	22.8	23.9	24.2	24.7	22.2	23.1	21.2

Source: CFEC Fish Ticket data provided by AKFIN Note: Conversion to mil of lbs. (M lbs.) provided for comparison to Section 4.5 Table 4-6.

The halibut resource has been near-fully utilized from 2010-2020. Overall, Area 4 accounted for 18 percent of state-wide ex-vessel value from commercial halibut catch. On an annual basis, Area 4 accounted for 16 percent (2010, 2013, 2014) to 23 percent (2011) of total value. Area 4 accounted for 19 percent of total ex-vessel value in 2019. Figure ES- 10 shows the gross ex-vessel value (2018$) of commercial halibut catch in Area 4 by subarea.



Source: CFEC Fish Ticket data provided by AKFIN

Figure ES- 10 Alaska commercial IFQ and CDQ halibut ex-vessel value (million 2018$) within Area 4, 2010 through 2019

Impacts of the Alternatives

Impacts to the Amendment 80 sector

Under Alternative 1, there would be no changes to the regulated halibut PSC limits. Since 2010, halibut PSC in the Amendment 80 sector has been 63 percent to 93 percent of the current PSC limits (Table ES-6) with 2020 representing the lowest percentage usage over this time frame. At the Council's request, industry sectors have made voluntary efforts to reduce halibut PSC in the BSAI since 2014.

Table ES-6. Halibut PSC limit, encounters, and mortality by Amendment 80 sector, 2010 through 2020

A80 Sector	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PSC limit	2,425	2,375	2,325	2,325	2,325	2,325	1,745	1,745	1,745	1,745	1,745
Halibut encounters	2,823	2,277	2,469	2,677	2,667	2,200	1,965	1,976	2,555	3,067	2,031
Halibut mortality	2,254	1,810	1,944	2,166	2,178	1,638	1,412	1,167	1,343	1,461	1,097
% of PSC limit used	93%	76%	84%	93%	91%	94%	81%	67%	77%	84%	63%

Note: Halibut PSC that occurs on an Amendment 80 vessel due to harvest in the CDQ fishery is not included in this table.

Alternative 2 could reduce the amount of halibut PSC in the Amendment 80 sector in years of low halibut abundance. Changes from status quo range from a 10 percent reduction to a 20 percent reduction in halibut PSC limits (Table ES - 1). Halibut PSC limits would remain at status quo during years of high halibut abundance under this alternative. Alternative 3 could reduce the amount of halibut PSC in the Amendment 80 sector in years of low halibut abundance or increase the amount of halibut PSC in years of high abundance. Possible outcomes range from status quo to as much as a 30 percent reduction in halibut

PSC limits. Halibut PSC limits could increase by 15 percent during years of high halibut abundance under this alternative. Alternative 4 could reduce the amount of halibut PSC in the Amendment 80 sector in years of low halibut abundance. Possible outcomes range from status quo to as much as a 45 percent reduction in halibut PSC limits.

For the action alternatives, a range of estimated catch and revenue outcomes for Amendment 80 were estimated relative to the range of the PSC limits associated with the alternatives. Alternative 2 has the narrowest range of PSC limits (1,396-1,745 mt) and thus the narrowest range of revenue estimates. Alternative 3 includes a wider range of PSC limits (1,222-2,007 mt) than Alternative 2 and is the only alternative that includes a limit that could be higher than status quo (2,007 mt). The range of PSC limits under Alternative 4 (960-1,745 mt) includes the lowest possible values and peaks at the status quo limit.

Data are drawn for separate simulation runs from five different time periods that select sets of years spanning the 2010 through 2019 period. Earlier years represent an era with higher Amendment 80 PSC while more recent years represent lower PSC use, better reflecting the present state of the fishery. Simulations were done either by drawing random hauls from the distribution or by stratifying haul-selection by month and maintaining historic monthly effort levels such that effort is constrained from the end of a fishing year backward rather than proportionally across the whole year.

Table ES-7 shows the results of these revenue estimates using different estimation methods. For each PSC limit and imposed groundfish catch limit – analogous to total Amendment 80 TAC – results shown by rows differ depending on the historical fishery data (haul-level catch, revenue, and PSC) that were used to simulate the fishery (Table ES-7). At higher PSC limits the sector is more likely to be constrained by their TAC than PSC, while PSC is more likely to be constraining at lower levels of PSC limits. This is particularly true for the datasets representing higher PSC use (2013-2014 and 2010-2014).

The choice of which dataset to use in the revenue analysis has the largest impact of any other variations between the scenarios. Changing the sampling method between random or stratified or changing the groundfish limit between 290,000 mt and 310,000 mt have smaller impacts on total revenue estimates. This is unsurprising since there is large variation in the rate of PSC use and revenue generated between years, and because the range of datasets were selected to demonstrate these differences. Datasets including more recent years generate higher revenues at all PSC limits. The differences in estimated revenues from higher PSC use and lower PSC use datasets are larger at lower PSC limits and become less substantial at higher PSC limits.

Table ES-7 Average estimated revenue (million wholesale $2018) by PSC limit and Alternative using different estimation methods. Green shading indicates the results were constrained by the PSC limit, blue shading indicates the results were constrained by the groundfish limit (290,000 or 3310,000 mt).

Estimation	PSC limit	960		1047		1222		1309		1396		1483		1571		1745		2007	
	Alternative(s)	4		4		3		3		2,3,4		2		2		1,2,3,4		3	
	GF limit (1,000 mt)	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310
Random	2010-14	160.582	160.815	174.982	175.215	204.050	204.313	219.181	218.550	233.493	233.235	248.384	247.668	262.813	262.705	291.338	291.603	327.968	335.497
	2010-19	189.686	190.121	207.396	206.935	241.993	241.715	259.314	258.923	276.215	276.468	293.723	293.380	310.690	310.046	335.887	345.264	335.937	359.123
	2016-19	246.206	246.385	268.807	268.887	313.489	313.519	335.524	335.829	346.417	358.232	346.366	370.300	346.425	370.269	346.417	370.311	346.454	370.271
	2013-14	137.994	138.184	150.453	150.591	175.812	175.384	187.950	187.992	200.795	200.295	213.141	213.202	225.934	225.979	251.137	251.123	288.273	288.545
	2017-18	282.581	282.479	307.928	308.073	359.795	359.146	376.517	385.223	376.582	402.458	376.509	402.584	376.623	402.591	376.558	402.546	376.604	402.554
Stratified	2010-14	182.258	182.272	195.088	195.065	216.307	216.059	227.666	227.668	246.072	246.276	268.338	267.997	283.966	283.479	313.799	313.520	327.054	349.666
	2010-19	202.931	202.828	216.382	216.445	242.752	242.719	255.780	256.090	277.083	277.964	305.385	305.515	326.047	326.307	336.782	360.053	336.793	360.511
	2016-19	218.741	218.978	253.143	253.251	319.090	318.907	341.704	341.720	349.070	366.178	349.027	372.528	349.165	372.536	349.034	372.499	349.147	372.479

The likelihood of falling into one of the cells in Table ES-7 is based on multiple factors. The first, most direct, factor is determined by the survey indices and the applicable PSC limit as determined by the alternatives (look up tables). The second factor determining which cell represents the most likely outcome is which dataset was used to create the estimate. The lowest bound is represented by the 2013-14 dataset and the highest by the 2017-18 dataset. Given reductions in PSC limits and operational changes such as increased deck sorting, it is most likely that future PSC use will be similar to what has been seen in the years since 2015 – i.e., estimates using 2016-19 or 2017-18 data are most likely.

Currently, both the setline and the trawl surveys are in the low categories, which correspond to PSC limits that represent immediate reductions from the status quo PSC limit of 1,745 mt. Revenue estimates under the resulting PSC limits in the current low, low survey category using the 2016-19 dataset range from no change to a reduction of 3 percent under Alternative 2, reductions of 3 percent to 9 percent under Alternative 3, and reductions of 22 percent to 32 percent under Alternative 4.

The analysts also note that PSC use is a function of many factors, some of which are outside of the fleet's direct control. For example, changing environmental conditions could disperse groundfish or cause them to move out of well-known, fishable areas. This could cause the fleet to tow more hours for the same amount of catch, increasing gross costs as well as the possibility of high-bycatch events. A changing environment might also change the extent to which groundfish and halibut are comingled, also changing the probability of bycatch. The extent of these changes is presently unknown, meaning that at this time they can be thought of as risk factors that may affect the fleet's ability to maintain harvest levels under a lower PSC limit in a practicable manner.

The practicability of the Amendment 80 fleet to operate under reduced PSC limits relies on a number of different factors and behavioral modifications by the fleet in recent years. A fleet's last response to constraining halibut PSC limits is to reduce total groundfish harvest. This fishing strategy includes an assumption that fishermen will optimize their harvest in response to constraining limits. For example, prioritizing fishing operations to the best target fishery, area, and time to maximize net revenue, and reducing effort in the target fishery, area, and time that produce less net revenue. Multiple on-going actions by the fleet to address bycatch avoidance are described in this analysis, including cooperative fishing strategies, evaluating behaviors against standard fleet-wide bycatch rates, communication among captains, test tows, excluder use and deck sorting to reduce mortality when encounters cannot be avoided. Because of the efforts and expenditures already undertaken by the sector, dramatic increases in halibut avoidance or reductions in mortality are not expected with the tools that are currently available to the fleet. Some marginal improvements are anticipated to continue to be realized, especially if halibut limits are further reduced and the fleet forgoes some profitability to reduce halibut mortality further. Reductions in halibut mortality are expected to result from the sector increasing costs or reducing efficiency. The amount of marginal mortality reductions cannot be quantified with any certainty. If substantial reductions in halibut mortality are realized, they are likely to be derived from the development and implementation of new technologies that are not currently available or practicable.

Impacts to Pacific halibut stock and directed fishery

Halibut spawning stock biomass

This analysis uses the best available information to determine the effects of the alternatives on the halibut stock. The effects of the alternatives on the halibut stock are dependent, in large part, on policy and management decisions made by the IPHC rather than by the Council and NMFS. Under its current harvest policy, the IPHC deducts halibut PSC in the groundfish fisheries, recreational, subsistence, and personal use halibut catches; and wastage in the commercial halibut fishery from the exploitable biomass before establishing commercial halibut catch limits each year. This analysis assumes the IPHC will continue to deduct all halibut removals when establishing commercial fishery catch limits to ensure the short- and long-term sustainability of the halibut stock, consistent with its mandate under the Convention between the United States and Canada for the Preservation of the Halibut Fishery of the North Pacific Ocean and Bering Sea.

Impacts to the halibut biomass under all of the alternatives are expected to be similar and result in no impact to spawning stock biomass (SSB). The IPHC's SPR-based management approach is expected to conserve spawning biomass across differing patterns in fishery selectivity and/or allocation among different fisheries. As such, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative.

Directed Halibut fishery

PSC reductions could indirectly lead to increases in directed halibut catch through two means. First, reductions in the U26 portion of the PSC could lead to longer term benefits to the commercial halibut fisheries throughout the distribution of the halibut stock. Benefits from reduced mortality of these smaller halibut could occur both in the Bering Sea and elsewhere as these halibut migrate and recruit into the commercial halibut fisheries. Second, the current IPHC interim harvest policy subtracts the projected O26 portion of non-directed discard mortality (bycatch) from the TCEY by IPHC Regulatory Area when calculating fishing limits.

The magnitude of the relationship between PSC limits and directed catch limits depends on many variables. According to the IPHC interim management procedure, the non-directed discard mortality projection used when calculating catch limits is the three-year average non-directed discard mortality from the most recent year (specified during IPHC 2020 Annual Meeting [AM096 para. 97]). Therefore, a change in the PSC use in a specific year will only begin to affect the trade-off with the directed halibut limit in the next year. Furthermore, the relationship between the PSC limit and PSC use varies; therefore, a reduction in the PSC limit may not always generate an increase in directed catch limits in the short-term and even when it does, the magnitude may vary based on the actual Amendment 80 O26 PSC mortality.

Assuming no change to IPHC harvest policy or implementation, and a constant relationship between PSC use and limit, the relationship between PSC and directed catch limit will still vary with the relative proportions at age observed in the bycatch (which could be influenced by factors such as selectivity and recruitment allocation varying over time).

Given that Amendment 80 PSC accounts for ~60-82 percent of trawl discards, a larger percentage of Amendment 80 PSC that is O26, results in a lower directed halibut fishery catch limit. The three-year average of Amendment 80 PSC that are O26 has varied from 34 to 61 percent over the past 10 years. Because the relationship between PSC limits and directed halibut catch limits is uncertain and varies year to year, a range of potential changes in directed halibut catch resulting from the PSC limit changes that could occur under the alternatives is provided in Table ES-8. These changes are calculated using ratios of 0.25, 0.5, 0.75 and 1 to represent the relationship between PSC limits and directed catch limits. For example, using a ratio of 1, the entirety of the PSC limit change is transferred into the directed catch limit. This scenario of a PSC limit reduction leading to an equivalent increase in directed catch represents a scenario in which 100 percent of the PSC limit is taken as O26 PSC for the previous three years given that the projected PSC removal is the three-year average of recent O26 PSC usage rather than the PSC limit. A ratio of 1 is the maximum because that implies all PSC usage is composed of O26 halibut and has a direct trade-off with the directed halibut limit. Ratios less than one indicate that PSC usage occur wholly or partially on Pacific halibut less than 26 inches. Such fish would be subject to natural mortality and movement out of the region. Both of these processes, while uncertain, lower the impact of PSC usage on potential gains to the directed Pacific halibut fishery. Given recruitment variability, variable fishing patterns resulting in annual changes to selectivity, and variable population processes such as growth and movement, the ratio may occur anywhere in this range in a given year.

Table ES-8. Change from status quo (SQ) BSAI directed catch limits (million net pounds) resulting from proposed PSC limits (mt) given an assumed ratio between the PSC limit and the directed halibut limit. The bottom four rows display change from status quo directed BSAI catch limits resulting from the PSC listed at top, calculated using the quartiles of potential ratios.

		Alternative(s)	**4**	**4**	**3, 4**	**3**	**2, 3, 4**	**2**	**2**	**2, 3, 4**	**3**
		PSC Limit (mt)	**960**	**1047**	**1222**	**1309**	**1396**	**1483**	**1571**	**1745**	**2007**
difference from SQ PSC Limit		(mt)	-785	-698	-523	-436	-349	-262	-174	0	262
		(mil net pounds)	-1.298	-1.154	-0.865	-0.721	-0.577	-0.433	-0.288	0	0.433
ratio (PSC limit: directed catch limit)	1.00	change in directed catch limit (mil net pounds)	1.298	1.154	0.865	0.721	0.577	0.433	0.288	0	-0.433
	0.75		0.973	0.866	0.649	0.541	0.433	0.325	0.216	0	-0.325
	0.50		0.649	0.577	0.432	0.360	0.289	0.217	0.144	0	-0.217
	0.25		0.324	0.289	0.216	0.180	0.144	0.108	0.072	0	-0.108

A range of revenues associated with the potential changes in the net pounds of directed halibut catch limits (as calculated by the ratios in Table ES-8) are reported in chapter 5 (Table 5-3). The ex-vessel values are reported in 2018-dollar adjusted ex-vessel values for Area 4 as reported in Section 4. The ex-vessel value represents the amount paid to fishermen by a primary processor for raw fish. Ex-vessel prices are the most appropriate value to represent halibut fishery revenues given that this is the most common halibut supply chain in Alaska, particularly in the BSAI or Area 4 (see Section 4). In response to requests contained in public comments, halibut revenues are also reported in wholesale values using estimates of first wholesale production values for head and gut fish as reported in the Economic SAFE Report. These calculations may overestimate potential changes in revenue as they assume 100 percent usage of the additional catch limit. The Area 4 TAC utilization rate was roughly 91 percent from 2011 through 2020 and was roughly 85 percent in 2020. The analysis also highlights the reasons why recently observed per-unit values for gross ex-vessel halibut revenues might not be a reliable predictor of future value in the near term due to significant market disruptions. These revenues are estimated using an entirely different approach and methodology than those used to analyze impacts in the groundfish sector and should not be used for cross-sector revenue comparisons.

Given that IPHC catch setting policy removes O26 bycatch by IPHC regulatory area, the spatial distribution of PSC may impact the distribution of directed fishery catch limits within Area 4. Total Amendment 80 PSC has decreased since 2015. However, the distribution within Area 4 has stayed fairly consistent with Area 4CDE accounting for between 83 percent and 90 percent of annual Amendment 80 PSC since 2015 (Figure ES-11). If the spatial distribution of PSC within Area 4 remains consistent in the future, the directed halibut fishery in Area 4CDE would have the greatest potential for experiencing whatever incidental reallocative effects may occur under the proposed action alternatives.

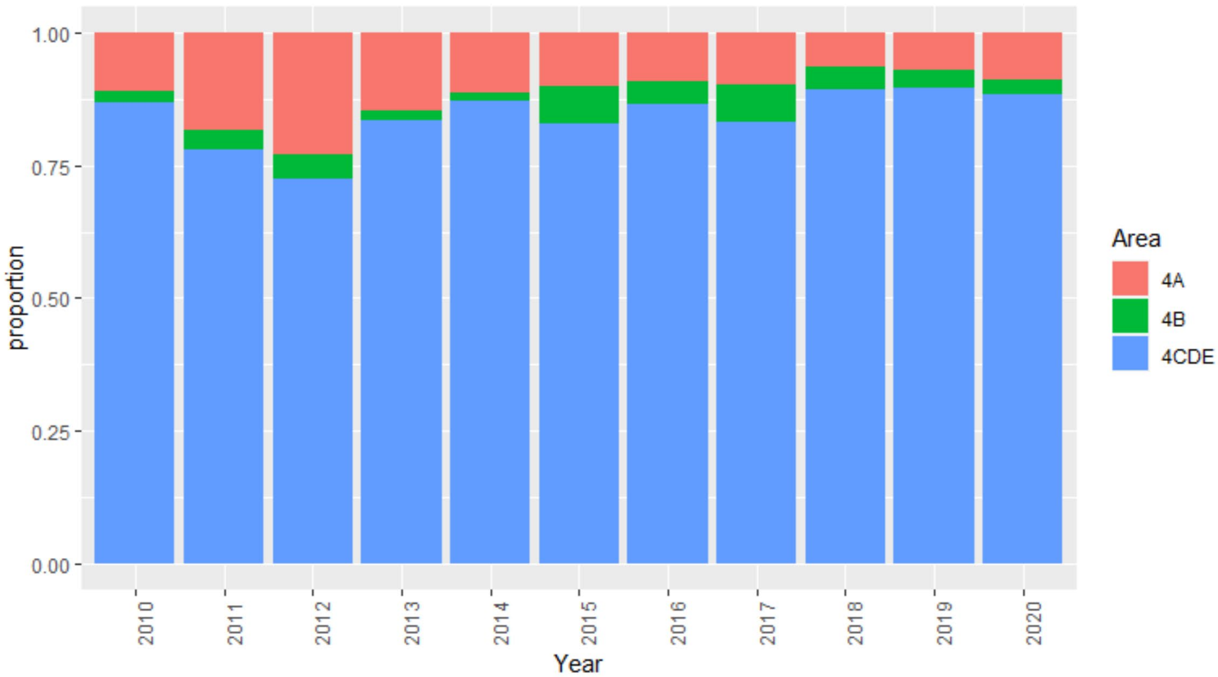


Figure ES- 11 Proportion of Amendment 80 halibut PSC by IPHC Regulatory Area from 2010 to 2020.

Management and monitoring considerations

Management and Enforcement considerations for this action are described in Section 5.8 of the DEIS. These include the potential changes to cost recovery amounts for the Amendment 80 fishery, any increased issues with vessel safety. Potential enforcement issues including increased coercive behavior by vessel operatives and attempts to bias observer samples and any additional management issues that may need to be addressed in regulations as a result of this action.

Social and Environmental Justice

A social impact assessment (SIA) is appended separately (Appendix 1) and the findings are summarized in the Social and Environmental Justice section of this DEIS. The SIA evaluates community and regional patterns of engagement in and dependency on the BSAI Amendment 80 groundfish commercial fishery and the BSAI/Area 4 halibut commercial fishery as well as the potential for community level impacts under the no-action and action alternatives. Potential impacts to regional subsistence and sport halibut fisheries in Alaska are also evaluated. Myriad communities in Alaska and the Pacific Northwest participate directly and/or indirectly in one or both commercial fisheries. Within Alaska, more communities participate directly in the BSAI/Area 4 commercial halibut fishery than in the Amendment 80 fishery; however, the Amendment 80 fishery touches multiple Alaska communities directly or indirectly in several ways including: being the location of product transfers, which generate tax revenues realized at the state and local level; being ports of call, which may generate local support service sector economic activity; and/or being industry partners for the harvest of CDQ multispecies groundfish quota, among others. The BSAI/Area 4 halibut fishery, on the other hand, is fundamentally important to the local fleets of multiple Alaska communities and regions and, in some cases, provides one of the few options for private sector employment and income opportunities in those communities.

Net benefits to the nation

Net benefits to the Nation are calculated by summing all producer and consumer surplus that occurs in the US economy. Both costs and benefits are defined broadly, from the Nation's perspective, to include all surpluses that accrue to direct and indirect participants in the fishery as well as to other members of society. The groups considered include those persons who harvest or process fish effected by the action, those who provide support services to the harvesting and processing sectors of the fishing industry effected by the action, consumers of the halibut and Amendment 80 fishery products (and any other substitute species whose producer or consumer surplus changes as a direct result of the action), and members of society that are non-consumptive users of halibut that value the resource.

It is assumed that the Amendment 80 sector fisheries are constrained by halibut mortality limits during some years under the current PSC limit and could be further constrained if the halibut PSC limit is reduced further. The reduction in the PSC limit may have some positive impact on the directed users of the halibut resource in future years outside of the one in which the Amendment 80 fleet is constrained. This is not an actual expected result of implementing a lower limit because the fleet operates under a hard cap and will stop fishing before reaching the limit to avoid penalties and it is assumed that, depending on the size of the PSC limit reduction, the conditions in the fishery will result in years when halibut mortality rates in the groundfish fishery are lower because directed fishery species are more aggregated and it is easier to avoid halibut bycatch.

Overall, given the constraints described in the analysis and the expected cost increases to the Amendment 80 sector and the differing impacts and magnitude of impacts to producers and suppliers of both the Amendment 80 sector and the directed halibut fishery, producer surplus is expected to be negative because the expected catch reductions in the Amendment 80 sector are not offset by equivalent catch increases in the directed halibut fisheries. Consumer surplus will be little changed and will depend on the relative cost and availability of substitutes in the world whitefish market. Overall, net benefits to the Nation are expected to be negative. The magnitude cannot be quantified and is expected to be more negative as the mortality limit reduces the amount of Amendment 80 species catch taken on an annual basis and increases costs associated with the harvest of those species.

Policy tradeoff and decision points

In selecting a preferred alternative (PA), there are multiple alternatives and options to select from as well as policy tradeoffs to be considered. This section describes the decision-tree for the construction of a PA as well as policy-level considerations with respect to the MSA National Standards in doing so. Up to three steps are necessary to create a PA as shown in Figure ES- 12. As described previously, there are three action alternatives in this analysis, in addition to the No Action Alternative (Alternative 1). These action alternatives, if selected, would modify the Amendment 80 PSC limit to establish an annual regulatory process for PSC limit-setting based on look up tables framed by survey states. Next, the Council may choose to select additional options in addition to the specific action alternative to either smooth the inter-annual variability in the PSC limit (Option 1), limit the variability from Status Quo in the first year of implementation (Option 2) or add additional incentives regarding PSC usage (Option 3). Finally, Options 2 and 3, if selected, would require the Council to select a specific suboption.

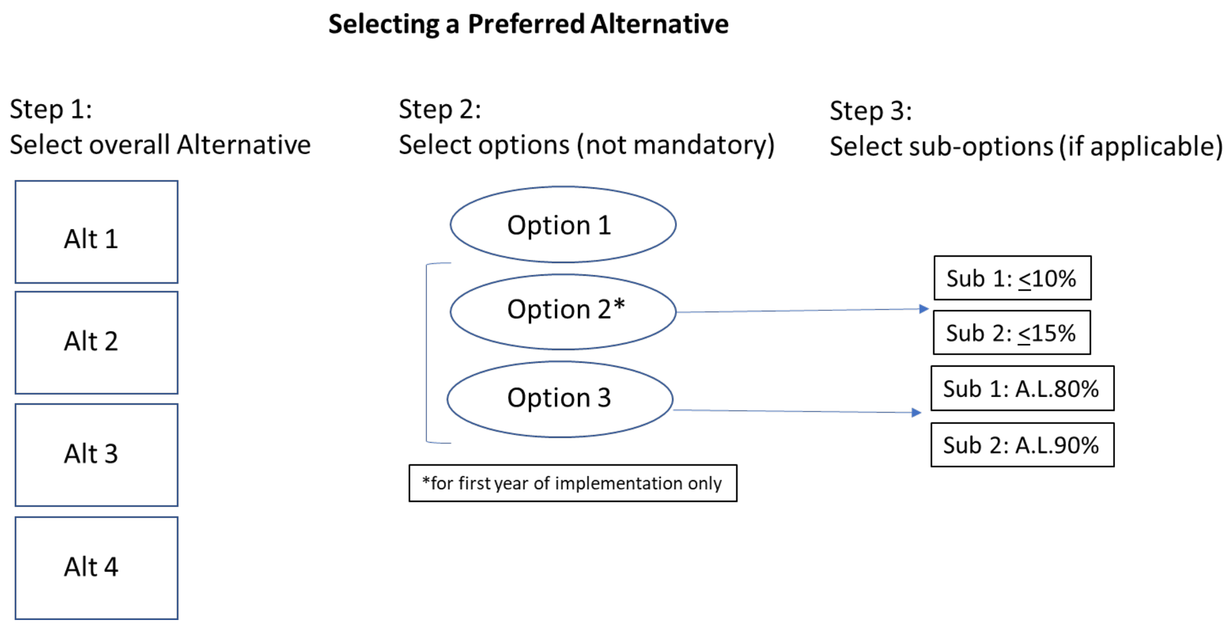


Figure ES- 12 Alternative steps in selecting amongst Alternatives and Options for creating a preferred alternative. Note that neither Option 1 nor 4 have additional sub-options associated with them and that the selection of Option 4 is mutually exclusive with the selection of Options 2 and 3.

One of the policy considerations of this management action involves balancing competing interests among the National Standards: minimizing bycatch and assessing the practicability of doing so under National Standard 9, minimizing costs (where practicable) under National Standard 7, and factoring into account the importance of groundfish and halibut resources to fishing communities under National Standard 8. The practicability of operation under reduced PSC limits is extensively discussed in the analysis. Given their broader range of possible PSC limits and the indications that the Amendment 80 sector is more likely to be constrained by their TAC than PSC at high levels of PSC limits, Alternatives 2 and 3 provide the most flexibility for fishing operations to achieve their TAC both at lower halibut biomass levels and particularly at higher biomass survey states. Options 1 and 3 provide some mitigation of interannual variability in survey biomass estimates (Option 1) and further incentives to reduce bycatch below the regulatory PSC limit (Option 3). Policy decisions should address the ability of the fleet to catch their quota while minimizing bycatch to the extent practicable.

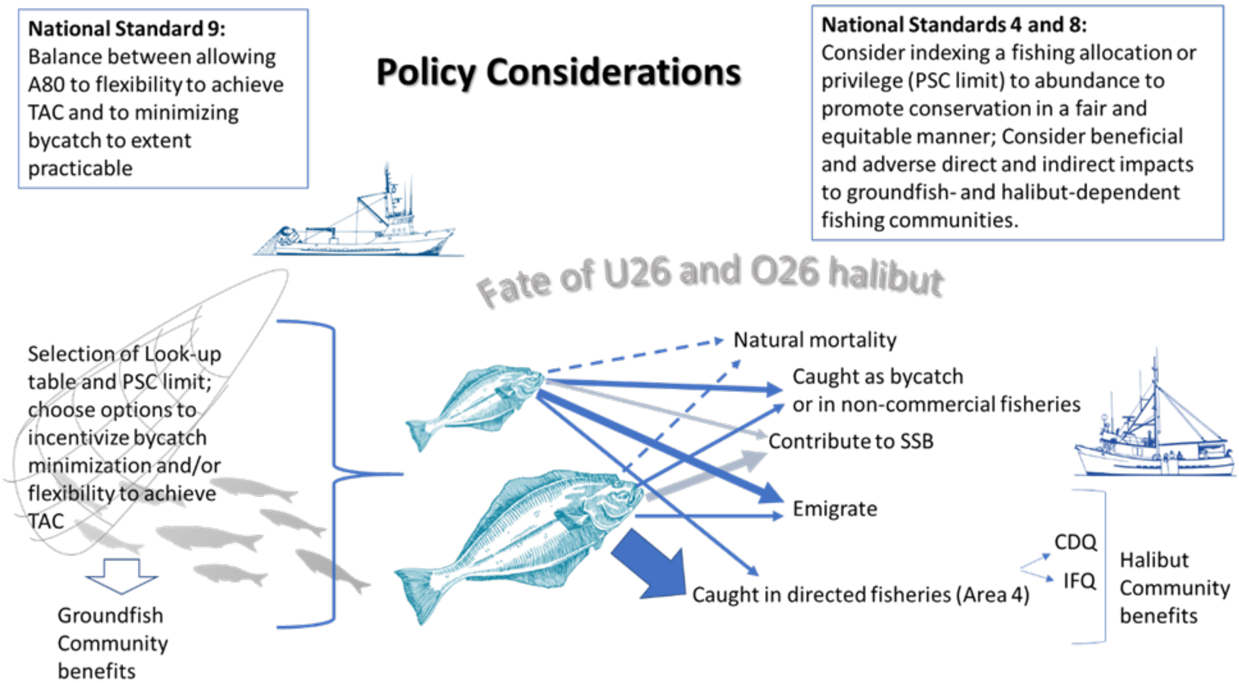


Figure ES- 13 **Schematic of trade-offs in considerations of some key National Standards based on the relative fate of O26 and U26 halibut. Here the width of the blue arrows represents relative magnitude of removals between O26 and U26 fish. Grey arrows show that contribution to SSB is from both sources but unknown magnitude while dotted lines for natural mortality indicate that it is considered equivalent between older and younger fish but is in fact an unknown quantity.**

Another policy tradeoff stemming from the National Standards include consideration of National Standards 4 (allocate fishing privileges (in this case, a halibut PSC limit that varies with abundance) in a manner that is fair and equitable to all U.S. fishermen) (Figure ES- 13). Options are provided to incentivize bycatch reduction beyond what is provided by the PSC limit itself. Additional information on how all of the alternatives under consideration address each of the ten National Standards is contained in the analysis in Section 7.1.

Where are we in the process?

The Council has already reviewed several discussion papers, a preliminary review draft EIS, an initial review draft and modified the suite of alternatives for analysis. Figure ES-14 shows the schedule of previous iterative review and where final action on this DEIS fits into the overall Council and NEPA process and with the NMFS process to publish the Record of Decision and implementation of the management action (PA) selected at final action.

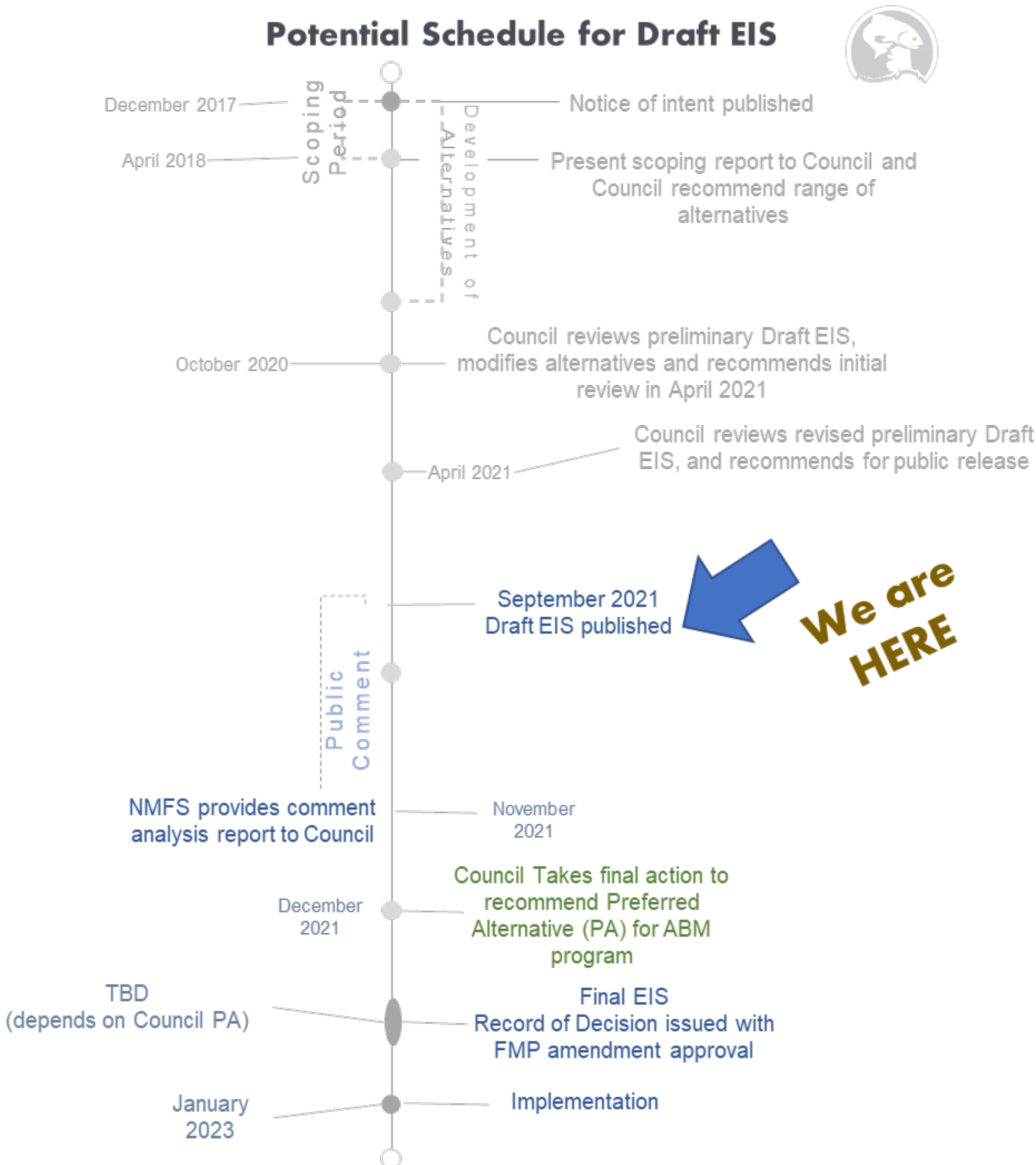


Figure ES- 14 **Previous Council considerations (grey), future Council considerations (green), proposed NEPA schedule and potential Council schedule for final action**

1 Introduction

This document analyzes a proposed management measure to link the Pacific halibut prohibited species catch (PSC) limit for the Amendment 80 commercial groundfish trawl fleet in the Bering Sea and Aleutian Islands (BSAI) groundfish fisheries to halibut abundance. The North Pacific Fishery Management Council (Council) is considering a program that provides incentives for the fleet to minimize halibut mortality at all times, that could promote conservation of the halibut stock, and may provide additional opportunities for the directed halibut fishery.

This document is a Draft Environmental Impact Statement (DEIS). An Environmental Impact Statement (EIS) provides assessments of the environmental impacts of a proposed action and its reasonable alternatives as well as the economic benefits and costs of the action alternatives and their distribution. This DEIS addresses the statutory requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the National Environmental Policy Act (NEPA), and Presidential Executive Order 12866. A DEIS is a document produced by the Council and the National Marine Fisheries Service (NMFS) Alaska Region to provide the analytical background for decision-making. A Social Impact Assessment (SIA), appended, has also been prepared as a part of this analysis.

This DEIS is being prepared using the 1978 Council on Environmental Quality (CEQ) NEPA Regulations. NEPA reviews initiated before the effective date of the revised CEQ regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. A Notice of Intent to publish an EIS for the proposed management measures was published in the **Federal Register** on December 12, 2017 (82 FR 58374). This review began on that date, and the agency has decided to proceed under the 1978 regulations.

Pacific halibut (*Hippoglossus stenolepis*) is targeted in Alaska in commercial, personal use, recreational (sport), and subsistence halibut fisheries. Halibut has significant social, cultural, and economic importance to fishery participants and fishing communities throughout the geographic range of the resource. Halibut is also incidentally taken as bycatch in commercial groundfish fisheries.

The Council is examining abundance-based approaches to set the halibut PSC limit for the Amendment 80 sector in the BSAI. Currently halibut PSC limits for groundfish fishery sectors are set in the BSAI Groundfish Fishery Management Plan (FMP) at a fixed amount of halibut mortality in metric tons (mt). When halibut abundance declines, halibut PSC becomes a larger proportion of total halibut removals and can result in lower catch limits for directed halibut fisheries. This action is limited to the Amendment 80 sector because that sector is responsible for the majority of BSAI halibut mortality in the groundfish fisheries. In light of the continued decline in the halibut stock, both the Council and the International Pacific Halibut Commission (IPHC) have expressed concern about impacts on directed halibut fisheries under the status quo and identified abundance-based halibut PSC limits as a potential management approach to address these concerns.

1.1 Halibut Management Authority

The IPHC and NMFS manage Pacific halibut fisheries through regulations established under the authority of the Northern Pacific Halibut Act of 1982 (Halibut Act) (16 U.S.C. 773-773k). The IPHC adopts regulations governing the target fishery for Pacific halibut under the Convention between the United States of America and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea (Convention), signed at Ottawa, Ontario, on March 2, 1953, as amended by a Protocol Amending the Convention (signed at Washington, DC, on March 29, 1979). For the United States, regulations governing the fishery for Pacific halibut developed by the IPHC are subject to acceptance by the Secretary of State with concurrence from the Secretary of Commerce. After acceptance by the Secretary of State with the concurrence of the Secretary of Commerce, NMFS publishes the IPHC regulations in the **Federal Register** as annual management measures pursuant to 50 CFR 300.62. IPHC and NMFS regulations authorize the harvest of halibut in commercial, personal use, sport and subsistence fisheries by hook-and-line gear and pot gear. In the BSAI, (which largely coincides with IPHC Regulatory Area 4 (hereafter referred to as “Area 4”) and its five subsareas (ABCDE)), halibut is harvested in all of these fisheries.

Section 5(c) of the Halibut Act also provides the Council with authority to develop regulations that are in addition to, and not in conflict with, approved IPHC regulations. The Council has exercised this authority in the development of Federal regulations for the halibut fishery such as (1) subsistence halibut fishery management measures, codified at § 300.65; (2) the limited access program for charter vessels in the guided sport fishery, codified at § 300.67; and (3) the Individual Fishing Quota (IFQ) Program for the commercial halibut and sablefish fisheries, codified at 50 CFR part 679, under the authority of Section 5 of the Halibut Act and Section 303(b) of the Magnuson-Stevens Act.

The Council manages the groundfish fisheries of the BSAI under the authority of the MSA and the BSAI FMP. National Standard 9 of the MSA requires that fishery conservation and management measures shall, to the extent practicable: (1) minimize bycatch; and (2) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. Bycatch, as defined by the MSA, “means fish which are harvested in a fishery, but which are not sold or kept for personal use and includes economic discards[4] and regulatory discards.” 16 U.S.C. 1802(2). The term “regulatory discards” means “fish harvested in a fishery which fishermen are required by regulation to discard whenever caught, or are required by regulation to retain, but not sell.” 16 U.S.C. 1802(38). In the BSAI FMP, the Council has designated Pacific halibut, along with several other fully utilized species such as salmon, herring, and crab, as “prohibited species” in the groundfish fisheries (Section 3.6.1 of the BSAI groundfish FMP). By regulation, the operator of any vessel fishing for groundfish in the BSAI must minimize the catch of prohibited species (50 C.F.R § 679.21(a)(2)(i)). The Council has also set catch limits for individual PSC species, which are defined in BSAI FMP Section 3.6.2.1. Under the designation as a PSC species, their capture is required to be avoided, and their retention is prohibited except when retention is required or authorized by other applicable law. Unintended removals of prohibited species are separately monitored and controlled under the groundfish FMPs.

The Council does not have authority to set catch limits for the commercial halibut fisheries, and halibut PSC in the groundfish fisheries is only one of the factors that affects harvest limits for the commercial halibut fisheries. Nonetheless, halibut PSC in the groundfish fisheries are a significant portion of total mortality in BSAI IPHC areas and have the potential to affect catch limits for the commercial halibut fisheries in Area 4 under the current IPHC harvest policy. While the impact of halibut PSC reductions on catch limits for commercial halibut fisheries is dependent on IPHC policy and management decisions, reductions to the current Amendment 80 halibut PSC limit in the BSAI could provide additional harvest opportunities in the BSAI commercial halibut fishery.

Although halibut is taken as bycatch in groundfish fisheries by vessels using all types of gear (trawl, hook-and-line, pot, and jig gear), halibut bycatch primarily occurs in the trawl and hook-and-line groundfish fisheries. The Council and NMFS manage halibut bycatch in the BSAI by (1) establishing halibut PSC limits for trawl, non-trawl, and Community Development Quota (CDQ) groundfish fisheries; (2) apportioning those halibut PSC limits to groundfish sectors, and in some cases, target fishery categories and seasons; and (3) managing groundfish fisheries to prevent PSC from exceeding the established limits. Consistent with National Standard 1 and National Standard 9 of the MSA, the Council and NMFS use halibut PSC limits in the BSAI groundfish fisheries to balance the objective to minimize bycatch to the extent practicable with the objective to achieve optimum yield from the groundfish fisheries on a continuing basis. Halibut PSC limits in the groundfish fisheries provide a constraint on halibut PSC mortality and promote conservation of the halibut resource. The halibut PSC limit established

[4] “Economic discards” are defined as “fish which are the target of a fishery, but which are not retained because of an undesirable size, sex, or quality, or other economic reason.” 16 USC 1802 (9)

for the Amendment 80 sector is managed at the sector level in regulation, enforced at the sector level, and prohibits further groundfish fishing for the remainder of the year once the halibut PSC limit has been reached. Therefore, the Amendment 80 halibut PSC limit must be set to balance the needs of fishermen, fishing communities, and U.S. consumers that depend on both halibut and groundfish resources.

1.2 Purpose and Need

The Council amended its purpose and need statement for this action in October 2020 to be the following:

> *Halibut is an important resource in the Bering Sea and Aleutian Islands (BSAI), supporting commercial halibut fisheries, recreational fisheries, subsistence fisheries, and groundfish fisheries. The International Pacific Halibut Commission (IPHC) is responsible for assessing the Pacific halibut stock and establishing total annual catch limits for directed fisheries and the North Pacific Fishery Management Council (Council) is responsible for managing prohibited species catch (PSC) in U.S. commercial groundfish fisheries managed by the Council. The Amendment 80 sector is accountable for the majority of the annual halibut PSC mortality in the BSAI groundfish fisheries. While the Amendment 80 fleet has reduced halibut mortality in recent years, continued decline in the halibut stock requires consideration of additional measures for management of halibut PSC in the Amendment 80 fisheries.*
>
> *When BSAI halibut abundance declines, PSC in Amendment 80 fisheries can become a larger proportion of total halibut removals in the BSAI, particularly in Area 4CDE, and can reduce the proportion of halibut available for harvest in directed halibut fisheries. The Council intends to establish an abundance-based halibut PSC management program in the BSAI for the Amendment 80 sector that meets the requirements of the Magnuson-Stevens Act, particularly to minimize halibut PSC to the extent practicable under National Standard 9 and to achieve optimum yield in the BSAI groundfish fisheries on a continuing basis under National Standard 1. The Council is considering a program that links the Amendment 80 sector PSC limit to halibut abundance and provides incentives for the fleet to minimize halibut mortality at all times. This action could also promote conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery.*

Although fishermen are required by the BSAI groundfish FMP to avoid the capture of any prohibited species in groundfish fisheries, the use of halibut PSC limits in the groundfish fisheries provides a constraint on halibut PSC and promotes conservation of the halibut resource. Halibut PSC limits provide a regulated upper limit to mortality resulting from halibut interceptions because continued groundfish fishing is prohibited once a halibut PSC limit has been reached for a particular sector and/or season. This management tool is intended to balance the optimum benefit to fishermen, communities, and U.S. consumers that depend on both halibut and groundfish resources.

1.2.1 Relative roles and responsibilities of the IPHC and NPFMC as they relate to halibut PSC

The IPHC accounts for all sources of halibut mortality, including halibut PSC in the groundfish fisheries, recreational catches, and subsistence catches before setting commercial halibut catch limits each year. Halibut fishery catch limits are the result of a multi-step process by the IPHC, with allocative input from U.S. and Canadian fishery management organizations, with the objective of determining how much can be harvested by the commercial halibut fishery, given the IPHC's goals for stock conservation. The current harvest policy for Pacific halibut is based on two harvest targets: the distribution of harvest rates among regulatory areas, and scale of that harvest at the coastwide level. The IPHC refers to halibut "bycatch" to describe the mortality of all sizes of halibut caught in the commercial groundfish fisheries that are managed by the Council and NMFS (hook-and-line sablefish and Pacific cod; trawl Pacific cod, pollock, flatfish, and rockfish, and pot Pacific cod), and minor amounts in commercial shrimp trawl and crab pot fisheries. In the groundfish fisheries, Pacific halibut is a prohibited species, and bycatch mortality of halibut is referred to as halibut PSC.

In IPHC terms, "wastage" describes halibut killed, but not landed by the commercial (hook-and-line) halibut fisheries, due to lost and abandoned gear, and mortality of fish released due to the minimum commercial size limit of 32 inches in length. Wastage is not included in IPHC estimates of "bycatch" but is reported annually.

Specifically, the IPHC uses the current year's projection of the PSC mortality to establish the following year's commercial halibut fishery catch limit. For several years, there have been concerns raised by stakeholders and the Council about the levels of halibut PSC in the commercial groundfish sectors. The spawning biomass of Pacific halibut in the 1990s was the highest seen in many decades, but has been declining since the 2000s. The declining biomass from those high levels resulted in lower Pacific halibut catch limits set by the IPHC for the BSAI commercial halibut fisheries (Area 4), especially in 2013 and 2014 for the commercial halibut fishery in the northern and eastern Bering Sea (Area 4CDE) (Figure 1-1). The Council addressed this initial concern by reducing trawl, non-trawl, and CDQ sectors' halibut PSC limits for the BSAI groundfish fisheries, implemented in 2016 by Amendment 111 to the FMP. The Council continues to consider further management changes for the Amendment 80 sector PSC limit with this action.

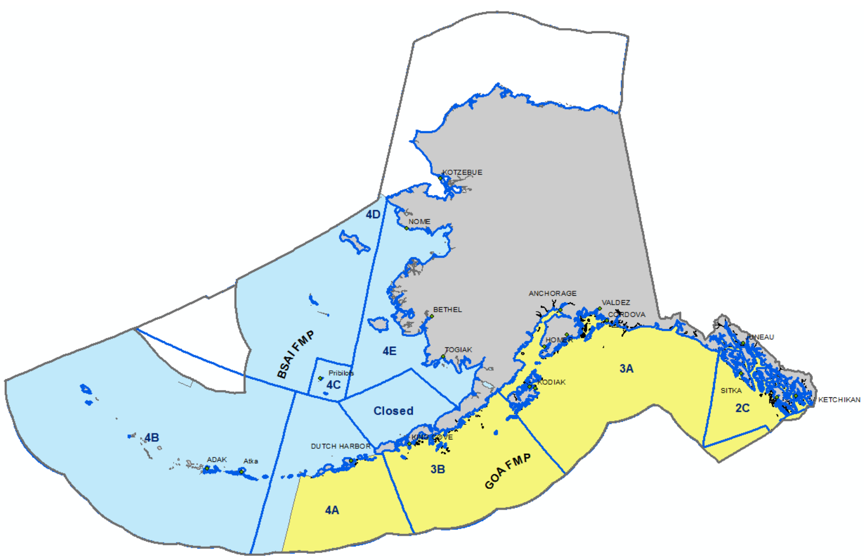


Figure 1-1 Map of IPHC Regulatory Areas (outlined in dark blue) and BSAI FMP (shaded in light blue) and GOA FMP (shaded in yellow) areas.

The Council recognizes efforts by the Amendment 80 sector to reduce total halibut PSC in the BSAI. Concerns persist, however, about continuing low levels of halibut biomass that result in reduced directed fishery catch limits in Area 4. Based on the IPHC management objectives as well as recent projections of halibut biomass and estimates of PSC mortality, directed fishery stakeholders remain concerned that halibut catch limits will not be sufficient to provide for a directed fishery in the BSAI at the PSC limits implemented under Amendment 111. The Amendment 80 sector fisheries account for the majority of halibut bycatch mortality in the BSAI. Therefore, the Council is considering the approach described here to link the Amendment 80 PSC limit to halibut abundance.

The Council does not have authority to set catch limits for the directed halibut fishery which is under the authority of the IPHC. The Council does set halibut PSC limits in the groundfish fisheries, and that is one of the factors that affects harvest limits for the directed halibut fisheries. Halibut PSC in the Amendment 80 groundfish fishery is a significant portion of total mortality in the BSAI and that affects the IPHC's calculation of catch limits for the directed halibut fisheries in Area 4. While the short-term impact of halibut PSC reductions on catch limits for directed halibut fisheries is partially dependent on IPHC policy and management decisions, linking the current Amendment 80 halibut PSC limit in the BSAI to halibut abundance could indirectly provide additional harvest opportunities in the BSAI directed halibut fishery, particularly at low levels of halibut abundance.

Under MSA National Standard 8, conservation and management measures must take into account the importance of fishery resources to fishing communities in order to provide for the sustained participation of and minimize adverse economic impacts on fishing communities that depend on both halibut and groundfish resources. BSAI coastal communities are affected by reduced catch limits for the directed halibut fishery, especially in Area 4CDE. In considering changes to the management of the Amendment 80 halibut PSC limit in the BSAI, the Council must balance these communities' engagement in and dependence on halibut fisheries with community engagement in and dependence on the groundfish fisheries. The Council must also consider MSA National Standard 4 which states that management measures shall not discriminate between residents of different states. National Standard 4 also requires allocations of fishing privileges to be fair and equitable to all fishery participants. To be consistent with the National Standards 1, 7, 8, and 9 of the MSA, a Council action to implement an abundance-based halibut PSC limit must minimize halibut PSC in the Amendment 80 groundfish fisheries to the extent practicable while preserving the potential for the optimum harvest of the groundfish total allowable catch (TAC). An abundance-based halibut PSC limit should minimize halibut PSC to the extent practicable in consideration of the regulatory and operational management measures currently available to the Amendment 80 groundfish fleet and the need to ensure that groundfish catch contributes to the achievement of optimum yield. Minimizing halibut PSC to the extent practicable is necessary to maintain a healthy marine ecosystem, ensure long-term conservation and abundance of the halibut stock, provide optimum benefit to fishermen, communities, and U.S. consumers that depend on both halibut and groundfish resources, and comply with the MSA and other applicable Federal law.

Consistent with the Council's purpose and need statement, an abundance-based halibut PSC limit for Amendment 80 may provide improved harvest opportunities in the Area 4 commercial halibut fishery that meet IPHC and Council management objectives, particularly at low levels of halibut abundance. Distinguishing between the fish that are over 26 inches in length (O26) and those that are under 26 inches in length (U26) components is important for the IPHC harvest policy. Under that policy, the O26 component taken as PSC has approximately the same effect on the halibut stock as O26 catch in the commercial halibut fishery and is treated the same: it is directly deducted from the total constant exploitable yield (TCEY) (See Section 4.4.1 for description of the IPHC harvest policy and TCEY). If halibut PSC is reduced relative to the status quo, additional harvest opportunities for the BSAI directed halibut fisheries could result in the near term from PSC related mortality reductions of O26 halibut. Under current IPHC harvest policy, these O26 halibut could be available to the commercial halibut fishery in the area the PSC reductions occurred in the year following the PSC reductions or when the fish are likely to reach the legal-size limit for the directed halibut fishery (greater than or equal to 32 inches in total length).

Longer term benefits to the directed halibut fisheries could also accrue throughout the distribution of the halibut stock from a reduction of PSC mortality to U26 halibut. Removals of U26 halibut are included in the stock assessment, and therefore in the estimated productivity and current status of the stock. Because the stock assessment is conducted at the coastwide level, the U26 component of PSC is implicitly assumed to have an equal effect on the productivity of all IPHC areas. The reason for this has to do with the small size and future potential of these fish. Benefits from reduced mortality of these smaller halibut could occur both in the Bering Sea and elsewhere as these halibut migrate and recruit into the directed halibut fisheries over the full range of the halibut stock. At higher levels of halibut abundance, an abundance-based halibut PSC limit may provide the Amendment 80 groundfish fisheries with a higher PSC limit and increased groundfish harvests.

1.3 History of this Action

The Council and NMFS have enacted a range of management measures and regulations to address halibut bycatch since the origin of the BSAI Groundfish FMP in 1981 (Figure 1-2). A synopsis of historical management measures in the BSAI FMP and regulations from 1981 through 2012 was provided to the Council in June 2012 (Northern Economics, Inc. 2012). Amendment 80 was implemented in 2008. Table 1-1 shows the changes in the PSC limits by sector from 1981 to present. Step-down provisions reduced the Amendment 80 limit annually from 2008 through 2012. Note that in conjunction with step-down provisions in Amendment 80, the Community Development Quota (CDQ) limit was increased by 50 metric tons in 2010 before a subsequent reduction in 2016 as part of Amendment 111. Non-trawl and Trawl Limited Access sector PSC limits were also reduced as a result of Amendment 111. Note that only Amendment 80 PSC limit modifications are considered as part of this action. Amendment 80 continues to comprise the majority of halibut PSC mortality in the BSAI and since 2015 mortality has been substantially below their PSC limit due to innovations and efforts by the Amendment 80 fleet to reduce their bycatch (See Table 2-4 for mortality and Section 5.3.2.3 for further discussions of practicability of additional bycatch reductions).

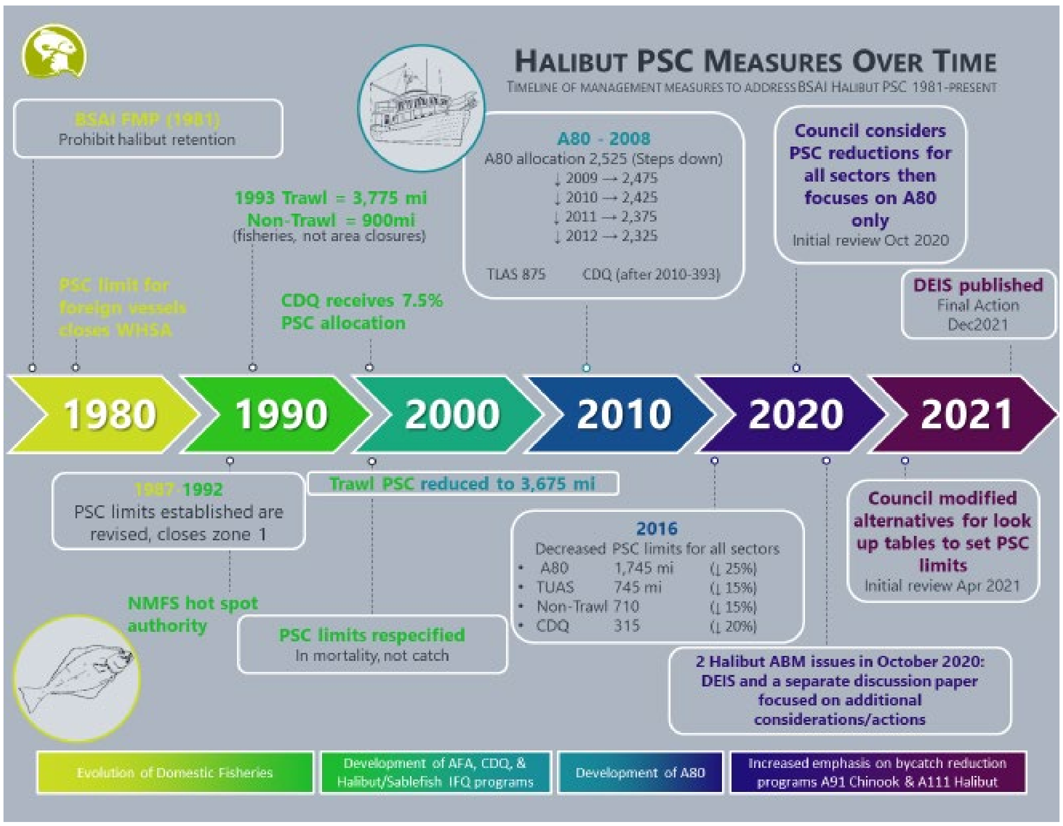


Figure 1-2 Historical overview of BSAI halibut PSC measures 1981-present.

Table 1-1 Evolution of Pacific halibut PSC limits in metric tons (mt) of mortality, by main sectors in the BSAI region, 1999-2021 (see Fig. 1-1 for additional information on halibut limits and actions 1981-2016). Here PSC limits for trawl and non-trawl from 2008 to 2015 reflect the reduction for the CDQ limit. Limits for 1999-2007 were also reduced 7.5% for the CDQ but this is not shown in the table.

	Trawl	Am80	BSAI Trawl Limited Access*	Non-trawl	CDQ	Total PSC limit
1999-2007	3,675	NA	NA	900	**	4,575
2008		2,525	875	833	343	4,576
2009		2,475	875	833	343	4,526
2010		2,425	875	833	393	4,526
2011		2,375	875	833	393	4,476
2012		2,325	875	833	393	4,426
2013-2015		2,325	875	833	393	4,426
2016-2021		1,745	745	710	315	3,515

* The BSAI Trawl Limited Access fisheries encompass all trawl fisheries in the BSAI except Amendment 80 catcher processors (i.e., all trawl catcher vessels in any target fishery, and American Fisheries Act catcher processors).

** Limits for 1999-2007 were reduced by 7.5% for PSC usage by the CDQ sector.

In February 2015, in conjunction with initial review of the analysis prepared for Amendment 111 to the BSAI FMP that considered reductions of BSAI Pacific halibut PSC limits, the Council also requested that Council and IPHC staff evaluate possible approaches to link BSAI halibut PSC limits to data or model-based abundance estimates of halibut. IPHC staff took the lead on drafting a paper examining several aspects of potential abundance-based halibut PSC limits in the BSAI, including a review of harvest policies by both Council and IPHC staff, fishery trends, a range of potential candidate abundance indices, a discussion of basing allocation on yield (biomass) versus spawning capital (relative fishing impact), and a review of research recommendations (Martell et al., 2016).

The Council then initiated subsequent discussion papers and requested that analysts from within the different agencies (IPHC, NMFS Alaska Fisheries Science Center [AFSC], NMFS Alaska Regional Office [RO], and Council staff) collaborate to provide additional information on appropriate abundance indices for use in scaling PSC to halibut abundance (referred to in this document as 'indexing PSC to abundance') indexing halibut abundance to PSC in the Bering Sea, how to establish control rules, and the development of performance metrics.[5] In 2017, NMFS published a Notice of Intent to publish an EIS for the proposed management measures. In addition to the formal scoping period, the Council provided considerable opportunities for stakeholder input, including formation of a stakeholder committee in 2018 tasked with providing the analysts with specific scenarios from the broad suite of alternatives, elements, and options for analysis, and to provide feedback on recommended performance metrics. These scenarios were included in the alternatives, and staff provided drafts of the analysis that included performance metrics to address competing objectives in October 2019 and February 2020. Staff developed a model-based analysis of the alternatives to assess the use of chosen indices on halibut abundance and resulting PSC limits. At the February 2020 meeting, the Council modified the scope of this analysis to focus exclusively on the Amendment 80 sector, due to that sector comprising the majority of the halibut mortality annually. The analysis was reworked, and in October 2020, the Council reviewed another preliminary DEIS. At the October 2020 meeting, the Council revised the purpose and need statement to more directly address the action before the Council and embedded its objectives directly into the purpose and need statement. The Council also revised its alternative set to the current three action alternatives, that

[5] A summary of the papers reviewed by the Council and the focus of those papers from 2016 through 2019 is included in Chapter 1 of the October 2020 DEIS, accessible at: https://meetings.npfmc.org/CommentReview/DownloadFile?p=64175697-f114-4386-943f-3a864ac24361.pdf&fileName=C6%20ABM%20Draft%20DEIS%20Analysis.pdf

all use a look up table approach to set PSC limits based on the status of halibut as indexed in both the IPHC setline and eastern Bering Sea (EBS) trawl surveys. The Council requested that version of the preliminary DEIS shift the analytical focus from a management strategy evaluation (MSE) approach centered on evaluating objectives with respect to performance metrics, to a more traditional impacts analysis on the affected fishing sectors and other affected resource components. Finally, following initial review of a preliminary DEIS in April 2021, the Council modified the options applied to the alternatives and requested the document be revised in response to Scientific and Statistical Committee (SSC) requests to the extent feasible before publishing it for the public comment period.

Table 1-2 Information contained in previous materials provided April 2016-October 2020

Topic	Information	Link
Initial Review DEIS Initial Review DEIS	April 2021 initial review DEIS Preliminary DEIS on previous alternative set Revised Alternative set from October 2020 motion	April 2021 initial review DEIS October initial review preliminary ABM DEIS October 2020 Council motion
Preliminary DEIS	Previous initial review draft which contained alternatives that applied to all sectors	October 2019
Indices	Data sources from which to derive indices including strengths and weaknesses of each	April 2016
	Description of potential abundance indices IPHC assessment; EBS trawl survey; combined and applied in a control rule	April 2016
Fishery characteristics	Halibut PSC by target; observed trawl and longline effort, CPUE, PSC rates	Supplement April 2016
Control rules	Control rule background	April 2016 October 2016 April 2017 April 2018
	Control rule features	April 2016 October 2016 April 2017 April 2018
	Control rule examples already in use	April 2016 April 2017
Quantifying objectives	Performance metrics	February 2017 April 2017
		June 2017
Incentives	Incentives	April 2017
Alternatives and scenarios	Example ABM alternatives	April 2016 October 2016 April 2017 Supplement Apr 17 April 2018
	Management issues and methods	October 2016
	Analytical considerations and example scenarios	April 2016 Supplement ppt October2016 April2017 Supplement Apr 17
	Methodology for analysis	June 2018(a)
Performance standard	Proposed O26 performance standard	June 2018 (b)

1.4 Where are we in the process?

As noted in Section 1.3, the Council has already reviewed several discussion papers, a preliminary review draft EIS, an initial review draft and modified the suite of alternatives for analysis. Figure 1-3 shows the schedule of previous iterative review and where final action on this DEIS fits into the overall Council and NEPA process and with the NMFS process to publish the Record of Decision and implementation of the management action (Preferred Alternative) selected at final action.

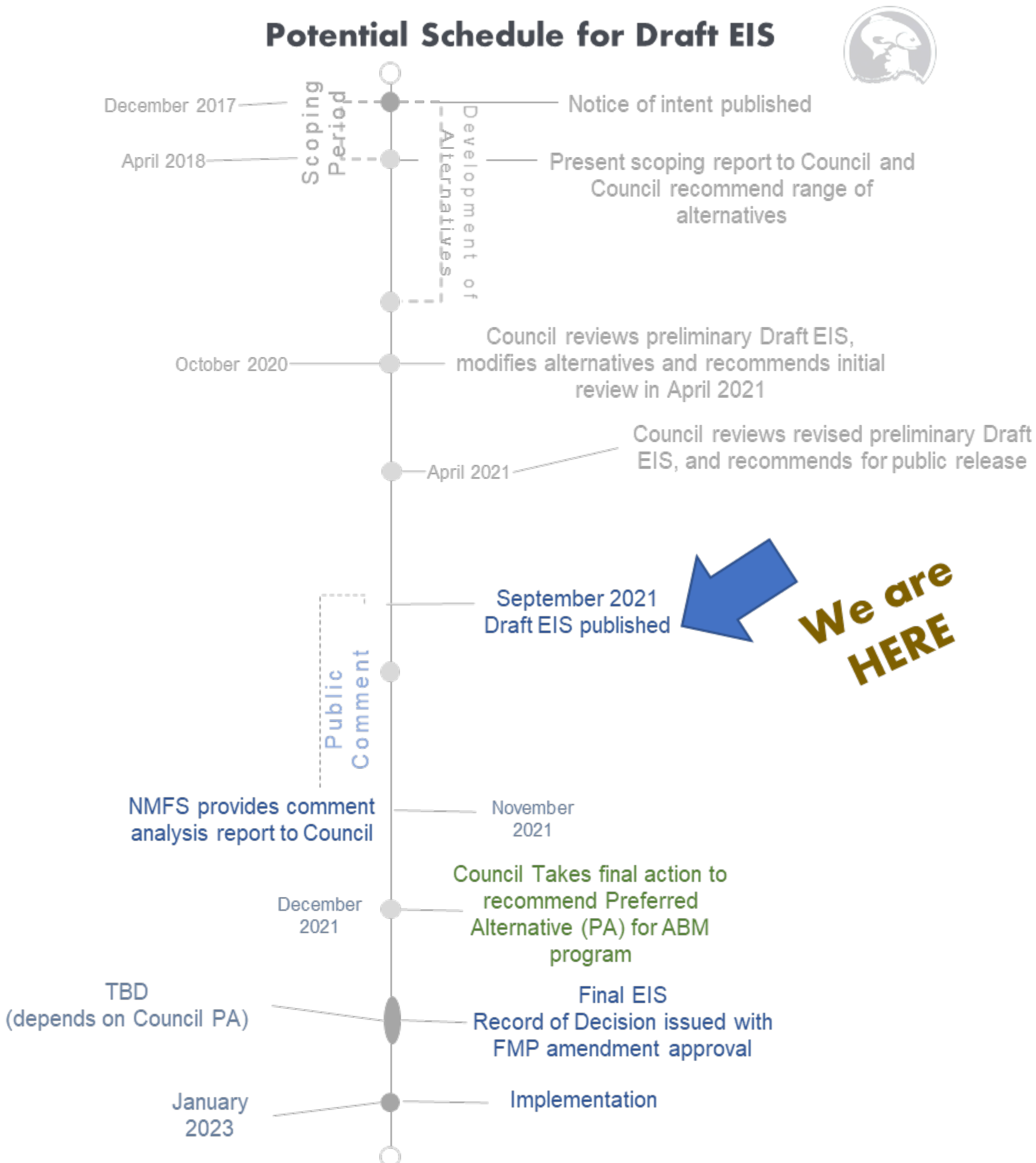


Figure 1-3 Previous Council considerations (grey), future Council considerations (green), proposed NEPA schedule and potential Council schedule for final action

1.5 Description of Management Area

The proposed action would be implemented in the BSAI groundfish management areas, which overlap IPHC regulatory areas 4A, 4B, 4C, 4D, and 4E (Figure 1-4).

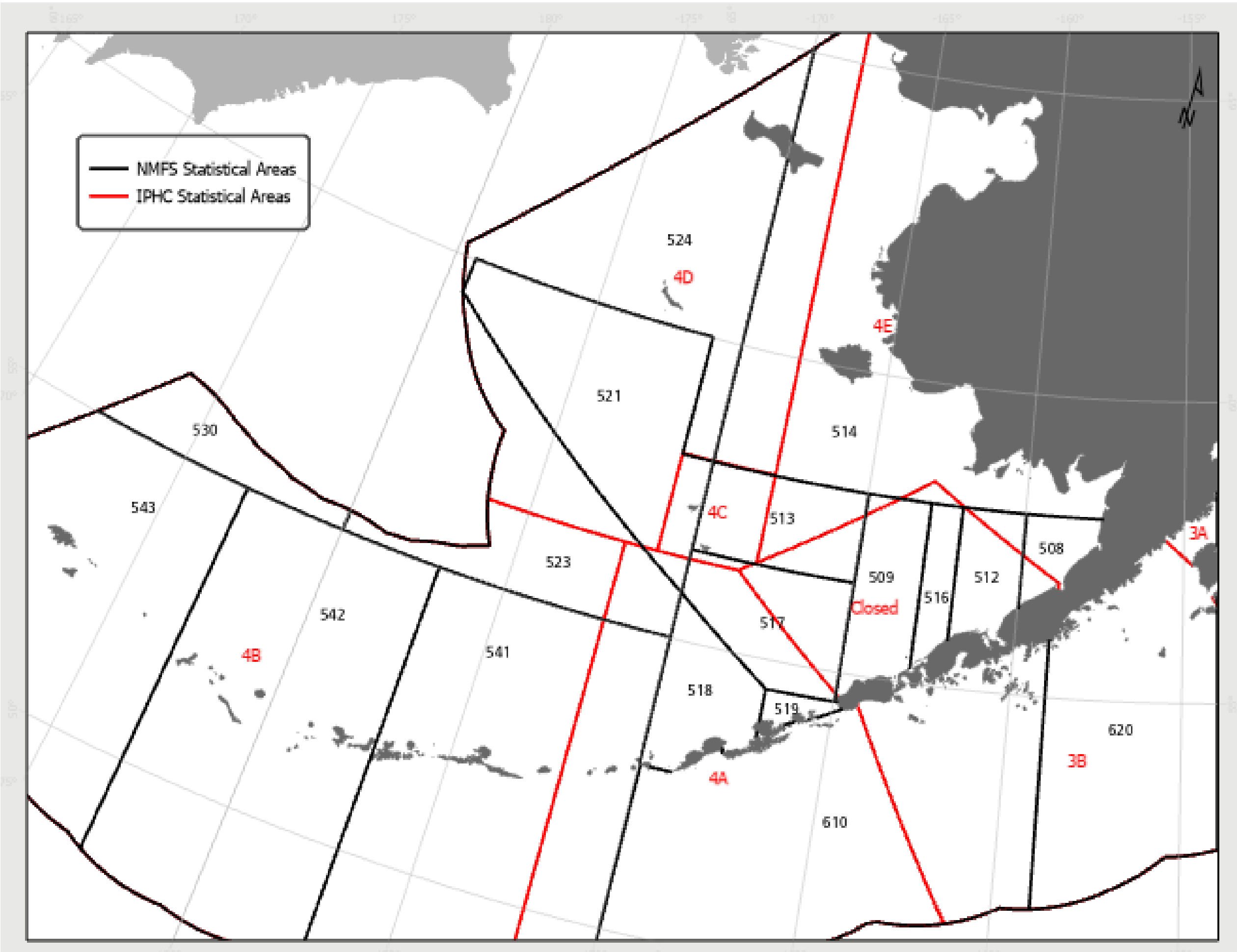


Figure 1-4 Alaska groundfish reporting areas and IPHC regulatory areas for Pacific halibut. Source: Adapted from NMFS Alaska Region map by Northern Economics Inc.

NMFS management areas do not match exactly to IPHC regulatory areas (Figure 1-4). To show the relative overlap, the groundfish BSAI reporting areas are equated with IPHC areas as shown in Table 1-3. Note that IHPC Area 4A includes part of NMFS Area 610, which is part of the Gulf of Alaska (GOA) FMP area.[6] Further information on how NMFS apportions halibut PSC mortality by regulatory area to provide to IPHC for their catch setting process is contained in Section 5.4.1.

[6] The treatment of directed halibut fishery information for IPHC Area 4 as it regards the overlap of BSAI and GOA FMP areas is addressed in Section 4.4.1 of this DEIS.

Table 1-3 Alaska groundfish reporting areas and IPHC regulatory areas for Pacific halibut. NMFS management area reassignments used to aggregate groundfish and halibut statistics to IPHC regulatory areas

IPHC Area	NMFS Areas	Region
4A	517, 518, 519, 521, 523, 541	BSAI
4B	523, 541, 542, 543	
4CDE and Closed area	508, 509, 512, 513, 514, 516, 517, 521, 523, 524	

1.6 Abundance indices

The Council selected two abundance indices (measures of the survey estimate of halibut either in metric tons (NMFS AFSC survey) or population-density as measures by weight per unit effort (IPHC survey)) that could be used to track halibut abundance and to guide setting the PSC limit for the Amendment 80 sector[7]. The selected indices are based on the NMFS Alaska Fisheries Science Center (AFSC) EBS shelf bottom trawl survey and the IPHC setline survey covering IPHC Areas 4ABCDE. Both indices represent the best available scientific information. A short description of the development of each index is provided below for context in understanding the alternatives that index halibut PSC to abundance.

1.6.1 AFSC EBS shelf bottom trawl surveys

The NMFS AFSC has conducted the EBS shelf bottom trawl survey (EBS shelf trawl survey) annually since 1982 ***with the exception of 2020***[8] using standardized protocols.

1.6.1.1 Survey Objectives

The AFSC designed the EBS shelf survey to describe the composition, distribution and abundance of demersal fish, shellfish and principle epibenthic invertebrate resources of the EBS. The continental shelf area of the EBS has proven to be one of the most productive fishing areas in the world in terms of both species' abundance and commercial value.

Results of the EBS shelf survey provide up-to-date estimates of biomass, abundance, and population structure of groundfish populations in support of stock assessment and ecosystem forecast models that form the basis for groundfish and crab harvest advice. Relative abundance (catch per unit effort) and size and/or age composition data are key results from this survey. The survey covers Pacific halibut in addition to target species such as walleye pollock, Pacific cod, yellowfin sole, northern rock sole, red king crab, and snow and tanner crabs. Additional data collected on the survey are used to improve understanding of life history of the fish and invertebrate species as well as the ecological and physical factors affecting their distribution and abundance. The EBS shelf survey is generally described in a NOAA Technical Memo (Stauffer, 2004).

The main objective of AFSC groundfish trawl surveys is to collect fishery-independent data for multiple species which describe the:

- temporal distribution and abundance of the commercially and ecologically important groundfish halibut and crab species,

[7] Additional indices were considered and not carried forward as candidate indices see Table 1-2 for more information on those indices.

[8] See Section 2.6 for information on the cancellation of 2020 surveys due to COVID-19 outbreak and further discussion of future planning for PSC limit determination in the event that future surveys are not able to be conducted or conducted at a reduced effort.

- changes in the species composition and size and age compositions of species over time and space,
- reproductive biology and food habits of the groundfish community
- the physical environment of the groundfish habitat.

1.6.1.2 Technical Design

The stratified random design of the EBS shelf survey consists of a grid with stations placed at the center of each 20 × 20 nautical square miles (Figure 1-4). Beginning in 1982, the same 356 stations were sampled annually. The AFSC added 20 stations to the northwest sector in 1987, resulting in a total of 376 stations.

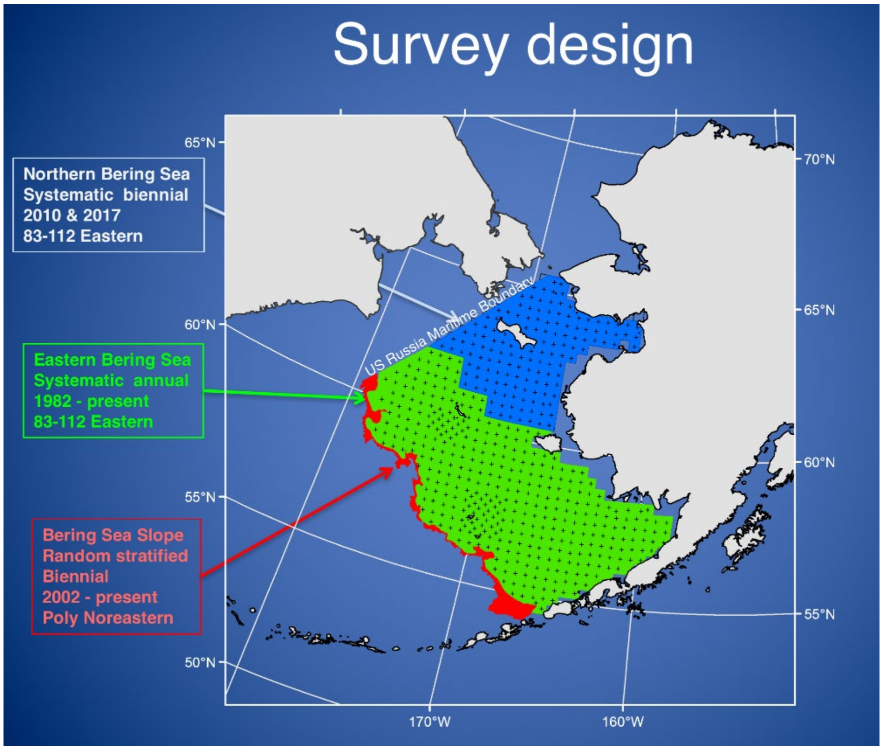


Figure 1-5 Layout of NMFS trawl survey designs (Source: Bob Lauth, AFSC).

The bottom trawl gear and trawling protocols used in AFSC surveys are described in Stauffer (2004). Samples obtained from the survey's standard 30-min tow range in weight from 30 to 17,800 kg (median = 1,167 kg). The time available to process this volume of catch is approximately equal to the time required for the vessel to traverse the 20 nautical miles to the next towing site (approx. 2 hours). Catches weighing 1,200 kg or less by visual estimate are lifted by crane from the trawl deck to a sorting table, where the catch is sorted and enumerated in its entirety. Catches from these tows are processed completely. However, roughly half of all EBS tows exceed the limits of the sorting table and must be subsampled. This is accomplished by lifting the whole catch off the deck, obtaining its weight with a load cell, and emptying it into a large bin containing a brailing net. The catch is subsampled by lifting the contents of the brailing net to a sorting table. The catch from the sorting table is weighed and enumerated by species, and weights and numbers are extrapolated to the total catch based on weight. The remaining catch on deck is sifted or "whole-hauled" for Pacific halibut (*Hippoglossus stenolepis*) and commercial crabs (*Lithodes* spp., *Paralithodes* spp., *Chionoecetes* spp.) and, in more recent years, other large-bodied species including Greenland turbot (*Reinhardtius hippoglossoides*), Pacific cod (*Gadus macrocephalus*), skates (*Raja* spp., *Bathyraja* spp.) and some species of sculpins (*Hemitripterus bolini*, *Hemilepidotus* spp., *Myoxocephalus* spp.).

Catches larger than the lifting capacity of the crane (approx. 5 mt) are emptied on deck and measured volumetrically using a density coefficient applied to calculate total catch weight. Once the weight of these very large catches (approx. 1.5% of all catches) is estimated, a sample is brought to the table for sorting and enumeration, and then extrapolated to the total catch. Whole-hauling occurs for the species mentioned above even on these large catches.

1.6.1.3 Survey Estimate of Halibut

The AFSC developed trawl efficiency and enumeration confidence matrices for both fishes and invertebrates collected during the EBS shelf survey from 1982 through 2014. The trawl efficiency index scores describe how accurate and consistent the survey is as an indicator of relative animal density and are provided for each taxon code appearing in the survey database. These efficiency index scores are subjective but were influenced by the results from several catch efficiency field experiments using NMFS trawl gear (e.g., Weinberg and Munro 1999; Munro and Somerton, 2001; Somerton and Munro, 2001; Weinberg et al. 2002; Kotwicki and Weinberg 2005; Somerton et al. 2007; Weinberg et al. 2016). The efficiency index for Pacific halibut received the highest score, indicating that the AFSC believes the Pacific halibut catch-per-unit-effort (CPUE) calculated from the EBS shelf survey is an accurate and consistent indicator of relative animal density. Pacific halibut also received the highest score for confidence in the enumeration of weight and counts from the EBS shelf survey. A detailed description of the efficiency and enumeration confidence indices is provided in a 2016 NOAA Technical Memo (Stevenson et al., 2016).

The IPHC has deployed a biologist on the EBS shelf survey every year since 1998 to collect halibut samples. The IPHC participates in the EBS shelf survey to augment information collected in its coastwide setline survey. The setline survey is the primary fishery-independent source of data for the halibut stock assessment (Henry et al. 2015). However, Pacific halibut occupy a vast area of the Bering Sea shelf for which the IPHC lacks the financial resources to sample in its entirety. Moreover, the fishing gear used in the coastwide setline survey data generally catches O26 halibut and available for harvest in the directed commercial fishery. Therefore, in most years, the EBS shelf survey is the only measure of relative abundance for U26 halibut for much of this area. The halibut data collection (including ages) and treatment of information collected by the IPHC during the EBS shelf survey is described and the results are reported in the IPHC Report of Assessment and Research Activities 2016 (IPHC-2016-RARA-26-R).

The EBS shelf survey has different size-selectivity than setline gear. To address this, the EBS trawl survey is calibrated to the setline survey selectivity before it is incorporated into the calculation of the setline survey indices. Therefore, the setline survey does not index smaller halibut (mostly U26). In 2006, the IPHC added shelf stations to its setline survey in the Bering Sea region to compare information from setline stations in that area with data collected on the EBS shelf survey. After the study, the IPHC concluded that the EBS shelf survey, along with periodic IPHC survey calibrations, provided an adequate accounting of Pacific halibut biomass on the EBS shelf (Clark and Hare 2007) and is a useful tool for constructing a population-density index for the IPHC stock assessment (Webster 2014). The 2006 study was repeated in 2015 and confirmed the earlier finding (IPHC-2016-RARA-26-R). Based on this information, the EBS shelf survey would be an appropriate index of halibut abundance in the Bering Sea.

1.6.1.4 Availability of halibut data

Annual survey data are available each year in the fall ***with the exception of 2020*** and are used to prepare groundfish stock assessments. Therefore, the most recent EBS shelf survey data would be available each fall for use as an index for the informing the Amendment 80 PSC limit in regulation.[9]

[9] EBS surveys were cancelled in 2020 due to the Covid-19 pandemic crisis. See Section 2.6 for further discussion of future planning for PSC limit determination in the event that future surveys are not able to be conducted or conducted at a reduced effort.

1.6.1.5 Halibut Abundance data from survey

The IPHC used the shelf survey to estimate total Pacific halibut abundance in the EBS at 66 million fish in 2016, slightly higher than in 2015. As shown in Figure 1-5 and Table 1-4, estimated abundance declined by 4% to 22% annually beginning in 2006 from a high of 133.4 million halibut down to around 70 million halibut in 2019. The biomass estimates have steadily declined since the 2010 peak of over 195 thousand mt down to just under 114 thousand mt in 2019.

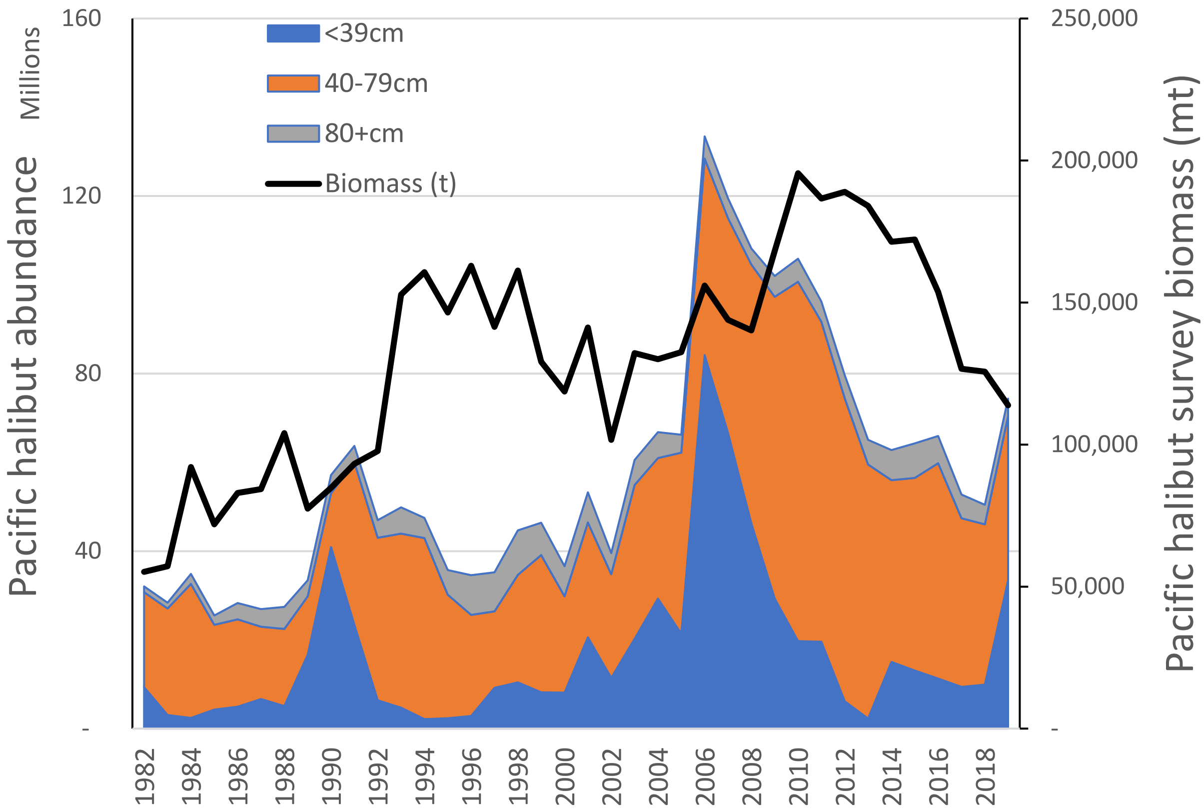


Figure 1-5 Estimated abundance (numbers of Pacific halibut) by length category, total biomass (mt) as estimated by the EBS bottom trawl survey data, 1982-2019. The trawl survey index was the area-swept biomass (catch-per-unit-effort multiplied by stratum area) estimated for the EBS by the annual NMFS EBS trawl survey during 1998–2019. These include all the standard core area strata (Table 1-4), but not the northwest area strata.

Table 1-4 Estimated trawl survey index (mt) for the year 1998–2019

Year	Trawl Index	Year	Trawl Index
1998	161,256	2009	168,102
1999	129,116	2010	195,535
2000	118,677	2011	186,666
2001	141,219	2012	189,000
2002	101,706	2013	183,989
2003	132,151	2014	171,427
2004	130,075	2015	172,237
2005	132,518	2016	153,704
2006	155,964	2017	126,684
2007	143,903	2018	125,957
2008	140,247	2019	113,855

1.6.2 IPHC Standardized Coastwide fishery independent setline survey (FISS)

The IPHC's annual fishery independent setline survey (FISS) survey, referred to as the setline survey in this document, is the most important and comprehensive data input to the annual Pacific halibut stock assessment.

1.6.2.1 Survey Objective

The primary objective of the IPHC setline survey is to sample Pacific halibut for stock assessment and stock distribution estimation. Other objectives include tagging of halibut, collection of environmental data, collecting data from other species, and recording observations of seabirds.

1.6.2.2 Technical design

In the past, the survey typically chartered 12 to 14 fishing vessels during the summer months to survey more than 1,300 stations on a 10 nautical mile (nm) by 10 nm grid in nearshore and offshore waters of southern Oregon, Washington, British Columbia, southeast Alaska, the central and western Gulf of Alaska, Aleutian Islands, and northern Bering Sea (Henry et al 2017). Depths surveyed typically ranged from 20–275 fathoms (37–503 meters [m]) but shallower stations from 10–20 fathoms (18–37 m) and deeper stations up to 400 fathoms (732 m) were surveyed in recent years as part of expansion studies. Now that those expansion studies are complete, the entire depth range from 10–400 fathoms (18–732 m) and IPHC convention area is part of the survey design and includes 1,890 stations on a 10-nm grid from California to the Bering Sea shelf edge. IPHC is currently considering sampling design options that include: 1) a full sampling of the 1,890 station design; 2) complete randomized sampling of stations within each IPHC Regulatory Area; 3) randomized cluster sampling in which clusters of stations are selected to make an operationally efficient fishing day; and 4) subarea sampling in which IPHC Regulatory Areas are divided into non-overlapping subareas and all stations within a selection of the subareas are sampled. The latter two options are examples that will meet the primary sampling objectives while also considering logistics and cost. Webster (2020) provides further details of the IPHC setline survey.

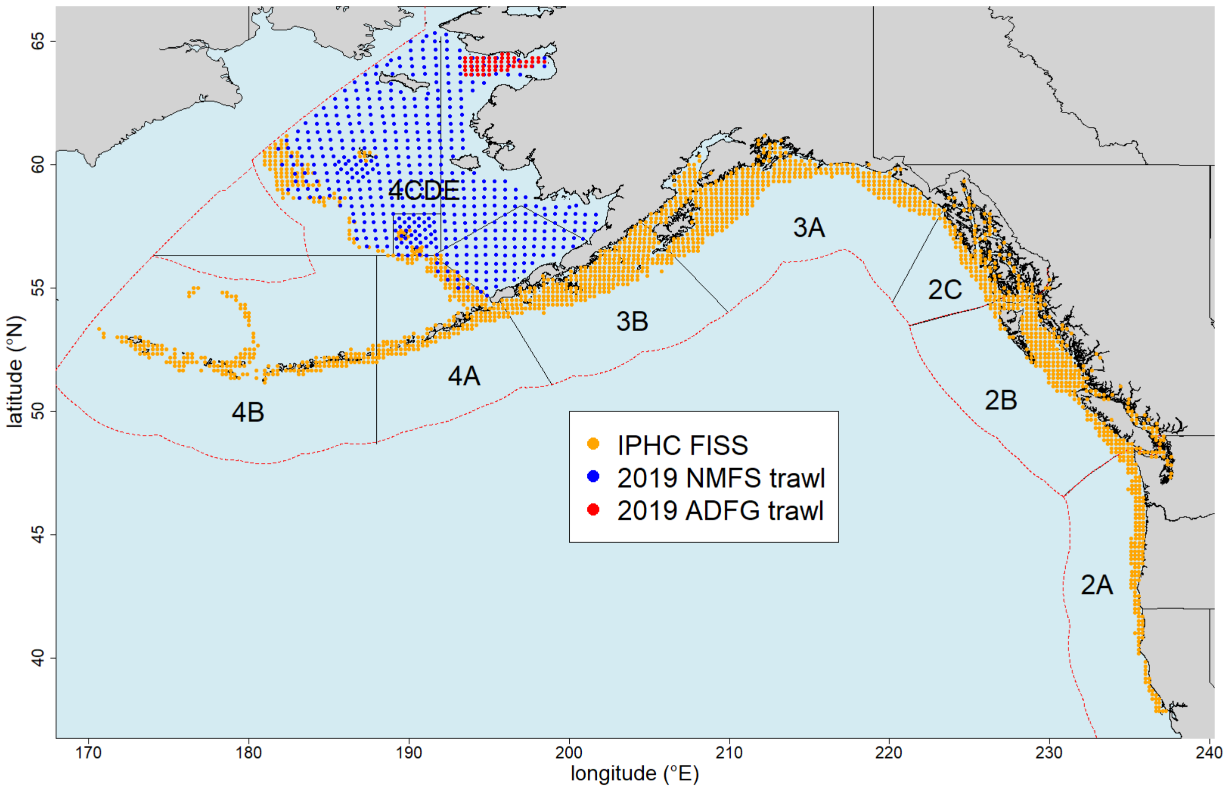


Figure 1-6 Map of the full 1890 station FISS design, with orange circles representing stations available for inclusion in annual sampling designs, and other colors representing trawl stations from 2019 NMFS and ADFG surveys used to provide complementary data for Bering Sea modelling. From Webster (2020).

The IPHC setline survey has evolved since 1993 with the addition of stations and the calibration with other surveys to utilize as much information as possible to estimate the abundance of Pacific halibut within the IPHC Convention Area. Prior to 1997, the survey had less coverage, but data are available for many Regulatory Areas (Stewart & Monahan 2016). The expansions from 2014–2019 added a considerable amount of information for the edges of the stock distribution, including calibrations with other surveys in the Bering Sea (e.g., the EBS trawl survey). In 2020, the IPHC setline survey sampled all stations in the core areas of the Pacific halibut stock (Areas 3A and 2C as well as the northern portion of area 2B). However, reduced survey effort was completed in the eastern half of Area 3B and other regulatory areas were omitted, including the EBS/AI areas (Figure 1-7).

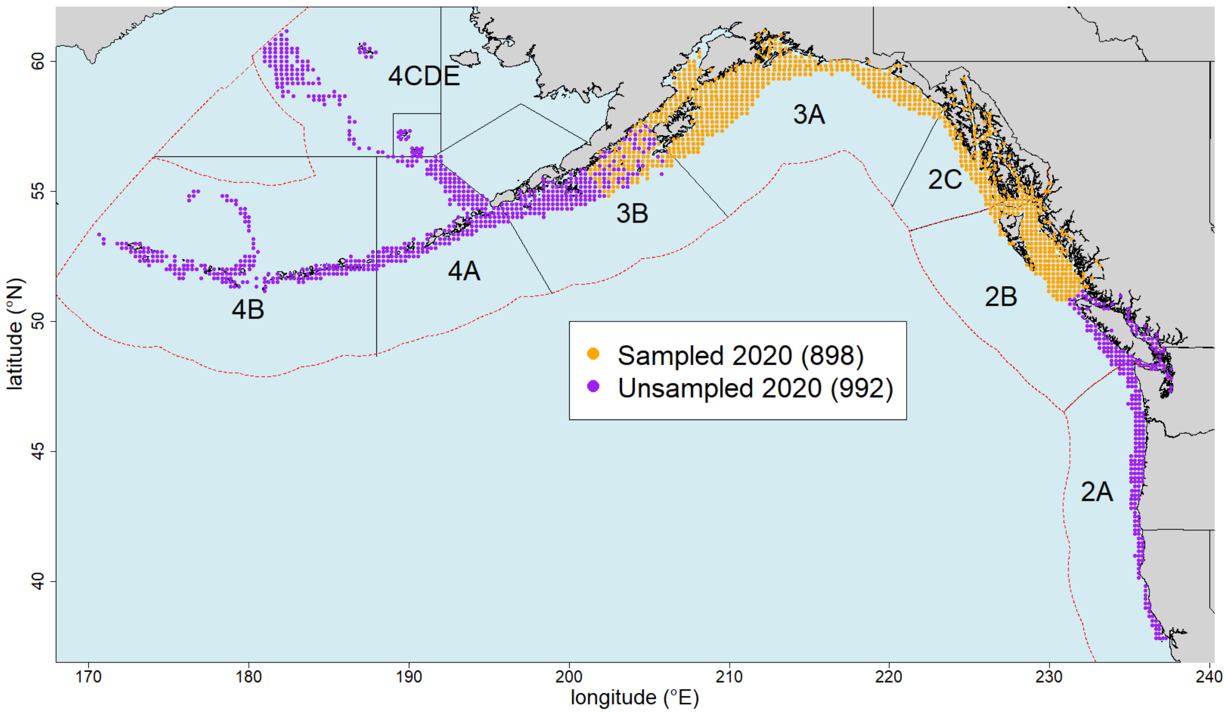


Figure 1-7 Map of the implemented 2020 FISS design, with orange circles representing those stations to be fished in 2020, and purple circles representing stations from the survey design that were not fished in 2020. From Webster (2020).

1.6.2.3 Sampling and analysis of IPHC setline survey (FISS) data

The fishing gear used in the setline survey generally catches halibut that are O26, similar to what is encountered in the directed fishery. Typically, five to seven skates (where each skate is typically 100 fathoms units of leaded groundline) of baited 16/0 hooks are fished where the number of skates may increase or decrease in each year depending on the expected encounter rate with Pacific halibut. The other specifications for gear, setting schedule, and soak time have remained consistent since 1998 (Henry et al 2017). A set is considered ineffective for stock assessment if predetermined limits for lost gear, depredation, or displacement from station coordinates are exceeded.

Pacific halibut observations are recorded by IPHC sea samplers on the vessel. The fork lengths of all Pacific halibut are recorded to the nearest centimeter. Each length is converted to an estimated weight using a standard formula (Clark 1992), and these weights were then used to generate the weight per unit effort (WPUE) data. However, starting in 2019, weights are directly observed during the sampling process. Average O32 WPUE, expressed as net pounds per skate, is calculated by dividing the estimated catch in pounds (net weight) of Pacific halibut equal to or over 32 inches (81.3 cm; O32 Pacific halibut) in length by the number of skates hauled for each station. The sex, state of maturity, prior hook injuries, and depredation are also recorded. Otoliths are collected from a subsample of O32 and U32 halibut.

The setline survey data are analyzed to estimate the coastwide numbers-per-unit-effort (NPUE) and WPUE of O32 halibut and all halibut caught (Total). In 2016, an improved approach (spatio-temporal modeling) was used to estimate density indices (Webster 2017). This space-time model improves estimation by fitting models to the data that account for spatial and temporal dependence, making use of the degree to which the halibut distribution is patchy (has regions of high and low density), and that those patches tend to persist with time. For example, if WPUE is high at a particular location it is more likely to be high at nearby locations, and at the same location in previous and subsequent years. Therefore, information about density at a location and time from a direct observation is also informed by information recorded nearby in space and time. Similarly, such an approach also allows estimation of a density index at a location with no data (e.g., a location between stations, a station with an ineffective set, or a region not surveyed annually). Additionally, auxiliary information collected on the survey (such as station depth) can provide further improvements.

The IPHC annual setline survey does not directly sample stations on the EBS flats (Figure 1-7), except for those around St. Matthew Island and the Pribilof Islands. Instead, data from annual NMFS trawl surveys, calibrated to the 2006 and 2015 IPHC setline surveys in the EBS (Webster et al. 2016), are integrated into the space-time analysis. The annual NMFS EBS trawl survey is used in conjunction with the NMFS/ADFG surveys of Norton Sound (Soong and Hamazaki 2012) to develop an estimate of the density of Pacific halibut in the Bering Sea (see Webster 2014 for details). The EBS trawl survey is calibrated to the setline survey selectivity before it is incorporated into the calculation of the setline survey indices. Therefore, the setline survey does not index smaller halibut (mostly U26). Additionally, data from the NMFS sablefish longline survey have been used to index deep water (>275 fathoms, 503 m) on the Area 4D edge, but are no longer needed with the expanded survey design.

The WPUE and NPUE are standardized to account for hook competition (competition for baits among Pacific halibut and other species) and timing of the survey relative to the total harvest of Pacific halibut. The hook competition adjustment will increase the raw WPUE or NPUE at an individual station slightly with more competition (fewer baits returned) and is applied before the space-time model to account for variability in the standardization among stations. The standardization to account for the amount of harvest taken before the setline survey uses target harvest rates for each IPHC Regulatory Area (See Section 5.4.1) and is done for each IPHC Regulatory Area instead of individual stations.

1.6.2.4 Availability of halibut data

The IPHC setline survey is typically completed in late summer and preliminary results are presented at the IPHC interim meeting in late November, although results may be available before then. It is possible that some minor changes due to data quality control and data checking may occur before the IPHC Annual Meeting in January, but these are not likely to be substantial. WPUE for all years 1993 to current are available for O32 and Total WPUE. Therefore, Total WPUE is used throughout this report since it is most congruent with the IPHC's concept of TCEY (O26 halibut) (See Section 4.4.1) and contains all of the information collected from the IPHC setline survey.

1.6.2.5 IPHC setline survey Pacific halibut abundance in the BSAI

The space-time model provides WPUE and NPUE for each IPHC Regulatory Area, with Area 4CDE combined into a single area. The IPHC Regulatory Areas can be summed together after weighting by bottom area of suitable habitat for Pacific halibut. Space-time model results of Total WPUE for IPHC Regulatory Areas 4A, 4B, and 4CDE are shown in Table 1-5 and Figure 1-8 along with an appropriately combined Total WPUE for all three areas (4ABCDE). The correlation between all of these index time-series is high.

The space-time model uses all years of data to inform the estimated WPUE in each year by estimating spatial and temporal correlations. This has two important outcomes. First, an additional year of observations will result in changes to the entire time-series, with the greatest change occurring to nearby years. For example, the addition of 2019 data slightly changed the index in 2018 as estimated from the previous year when 2019 data were not yet sampled (note this resulted in a 1.21% change from the previous calculated 2018 value). Second, the estimation of spatial and temporal correlation allows for the estimation of stations that were not sampled in a specific year (i.e., uses information from nearby stations that have observations in nearby years). This optimized use of the information from the sampled data reduces uncertainty and allows for the estimation of a consistent time-series over all years. Additionally, estimates of the WPUE can still be produced for areas that were not sampled in a particular year, with appropriate estimated uncertainty. This is particularly important for 2020 with the reduced survey in response to the COVID-19 pandemic crisis. The BSAI region was not surveyed by the IPHC or NMFS surveys (Figure 1-7), but the space-time approach is still able to produce an estimate for the area, with an increased uncertainty, using the observations from previous years and the stations outside of the BSAI that are sampled in 2020. Therefore, even though the BSAI was not sampled in 2020, an estimate from the setline survey for use as an abundance-based management (ABM) index is available, but additional years without data will further increase uncertainty and reduce precision in the predictions. The estimate of the 4ABCDE setline survey index for 2020 is 7,552 and the 2018 and 2019 indices are updated to 7,709 and 7,460, respectively. Therefore, the recent three-year average is 7,574.

Table 1-5 IPHC fishery independent setline survey Total WPUE for the entire coast (coastwide), specific areas in IPHC Regulatory Area 4, and the sum of all areas in IPHC Regulatory Area 4 (4ABCDE) appropriately weighted by bottom area. The indices are standardized to their means (1998-2019) for comparison, except for "Index 4ABCDE," which is the calculated weight-per-unit-effort index (WPUE) for all sizes of Pacific halibut. These estimates do not include 2020 data.

Year	Coastwide	4A	4B	4CDE	4ABCDE	Index 4ABCDE
1998	1.51	2.15	2.55	1.00	1.77	18,577
1999	1.40	1.88	2.04	0.97	1.55	16,155
2000	1.44	1.89	1.87	1.05	1.55	16,207
2001	1.30	1.58	1.38	1.03	1.32	13,681
2002	1.29	1.42	1.03	0.96	1.16	12,037
2003	1.17	1.22	0.84	0.97	1.04	10,862
2004	1.16	1.09	0.76	0.93	0.96	10,128
2005	1.05	0.99	0.71	0.94	0.91	9,856
2006	0.99	0.85	0.82	1.08	0.94	9,932
2007	0.98	0.80	1.01	1.01	0.93	9,922
2008	0.92	0.93	1.01	1.02	0.98	10,714
2009	0.85	0.90	0.84	1.03	0.94	9,989
2010	0.81	0.77	0.73	1.06	0.88	9,271
2011	0.81	0.69	0.75	1.02	0.83	8,896
2012	0.86	0.68	0.63	1.02	0.80	8,539
2013	0.74	0.53	0.75	1.01	0.76	8,133
2014	0.79	0.56	0.65	1.04	0.77	8,173
2015	0.80	0.56	0.67	1.05	0.78	8,385
2016	0.82	0.51	0.68	1.03	0.75	8,134
2017	0.68	0.52	0.62	0.91	0.69	7,583
2018	0.64	0.47	0.69	0.90	0.68	7,228
2019	0.60	0.56	0.60	0.85	0.68	7,104

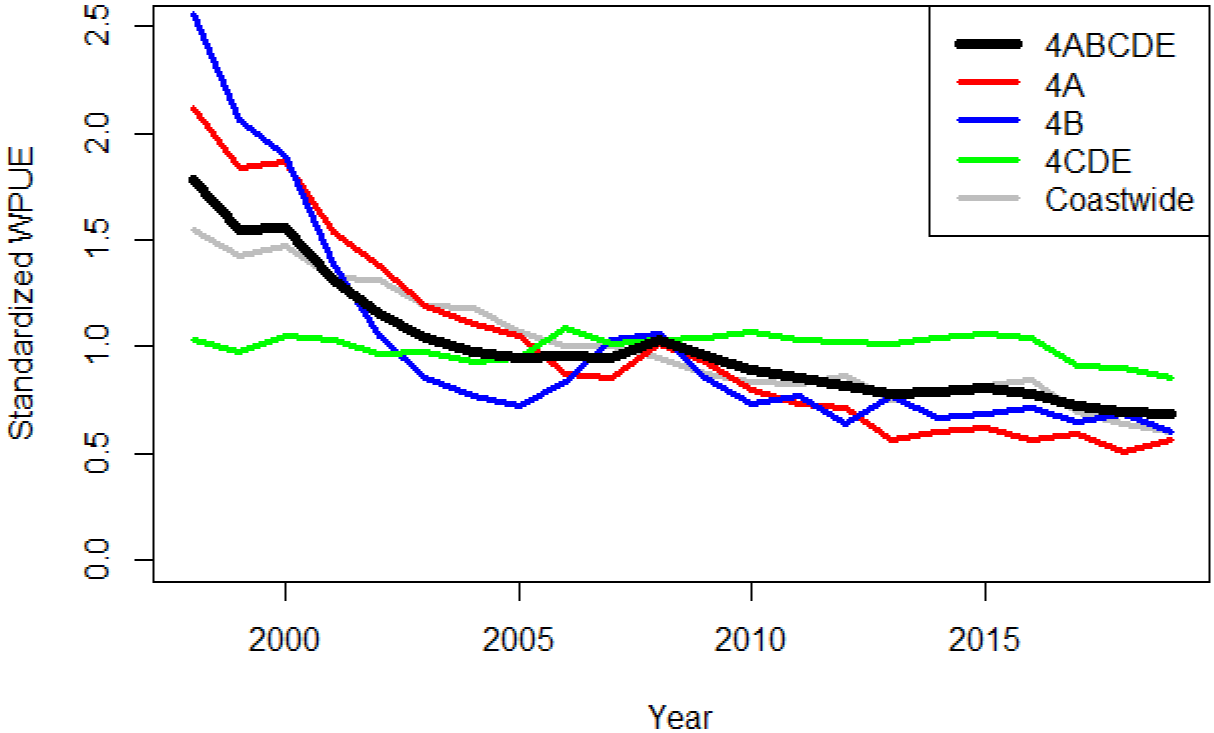


Figure 1-8 WPUE all Pacific halibut (Total) for IPHC Regulatory Areas in Area 4 standardized to the mean of the time series (1998-2019) for each Area. Area 4ABCDE is the sum of Areas 4A, 4B, and 4CDE, and Coastwide is all IPHC Regulatory Areas summed. Summed indices are appropriately weighted by bottom area. These estimates do not include 2020 data.

2 Description of Alternatives

NEPA requires that an EIS analyze a reasonable range of alternatives consistent with the purpose and need for the proposed action. The action alternatives (Alternatives 2-4) in this chapter were designed to accomplish the stated purpose and need for the action. All of the action alternatives were designed to link the PSC limit to halibut abundance for the Amendment 80 (also referred to A80 throughout) sector;[10] other sector PSC limits for BSAI halibut are unaffected. The current halibut PSC limit for the Amendment 80 sector is established in the BSAI Groundfish FMP. Changing the PSC limit for the Amendment 80 sector (under Alternatives 2, 3 and 4) requires amendments to both the FMP and federal regulations.

There are four alternatives under consideration by the Council. While the Council has considered a variety of options and approaches during the scoping and development of this issue (2016-2020; see further discussion in Section 2.7), in October 2020, the Council identified three action alternatives that variously index the halibut PSC limit for the Amendment 80 sector to BSAI halibut abundance using "look up" tables (Table 2-1 though Table 2-3).

For Alternatives 2 through 4, PSC limits would be determined annually by referencing the most recent survey abundance values to a "look up" table. Each "look up" table is a matrix containing a selection of unique PSC limit values that each correspond to an EBS trawl survey state (high or low) and to an IPHC setline survey state (high, medium, and low for Alternative 2 and high, medium, low, and very low for Alternatives 3 and 4). The Alternatives differ from each other with different PSC limit values associated with each pair of EBS trawl survey and IPHC setline survey states.

The Council also adopted three options, applicable under any of Alternatives 2 through 4, which could affect how the PSC limits would be calculated. Option 1 would use the three-year rolling average of the survey estimate instead of the most recent year available for the "look up" table, while other Options 2 is applied in the first year of implementation only to reduce the variability of the initial PSC limit change. Option 3 provides an additional threshold level below the PSC limit to increase the incentive to reduce bycatch to the extent practicable. The alternatives and options are discussed in more detail in the subsections that follow.

Alternative 1: No action. BSAI halibut Amendment 80 PSC limit is 1,745 mt.
Alternative 2: A 3X2 look up table with PSC limits that range from current PSC limit to 20% below current limit. PSC limit is determined annually based on the most recent survey values.

Table 2-1 Alternative 2: 3x2 look up table to determine PSC limits based on survey states, with PSC limits that range from current PSC limit to 20% below current limit.

		EBS shelf trawl survey index (mt)	
		Low < 150,000	High ≥ 150,000
IPHC setline survey index in Area 4ABCDE (WPUE)	High ≥ 11,000	1,571 mt (10% below current)	1,745 mt (current limit)
	Medium 8,000 – 10,999	1,483 mt (15% below current)	1,571 mt (10% below current)
	Low < 8,000	1,396 mt (20% below current)	1,483 mt (15% below current)

[10] See Section 3.3 for a description of the Amendment 80 sector.

Alternative 3: A 4X2 look up table with PSC limits that range from 15% above current PSC limit to 30% below current limit. PSC limit is determined annually based on the most recent survey values.

Table 2-2 Alternative 3: 4x2 look up table to determine PSC limits based on survey states, with PSC limits that range from 15% above current PSC limit to 30% below current limit.

		EBS shelf trawl survey index (mt)	
		Low < 150,000	High ≥ 150,000
IPHC setline survey index in Area 4ABCDE (WPUE)	High ≥ 11,000	1,745 mt (current limit)	2,007 mt (15% above current)
	Medium 8,000 – 10,999	1,396 mt (20% below current)	1,745 mt (current limit)
	Low 6,000-7,999	1,309 mt (25% below current)	1,396 mt (20% below current)
	Very Low < 6,000	1,222 mt (30% below current)	1,309 mt (25% below current)

Alternative 4: A 4X2 look up table to determine PSC limits based on survey states, with PSC limits that range from current PSC limit to 45% below current limit.

Table 2-3 Alternative 4: 4x2 Look up table to determine PSC limits based on survey states, with PSC limits that range from current PSC limit to 45% below current limit.

		EBS shelf trawl survey index (mt)	
		Low **< 150,000**	**High** **≥ 150,000**
IPHC setline survey index in Area 4ABCDE (WPUE)	**High** **≥ 11,000**	1,396 mt (20% below current)	1,745 mt (current limit)
	Medium **8,000 – 10,999**	1,222 mt (30% below current)	1,396 mt (20% below current)
	Low **6,000-7,999**	1,047 mt (40% below current)	1,222 mt (30% below current)
	Very Low **< 6,000**	960 mt (45% below current)	1,047 mt (40% below current)

2.1 Alternative 1, No Action

Under the No Action alternative, the BSAI PSC limits that are set in the FMP and in regulation as an amount of halibut equivalent to 3,515 mt of halibut mortality would remain unchanged. Within that total, the BSAI PSC limit for the Amendment 80 sector is set in the FMP and in regulation as an amount of halibut mortality equivalent to 1,745 mt (implemented at that level in 2016). The Amendment 80 trawl PSC limit is specifically allocated among the Amendment 80 cooperative(s) and the Amendment 80 limited access sector; however the Amendment 80 sector is currently comprised of a single cooperative, the Alaska Seafood Cooperative (AKSC), and there is currently no limited access participation. All vessels fishing in the sector must stop fishing for the remainder of the year when the annual PSC limit is reached. Table 2-4 provides data on halibut PSC mortality usage in the Amendment 80 sector from 2010 through 2020.

Table 2-4 Halibut PSC limit, encounters, and mortality by Amendment 80 sector, 2010 through 2020

A80 Sector	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PSC limit	2,425	2,375	2,325	2,325	2,325	2,325	1,745	1,745	1,745	1,745	1,745
Halibut encounters	2,823	2,277	2,469	2,677	2,667	2,200	1,965	1,976	2,555	3,067	2,031
Halibut mortality	2,254	1,810	1,944	2,166	2,178	1,638	1,412	1,167	1,343	1,461	1,097

Note: Halibut PSC that occurs on an A80 vessel due to harvest in the CDQ fishery is not included in this table.

2.2 Alternatives 2 through 4: Set PSC Limit for Amendment 80 based on Abundance of BSAI halibut according to tables employing levels of both the EBS trawl and the IPHC Setline Survey

Under Alternatives 2 through 4, the Amendment 80 sector halibut PSC limit would be prescribed annually based on look up tables, such that the level of the PSC limit (mt of halibut mortality) would be based on the independent values of two survey abundance indices: the EBS shelf trawl survey index (mt) and the IPHC setline survey index in Area 4ABCDE (WPUE).

The look up tables, which are different for each alternative, determine the Amendment 80 sector PSC limit based on the intercept of the two survey index values. Each alternative defines the same two states for the EBS trawl survey ("low" or "high") but differ by defining either three ("low/medium/high") or four (addition of a "very low") states for the IPHC survey. Figure 2-1 shows the historical EBS trawl survey biomass estimates with the delineation of low and high (below or above 150,000 mt) as indicated in Alternatives 2-4.[11] Figure 2-2 shows the biomass estimates for the IPHC Setline Survey historically with delineations for the ranges of states as indicated in Alternatives 2-4 (Very Low: <6,000, Low: 6,000-7,999, Medium: 8,000-10,999 and High: ≥11,000, note the Very Low state does not apply to Alternative 2). The breakpoints employed in these look up tables were determined by visual inspection of relative trends in the survey indices historically. Under all three of these Alternatives, the survey data for determining the appropriate 'state' under any of the look up tables would occur in the Fall of the preceding year (see Figure 2-3), to determine the appropriate PSC limit in the subsequent year.

[11] Note this and the following figure also illustrate survey values using the three-year rolling average as proposed under Option 1.

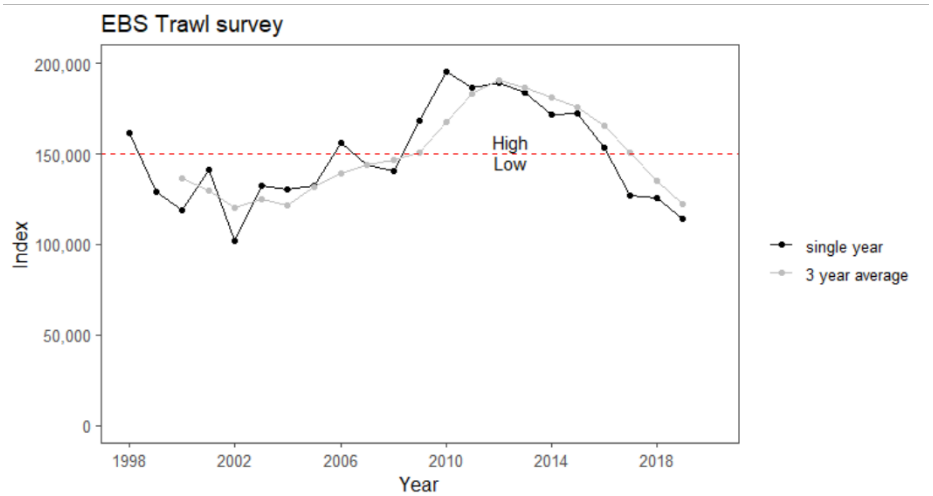


Figure 2-1 Historical values of the EBS trawl survey (mt) 1998 – 2019 for single point value in that year (black line and points) or Option 1's rolling three year average (grey).

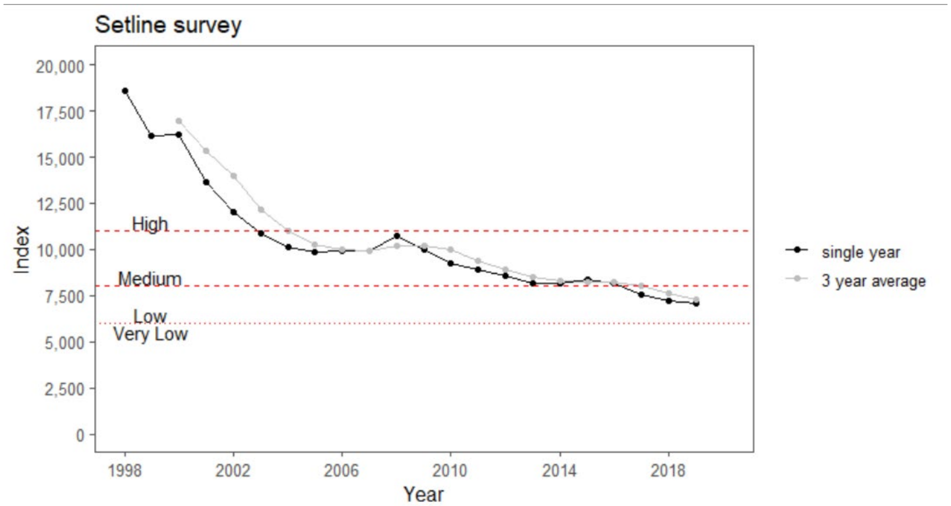


Figure 2-2 Historical values of the IPHC setline survey (WPUE) 1998 – 2019 for single point value in that year (black line and points) or Option 1's rolling three year average (grey).

Year of survey	Setline		Trawl		Year PSC limit set	Lookup tables		
	Index	State	Index	State				
Alternative		2,3,4		2, 3, 4	Alternative	2	3	4
2015	8,385	Medium	172,237	High	2016	1571	1745	1396
2016	8,134	Medium	153,704	High	2017	1571	1745	1396
2017	7,583	Low	126,684	Low	2018	1396	1309	1047
2018	7,228	Low	125,957	Low	2019	1396	1309	1047
2019	7,104	Low	113,855	Low	2020	1396	1309	1047

Figure 2-3 Schematic for understanding the timing of survey availability and resulting PSC limit setting as shown in Table 2-5

Table 2-5 contains the historical survey values for both surveys (1998 through 2019), their resulting state in that year as defined under the alternatives, and what the Amendment 80 PSC limit would have been in each historical year, under each Alternative, had the PSC limits been calculated under those survey states.

Table 2-5 Historical survey values for IPHC Setline index (WPUE), EBS Trawl (mt) and resulting PSC limit 'States" for each based on Alternatives 2 – 4 (left panel) (High/Medium/Low/Very Low). Note that current survey values for setline have not reached the established 'very low' level as specified under Alternatives 3 and 4. Back-calculated PSC limits based on Alternatives 2-4 are shown (right panel). Note that the year of PSC limit is lagged one year from the survey year as the determination of survey value is made in the year prior to implementation of the PSC limit.

	Setline		Trawl			PSC Limits from Look up tables		
Survey year	Index	State	Index	State	PSC Limit year	Alt 2	Alt 3	Alt 4
1998	18,577	High	161,256	High	1999	1745	2007	1745
1999	16,155	High	129,116	Low	2000	1571	1745	1396
2000	16,207	High	118,677	Low	2001	1571	1745	1396
2001	13,681	High	141,219	Low	2002	1571	1745	1396
2002	12,037	High	101,706	Low	2003	1571	1745	1396
2003	10,862	Medium	132,151	Low	2004	1483	1396	1222
2004	10,128	Medium	130,075	Low	2005	1483	1396	1222
2005	9,856	Medium	132,518	Low	2006	1483	1396	1222
2006	9,932	Medium	155,964	High	2007	1571	1745	1396
2007	9,922	Medium	143,903	Low	2008	1483	1396	1222
2008	10,714	Medium	140,247	Low	2009	1483	1396	1222
2009	9,989	Medium	168,102	High	2010	1571	1745	1396
2010	9,271	Medium	195,535	High	2011	1571	1745	1396
2011	8,896	Medium	186,666	High	2012	1571	1745	1396
2012	8,539	Medium	189,000	High	2013	1571	1745	1396
2013	8,133	Medium	183,989	High	2014	1571	1745	1396
2014	8,173	Medium	171,427	High	2015	1571	1745	1396
2015	8,385	Medium	172,237	High	2016	1571	1745	1396
2016	8,134	Medium	153,704	High	2017	1571	1745	1396
2017	7,583	Low	126,684	Low	2018	1396	1309	1047
2018	7,228	Low	125,957	Low	2019	1396	1309	1047
2019	7,104	Low	113,855	Low	2020	1396	1309	1047

2.3 Options that could apply to Alternatives

There are three options being considered. Selection of these options is not mandatory. The options are not mutually exclusive.

2.3.1 Option 1: Rolling survey average to determine PSC limits

PSC limit is determined using a 3-year rolling average of survey index values instead of the most recent survey value.

This option would be used to smooth inter-annual variability in the PSC limit based on changes in the survey index from one year to the next using the most recent three years of survey data available. Absent this option being selected, the most recent survey year value would determine the survey state for PSC setting in the subsequent year.

2.3.2 Option 2: PSC variability

In the first year of implementation, the PSC limit varies no more than (i: 10% or ii: 15%) from the status quo limit (1,745 mt)

Under Option 2, the Suboption, or percentage of PSC limit, selected constrains the determination of the new PSC limit in the first year of implementation after it is calculated using the Alternative's look up table. The purpose of this option is to reduce the initial inter-annual variability in the PSC limit in the first year of implementation. Regardless of the PSC limit determined from the look up table, the PSC limit in the first year of implementation must fall within the range 1,483 to 2,006 (representing a variability of +/- maximum 15% change from status quo 1,745 mt).

2.3.3 Option 3: Annual limit

Establish an annual limit of (i: 80% or ii: 90%) of the PSC limit generated by the look up table. In 3 of 7 years, the A80 sector may exceed the annual limit up to the PSC limit generated by the look up table. If the A80 sector has exceeded the annual limit in 3 of the past 7 years, then the annual limit is a hard cap for the following year.

The purpose of the annual limit (80-90% of the PSC limit generated from the action Alternatives look up tables) is to incentivize the Amendment 80 sector to achieve halibut bycatch mortality levels that are lower than the look up table PSC limit at all times. As such, the Amendment 80 sector would be permitted to incur an amount of halibut PSC mortality that is above the annual limit but below the PSC limit generated by the look up table in 3 of any 7 consecutive years, as assessed on a rolling 7-year timeline. If the Amendment 80 sector exceeds the annual limit in 3 of 7 years, then the annual limit proportion of the PSC limit generated by the look up table is a hard cap the following year.

In any given year, the Amendment 80 sector's PSC mortality is assessed against the annual limit to determine whether or not it has been exceeded. Next, the result from that year plus the results for the six preceding years will be assessed in total to determine whether the annual limit was exceeded in 3 of 7 years. If so, the annual limit becomes a hard limit in the following year. This process is triggered only following a year where PSC mortality exceeds the annual limit. Therefore, in years where the annual limit is not exceeded, the mortality in the previous 6 years is irrelevant. The sector does not remain under a hard cap each subsequent year until the sector is out of the 3 in 7 trigger,[12] however if the next time it is exceeded is within that trigger time frame, the subsequent year will again trigger a hard cap set at the level of the annual limit. It is therefore possible historically to have more than 3 times in a 7-year period in which the annual limit is exceeded. **If the Council selects this option at final action it may wish to clarify that the intent is not to retain the annual limit as a hard cap in subsequent years and only if triggered again following an annual limit[13] being exceeded**. It is therefore impossible to have the annual limit imposed as a hard cap two years in a row.

Table 2-6 provides a hypothetical series of incidences whereby the annual limit is exceeded in a number of years and a hard cap is imposed for the following year. The annual limit is imposed as a hard cap (shown in red text) only in a year where: 1) the previous year exceeded the annual limit and 2) the years over the limit is 3 or more in the last 7 (shown by grey shaded cells). In this example the annual limit is exceeded for the third time within 7 years in 2025 (after the annual limit was exceeded in 2021 and 2024). Thus, in 2026 annual limit level is imposed as a PSC limit. Because the sector will be shut down if it reaches the hard cap, 2026 is automatically a year in which the annual limit is not exceeded. Therefore, in 2027 operations resume under both an annual limit and a PSC limit. However, in 2028 the annual limit is again exceeded, imposing a hard cap (at the annual limit level) in 2029. This occurs because 2028 is the

[12] The language in the option should be modified to clarify this.
[13] For consistency with regulations at § 679.21(f)(6) if this option is selected as part of the Preferred Alternative (PA) the Council may wish to redefine the term "annual limit" as "annual threshold."

third time within the rolling 7-year period (2022 through 2028) in which the annual limit was exceeded. As with 2027, operations in 2030 return to being prosecuted under an annual limit that is not binding.

Table 2-6 Hypothetical synopsis of application of annual limit under Option 3 and the interplay between when it is imposed as a hard cap and for how long. A year specified as bold is prosecuted under a hard cap in that year.

Year	Annual Limit exceeded	Annual Limit imposed as a Hard cap	Years Over Limit
2021	Y	N	1 of 1
2022	N	N	1 of 2
2023	N	N	1 of 3
2024	Y	N	2 of 4
2025	Y	N	3 of 5
2026	NA	Y	3 of 6
2027	N	N	3 of 7
2028	Y	N	3 of 7
2029	NA	Y	3 of 7
2030	N	N	3 of 7

There may be unintended negative incentives to avoid bycatch in situations where the annual limit is close to or likely to be exceeded under this option. Additional mechanisms could be considered to incentivize continuing to reduce bycatch even if the annual limit is being approached or exceeded. As currently structured, once the annual limit is exceeded in a given year, based on within year PSC mortality the incentive to continue to reduce bycatch within that year is negligible until the PSC limit itself is being approached. Similarly, bycatch that remains below the annual limit is acceptable even if the annual limit is narrowly approached (e.g. 1 mt below is still counted as a 'below' year therefore the incentive to remain substantially below the annual limit may be weak). Some additional mechanisms to provide for continued PSC mortality reduction under these circumstances could be considered in conjunction with the structure of Option 3, such as evaluating whether or not an overage occurs on a rolling multi-year basis rather than only within a single year to determine a closure. Under that circumstance, PSC mortality would be assessed based on a rolling number of years to determine if the annual limit is exceeded rather than only based upon the within year PSC mortality. In that case, the overall PSC mortality in any one year remains relevant to bycatch avoidance actions that could impact the following year and provide incentive to continue to reduce bycatch to the extent practicable under any situation of single year overage.

2.4 Historical Comparison of Alternatives

Figures and tables in this section are designed to provide an overall comparison of PSC limits from 2009 through 2019 with the potential PSC limits under all of the alternatives. Figure 2-5 shows that PSC limits since 2016 have fallen to the level of the upper PSC limits included in the look up tables of the proposed alternatives, but not the lower PSC limits.

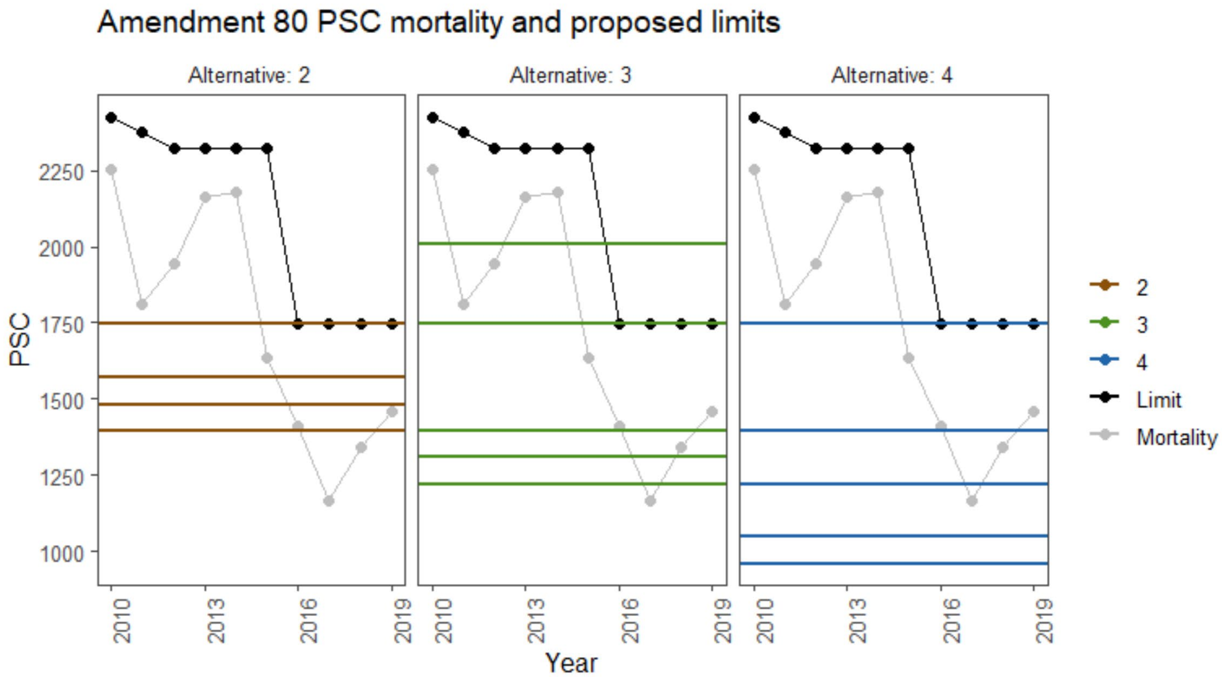


Figure 2-4 Historical comparison of the status quo PSC limits compared with the proposed PSC limits under each alternative, as indicated by solid bands (brown Alt2; green Alt 3; blue Alt 4). Black line is the actual historical PSC limit while grey indicates the actual PSC mortality. The status quo PSC limit from 2016-present is 1,745 mt.

Table 2-7 provides a comparison across the alternatives by indicating the PSC limits that apply to each alternative, as derived from various combinations of the EBS trawl and IPHC setline survey states. Figure 2-1, Figure 2-2, and Figure 2-4 provide the historical context of the observed values from these surveys and how they are applied to the identified states (1998-2019).

Table 2-7 Comparison of PSC limits across all three action alternatives with the survey states necessary to achieve that limit.

	Alt 2				Alt 3				Alt 4			
	EBS		Setline		EBS		Setline		EBS		Setline	
PSC limit	State	Index	State	Index	State	Index	State	Index	State	Index	State	Index
960									low	<150,000	very low	<6,000
1047									low	<150,000	low	6,000-7,999
									high	>150,000	very low	<6,000
1222					low	<150,000	very low	<6,000	low	<150,000	medium	8,000-10,999
									high	>150,000	low	6,000-7,999
1309					low	<150,000	low	6,000-7,999				
					high	>150,000	very low	<6,000				
1396	low	<150,000	low	<8,000	low	<150,000	medium	8,000-10,999	low	<150,000	high	>=11,000
					high	>150,000	low	6,000-7,999	high	>150,000	medium	8,000-10,999
1483	low	<150,000	medium	8,000-10,999								
	high	>150,000	low	<8,000								
1571	low	<150,000	high	>=11,000								
	high	>150,000	medium	8,000-10,999								
1745	high	>150,000	high	>=11,000	low	<150,000	high	>=11,000	high	>150,000	high	>=11,000
					high	>150,000	medium	8,000-10,999				
2007					high	>150,000	high	>=11,000				

Table 2-8 provides a comparison of the PSC limits across the alternatives resulting from identical survey states. Alternatives 2 and 4 set the maximum PSC limit equal to the status quo limit (1,745 mt). The maximum PSC limit in Alternative 3 is set at 2,007 mt. Minimum PSC limits across the action alternatives range from 20%-45% below the status quo. Because this action only applies to the PSC limit for the Amendment 80 sector, these proposed PSC limits represent potentially substantial changes relative to fixed limits for other sectors. For comparison, Table 2-9 shows the minimum and maximum PSC limits by alternative for Amendment 80 with the current fixed regulatory limits for the other sectors (see Section 2.7 alternatives considered, but not carried forward for the rationale in not addressing PSC limits across other sectors within the scope of this current analysis).

Table 2-8 Survey states, and the PSC limits that result from those combinations across alternatives

EBS		Setline		PSC limits		
State	**Index**	**State**	**Index**	**Alt 2**	**Alt 3**	**Alt 4**
low	<150,000	very low	<6,000	1396	1222	960
low	<150,000	low	6,000-7,999	1396	1309	1047
low	<150,000	medium	8,000-10,999	1483	1396	1222
low	<150,000	high	≥11,000	1571	1745	1396
high	>150,000	very low	<6,000	1483	1309	1047
high	>150,000	low	6,000-7,999	1483	1396	1222
high	>150,000	medium	8,000-10,999	1571	1745	1396
high	>150,000	high	≥11,000	1745	2007	1745

Table 2-9 Minimum and maximum PSC limits by alternative for Amendment 80 as compared with fixed limits for others sectors not impacted by this action

Groundfish Sector	A80	A80	A80	A80	BSAI TLAS	Non-Trawl	CDQ
Alternative	1	2	3	4	All	All	All
Minimum PSC Limit	1745	1396	1222	960	745	710	315
Maximum PSC Limit	1745	1745	2007	1745	745	710	315

2.5 Process for specifying PSC limits under Alternative 2 - 4

Alternatives 2 through 4 would necessitate changing PSC limits annually for the Amendment 80 sector based on the look up table associated with the selected alternative. The look up table would be included in regulation, while each fall the survey state for each of the two survey indices will be determined and will be referenced in the look up table to establish the PSC limit for the following year. This is similar to the Bering Sea Chinook PSC limits that are specified in regulation, with an annual determination of low or high Chinook abundance indicating whether the lower or higher PSC limits are specified for the next year (see regulations at § 679.21(f)(6)). For this proposed halibut abundance-based management action any of the options applied to the alternatives would also be included in regulation. Thus, while information on the PSC limit and annual limit (if Option 3 is selected) would be available to the Council in conjunction with the specifications process, there would be no action required of the Council in October or December to specify the PSC limit for the following year. As shown in Figure 2-5, while information may be insufficient in October of a given year to determine the subsequent year's PSC limit (and annual limit if Option 3 is selected), that information would be available for December and may help inform TAC-setting.

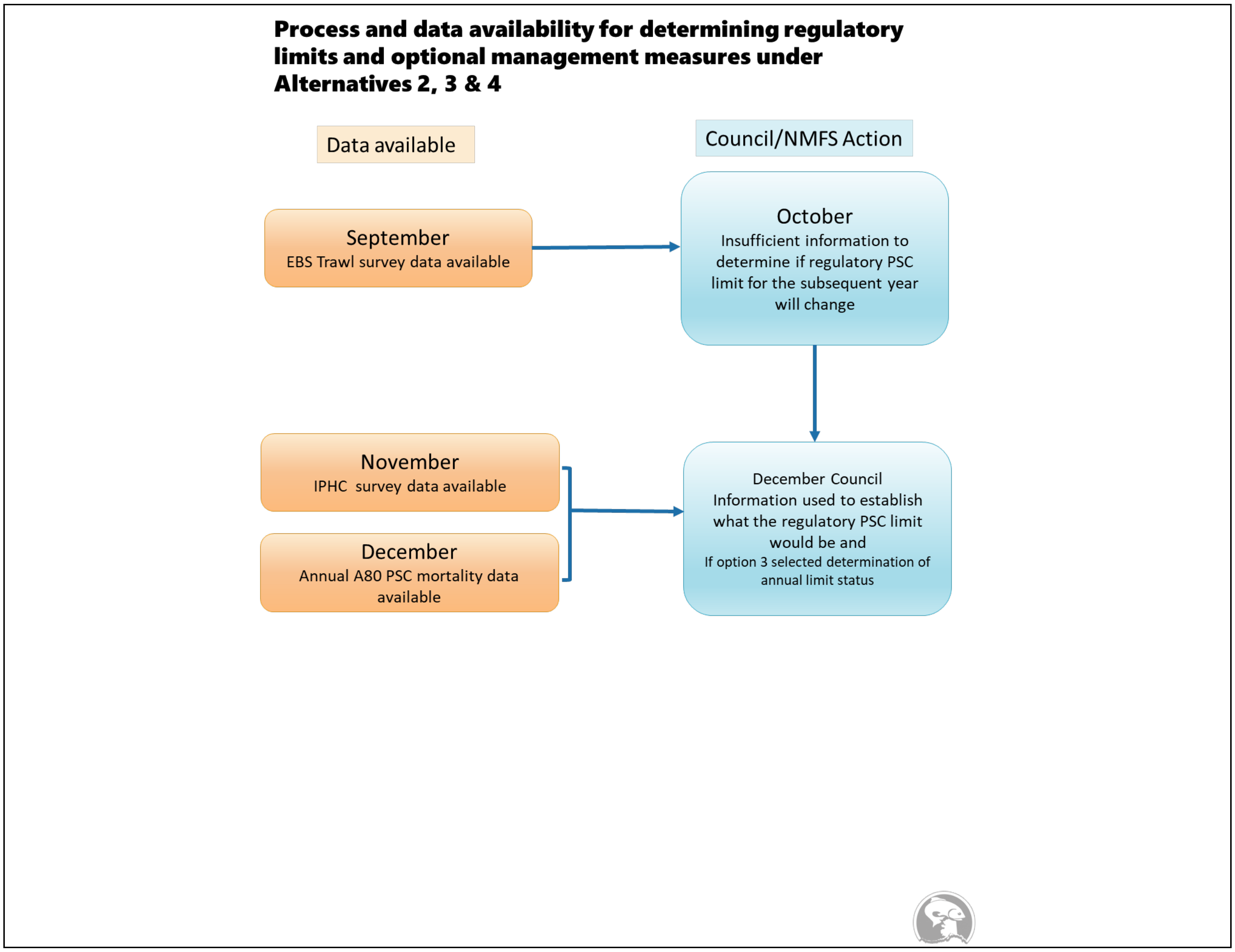


Figure 2-5 Information available for annual changing regulatory halibut PSC limits under Alternatives 2, 3, 4.

As discussed in Section 1.6.1, **with the exception of 2020,** EBS trawl survey biomass estimates are available annually for the September Groundfish Plan Team meetings. Information to assign the trawl survey state for use in the look up table would be available at that time,[14] which may provide the public some idea of whether or not the PSC limit is likely to change for the following year (i.e. if the EBS trawl survey has increased or decreased sufficiently from the previous year to shift from a low or high threshold at 150,000 mt). However, IPHC setline survey estimates may not be available until late October or possibly late November, because the survey is typically not completed until early September and time is needed to verify and model the data.

If the revised PSC limit in December is considerably lower than the one previously approved for opening the fishery in January (from the previous year), it may be adjusted in-season as needed by NMFS. See Section 3.2.1 on NMFS authority for in season adjustments to start the fishing year prior to final specifications being approved in March. This is of particular importance in the event of PSC or annual limits that decrease from one year to the next.

If Option 3 is applied to any of the Alternatives 2, 3, or 4, a determination of Amendment 80 PSC usage would be necessary before establishing whether an annual limit was exceeded. This information is generally available immediately following the close of the fishery and should be available in time for final

[14] See section 2.4 for considerations of no new survey data

specifications in December. Regardless, NMFS will provide a notice to the public to designate the proceeding years PSC limit prior to the start of fishing.

If Option 2 is selected, it is only employed in the first year of implementation of this proposed action.

2.6 Considerations in the circumstance of no new survey data

In 2020, the annual EBS trawl survey and the IPHC EBS setline survey component were cancelled due to the COVID-19 pandemic crisis, and a reduced survey effort was completed in the GOA and other regions. As of this writing, it is unknown if surveys will occur as regularly planned in 2021. In the absence of new data in any given year under any of the alternatives, the Council may wish to set the limits at the PSC limit from the previous year. Should there be multiple years without additional survey data the Council could consider an adjustment to the limit (higher or lower) depending upon the trend in survey data from previous years. **The Council should clarify how it would set annual PSC limits in the absence of one or more years of survey data.**

2.7 Alternatives considered but not carried forward for analysis

Complex multi-dimensional control rules: A preliminary review DEIS was presented to the Council in October 2020. At that time a more complex formulation of 2 and 3-dimensional control rules were considered for establishing halibut PSC limits. A two-dimensional control rule sets the control rule based on two variables (e.g., biomass and PSC limit) while a three-dimensional control rule adds an additional variable (e.g., two different estimates of biomass for both survey indices and a PSC limit as the third). Each alternative contained a range of starting points (e.g., the value of the PSC limit at the time of implementation) and slopes (e.g., the rate of change of the PSC limit with changes in the biomass estimate). At that time a discussion paper was also presented which provided, among other considerations, a more simplified approach to setting PSC limits indexed to halibut abundance using look up tables. Following Council review of both the discussion paper and preliminary review DEIS in October 2020, the Council chose to pursue further analysis of only the more simplified approach to setting PSC limits as being more transparent to the public. Therefore, the previous more complex set of Alternatives, Elements and Options which had been under development for several Council meetings (see Table 1-2) was replaced by the current alternative set presented in this DEIS.

Closed loop simulation modeling: Additionally, during review of the October 2020 analysis, the Council requested the analysts pursue a more simplified analysis that did not involve projecting alternative impacts based on the halibut operating model (described in Section 4.3) based on SSC recommendations regarding the use of the model results for context only. The Council's Purpose and Need for this action was also revised. As a result of that revision the previous 5 'inferred objectives' derived from the Purpose and Need for purposes of the modeling exercise were superseded by the focus upon adhering to balancing the National Standards as noted in the Council review.

Roll-over provisions for PSC: An option to roll over a percentage of unused PSC from one year to the next was considered for the April 2021 initial review DEIS but was eliminated from consideration at that time due to difficulties in incorporating such a provision with annually varying PSC limits.

Alternatives that apply to all groundfish fishing sectors: Additional alternatives had been considered previous to the October 2020 alternative set, including a broader alternative set, which included linking PSC limits to abundance for all fishing sectors in the BSAI: the fixed gear sector, BSAI trawl limited access sector and the CDQ. Those alternatives ranged from status quo with fixed halibut PSC limits by sector to a range of complex gear-specific PSC limits linked to BSAI halibut abundance for all sectors. Under that set of alternatives PSC limits would be established for all sectors by gear type (aggregate trawl PSC limit and an aggregate non-trawl PSC limit) using the two- and three-dimensional control rules under consideration at that time (which are superseded by the current alternative set as noted above). In February 2020 the Council narrowed the focus of the action and accompanying analysis to only the

Amendment 80 sector, eliminating the other sectors from the action and analysis, because Amendment 80 sector comprises the majority of halibut PSC mortality.

Standardized survey indices: In previous discussions, the potential benefits of standardized survey indices versus absolute values of biomass in an approach to abundance-based halibut PSC management have been summarized given the way survey index values are derived. The implications of using a standardized estimate of survey abundance as it relates to the IPHC setline survey is discussed under Section 1.1.2.5 of this analysis and more generally in the SSC minutes from April 2021.

From the SSC minutes (April 2021):

> *The SSC notes that the Council has framed the look up tables for each alternative for evaluation in terms of absolute levels for the two indices of halibut abundance, the IPHC modelled setline survey index and the Bering Sea trawl survey. The SSC strongly cautions against using indices of abundance couched in absolute units for look up tables. The IPHC's survey index is based on a spatio-temporal model, meaning the scale of the entire time series can change during any update to the data or modelling methods. This could lead to unintended and changing relationships between the scale of recent years, the status quo and the specified absolute levels in the table. Specifically, the state of the PSC lookup value could change location in the tables due to methodological changes rather than actual changes in the survey observations. Similarly, model-based estimators are now used for both Pacific cod and pollock in order to include the northern Bering Sea as the distributions of these species shift northward; a similar approach for halibut would lead to model-based estimators on both axes of the look up tables. The SSC notes that the analysts have cautioned against using absolute indices from the beginning of halibut ABM and used primarily relative indices in their earlier alternatives. The SSC recommends treating the indices of abundance as relative values compared to a specific year (or years) in order to eliminate this potential scaling problem and ensure that future use of the tables remains consistent with their intent at the outset.*

The Council has considered this, but analysts acknowledged that basing a look up table on standardized values makes it more difficult for stakeholders to read reported survey indices in a given year and map those onto a table to anticipate the resulting Amendment 80 PSC limit. Nevertheless, the estimates from the EBS trawl survey and the IPHC setline survey are relative indices and are not considered absolute estimates. The relative difference between estimates in each year (i.e., the trend) is the important outcome of the survey estimates. As with the IPHC space-time model, a spatiotemporal approach to estimate trawl survey trends or improved survey methods should it be employed in the future would likely result in changes to annual estimates for the entire survey time-series. In summary, the absolute values for the survey index are dependent on the assumptions of the survey design and data analysis, whereas a standardized index could show less year-on-year variability. However, in the interest of greater transparency to the public and in regulation, the Council chose to go with absolute values from the surveys recognizing that these historical values could change in the future. This is similar to how other PSC limits are set in the BSAI.

Additional alternatives and concepts that have been considered in previous iterations of this ABM action are listed below:

Indices of abundance: A wide range of different abundance indices were considered for linking halibut abundance to halibut PSC in the development of alternatives before selecting the EBS Trawl survey and the IPHC setline survey for the alternatives. Additional indices considered include the EBS slope survey, the GOA bottom trawl survey, the AFSC longline survey and the IPHC coastwise assessment results. Different size categories of halibut from these surveys were also considered to develop a 'juvenile index' of abundance. In addition, several fishery catch-per-unit-effort indices were also considered. The Council also considered indices in numbers instead of biomass. Additional information and correlation amongst these various indices are contained in Appendix 2 of the October 2019 DEIS. The SSC determined that the most appropriate indices for indexing PSC limits to abundance are the EBS trawl survey and the IPHC Setline survey.

Simplified bycatch control rules: In April 2016, an appendix to a discussion paper proposed some simplified bycatch control rules (referred to as BCRs). These proposed BCRs included a ratio of historical bycatch to indices of abundance from the IPHC setline survey and the EBS trawl survey as well as consideration of target spawning biomass and weighted based upon the previous year's PSC limit. These concepts were not carried forward by the Council at that time.

Extension to the GOA: The Council briefly considered extending the ABM analysis to include the Gulf of Alaska but deferred further consideration of this to after the Bering Sea ABM PSC action was completed.

3 Groundfish Stock Status and Amendment 80 Fishery Description

3.1 Description of Groundfish resources

The Council recommends annual catch limits, allocations, and PSC limits for the federally managed commercial groundfish fisheries in the BSAI. Target species managed in the BSAI FMP include: walleye pollock, Pacific cod, sablefish, various flatfishes (yellowfin sole, Greenland turbot, arrowtooth and Kamchatka flounders, northern rock sole, flathead sole, Alaska plaice, and others), various rockfish species (Pacific ocean perch, northern rockfish, rougheye and blackspotted rockfish, shortraker rockfish, and others), Atka mackerel, skates, sculpins, sharks, squids, and octopuses. Among the BSAI groundfish fisheries managed under the FMP is the sector that would be directly regulated by the action alternatives under consideration: the BSAI non-pollock trawl CP sector, commonly referred to as Amendment 80 (A80). This section of the DEIS describes how BSAI groundfish are assessed and managed, as well as the manner in which the A80 sector has operated since its implementation in 2008.

This document focuses on the A80 sector from among the several BSAI groundfish fisheries due to the narrowed scope of the proposed action alternatives. The preliminary analysis that was reviewed by the Council in October 2019 provided background on the other BSAI groundfish fisheries for which halibut PSC limits are established (NPFMC 2019a; Section 3). That information is incorporated here by reference. Those fisheries include the trawl limited access sector (TLAS), the hook-and-line CP sector (HALCP; often referred to as the Freezer Longline Coalition cooperative or FLC), the hook-and-line CV sector (HALCV), and the groundfish and PSC allocations made to Community Development Quota (CDQ) groups which are fished using a variety of gear types (trawl, HAL, pot) on vessels owned by the groups or in partnership with other groundfish harvest companies.

Annual Stock Assessment Fishery Evaluation (SAFE) report and Ecosystem Status Report (ESR) for 2020
The annual BSAI Groundfish SAFE Report (NPFMC 2020b), which is considered by the Council during its annual December meeting when determining the biennial final harvest specifications, provides a detailed discussion of the status of individual groundfish stocks, and is incorporated here by reference. The Council also receives an Ecosystem Status Report (ESR) on an annual basis in conjunction with setting harvest specifications. Given the lack or surveys in 2020, a brief summary of environmental conditions in 2019 is summarized below (excerpted from the ESR portion of the 2019 SAFE Report Introduction; NPFMC 2019b).

2019 represented the warmest bottom temperatures on record for the EBS, including unpreceded warm conditions in the inner domain, it is also a second winter in a row of low sea ice in NBS, with “physics to fisheries” impacts on the cold pool through fish distributions (juveniles and adults). Sea ice extent was anomalously low in the winter of 2018/2019 (despite an early near-normal ice extent through Jan. that rapidly retreated in Feb. 2019). As a result, there was a small cold pool in the NBS (only slightly larger than 2018). The zooplankton prey base in 2019 was dominated by small, lipid poor copepods and there was a low abundance of lipid rich large copepods and euphausiids. This shift in prey base has potential impacts on the carrying capacity of the system, especially for newly recruited juvenile fish. In contrast to previous years, there were below average coccolithophore blooms in 2019. The spring bloom was ~9 days earlier than normal, and jellyfish abundance continued to increase.

Upper trophic level responses were mixed. There was declaration by NOAA of an Unusual Mortality Event (UME) due to 200+ emaciation-caused deaths of gray whales migrating back to the EBS. This reflects the poor 2018 foraging conditions; in the EBS gray whales feed on amphipods, mysids, crab larvae, and are in potential competition with groundfish in the NBS. Similarly, short-tailed shearwater die-offs were observed in 2019, reflective of 2018 foraging conditions (e.g., euphausiids) in the EBS before making migrations. Like previous years, ice seals continued to be impacted by lack of sea ice. A

NOAA UME was also declared for Ice Seals in 2019. Like gray whales, many carcasses were young animals that were in poor condition or emaciated, and pups exhibited a decline in condition (blubber thickness), possibly reflecting competition with fish in the NBS and lack of ice.

In contrast, conditions likely improved in 2019 for other upper-trophic consumers like seabirds (except short-tailed shearwaters). Seabirds may have been successful at finding lipid rich copepods and euphausiids, even though abundances were low, competition for available prey may have been reduced as a result of shearwater mortality and/or poor recruitment events for fish species. Colonies at the Pribilof Islands may have benefited from northward shifts in fish populations. There remains a high level of concern regarding food security for local communities in Alaska that rely on subsistence resources including seabirds.

Similarly, fish condition in the Southeastern Bering Sea (SEBS) survey in 2019 was above average. Multiple groundfish stocks like pollock appear to be persisting through warm conditions and/or are utilizing cold water refugia in the Northern Bering Sea. For example, the pollock 2018-year class appears strong, Pacific cod biomass continue to increase in the NBS, and groundfish condition across multiple species increased from 2018. Groundfish biomass in the NBS continued to increase (30% since 2017) as did abundance (52% increase relative to the 2017 survey). Abundance in the SEBS increase 112% from 2018 while biomass increased slightly (2% relative to 2018). There was indication of recruitment of some key fish species in both areas (e.g., Pacific cod). Juvenile Walleye pollock (age 0) pollock were captured in the NBS, and the SEBS saw a 75% increase in juvenile pollock biomass. Other species show mixed responses. Bristol Bay sockeye had the 4th largest return since 1963; crab biomass is down, likely reflecting multiple years of benthic productivity, difference in larval recruitment, and changes (increase) in predation. The Ocean Surface Current Simulator (OSCURS) model based index of on-shore transport (key for flatfish recruitment) showed high on-shore transport, which is in contrast to previous years of offshore or little-onshore transport. For pollock, below average recruitment is projected from age 0 energy density, diet energy density, and surface silicic acid, while the temperature change index indicates increased recruitment. Combination of reduced predation and increased productivity may have led to increased survival (based on the multispecies stock assessment model for the Bering Sea known as ‘CEATTLE’ for Climate-enhanced, Age-based model with Temperature-specific Trophic Linkages).

Overall, despite anomalous environmental conditions, the present status of the BSAI stocks continues to appear mostly favorable. Nearly all stocks are above their target levels (Figure 3-1). The abundances of EBS pollock, EBS Pacific cod, all rockfishes managed under Tier 3, and all flatfishes managed under Tiers 1 or 3 are projected to be above their target biomass levels in 2020 (B_{MSY} or the B_{MSY} proxy of $B_{35\%}$) in 2020 while sablefish and blackspotted/rougheye rockfish remain below this target level.

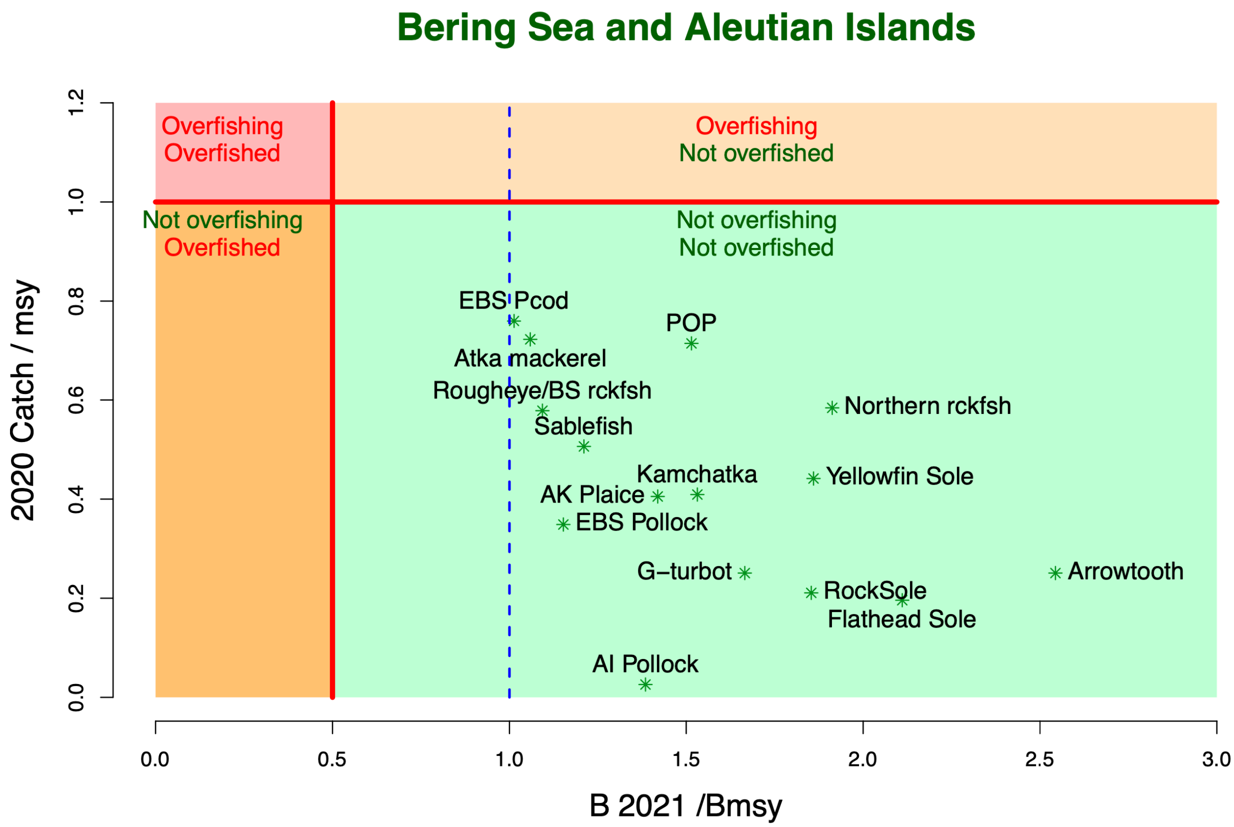


Figure 3-1 Summary of Bering Sea stock status 2021 (spawning biomass relative to Bmsy; horizontal axis) and 2020 year catch relative to fishing at Fmsy (vertical axis) where F_{OFL} is taken to equal F_{MSY}.

Across all gear types and sectors, total commercial groundfish catch levels (TACs) in the BSAI are capped at 2 million mt each year; the cap corresponds to the upper limit on the optimum yield in the BSAI FMP. The 2 million mt constraint is well below the sum of ABCs for the FMP groundfish species. For example, the sum of 2020 groundfish FMP species' ABCs is 3,272,581 mt. In 2019 the sum of ABCs was 3,367,578 mt; the TAC was set at 2,000,000 mt and total catch was 1,957,943 mt. Figure 3-2 and Table 3-1 show total BSAI groundfish harvest (mt) by species or species group from 2004 through 2019.[15] Figure 3-3 shows the relative percentage of harvest for each species or species group. Total catch has consistently approached the 2-million-ton cap, excepting the period from 2008 through 2010 when TACs were set lower and may have been suppressed by the demand impact of a broad economic recession in addition to lower pollock TAC.[16] Pollock has always accounted for the largest share of groundfish catch (roughly 70% since 2015, up from 60% to 65% from 2008 through 2012). The figures break out yellowfin sole from other flatfish. Yellowfin sole has accounted for roughly 7% to 10% of total groundfish catch during the analyzed period, while all other flatfish combine to account for roughly 4% to 7%. Within the BSAI flatfish category, yellowfin sole accounted for an average of 55% of catch from 2004 through 2019, and that proportion has been above 60% since 2016.[17] Other notable trends in the most recent years include an increase in the harvest of rockfish species and sablefish. Rockfish catch reached 54,657 mt in 2019 while the period's annual average before that year was 28,000 mt. Sablefish catch volume remains small compared to the entire BSAI cap but increased from 85 mt in 2015 to 3,070 mt in 2019.

[15] "Other species" include sculpins, skates, sharks, squid, and octopus.
[16] Total TAC was 1.84 million t in 2008, 1.68 million t in 2009, and 1.68 million t in in 2010 before increasing to 2.0 million t in 2011.
[17] Other flatfish include arrowtooth flounder, Bering flounder, Alaska plaice, Kamchatka flounder, starry flounder, rock sole, rex sole, flathead sole, petrale sole, dover sole, English sole, butter sole, and Greenland turbot,

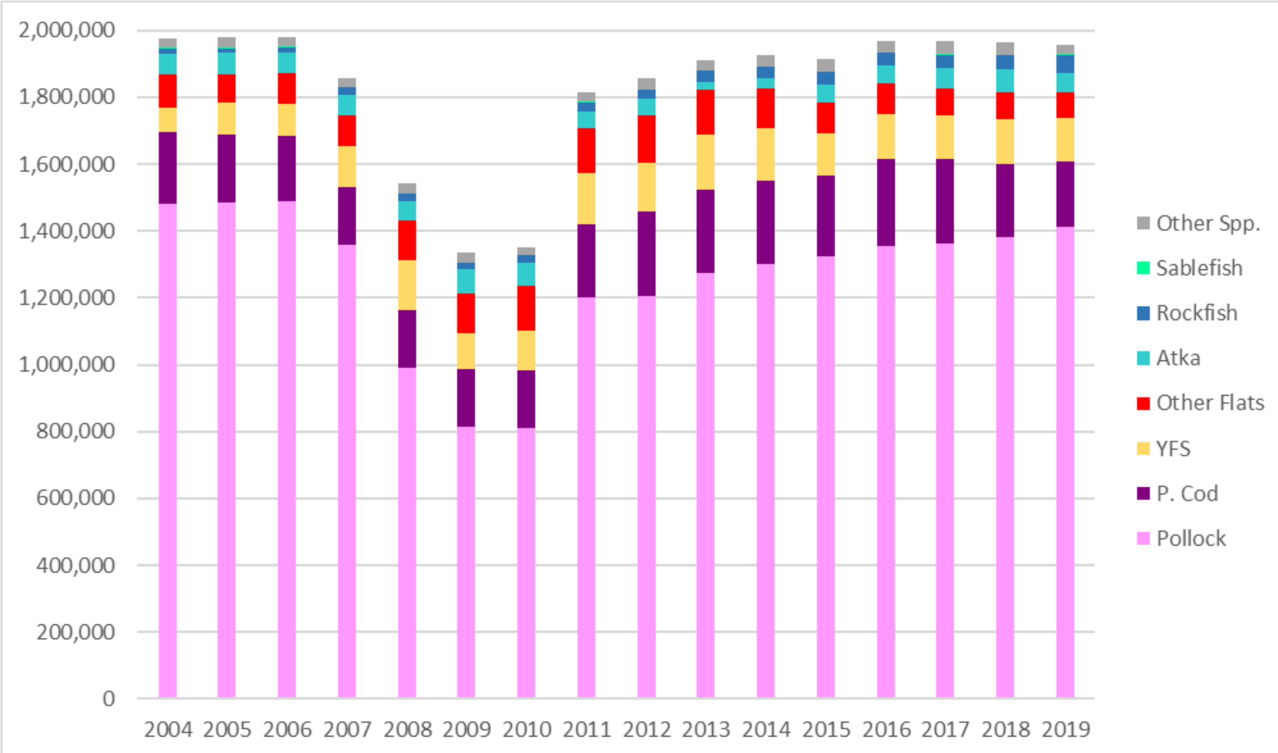


Figure 3-2 **BSAI catch (mt) by species or species group across all gear types and sectors, 2004 through 2019**

Table 3-1 **BSAI catch (1,000 mt) by species or species group across all gear types and sectors, 2004 through 2019**

Year	Pollock	P. Cod	YFS	Other Flats	Atka	Rockfish	Sablefish	Other Spp.	Total
2004	1,482	213	76	99	61	18	0.9	30	1,977
2005	1,485	205	94	85	62	15	1.3	30	1,979
2006	1,490	193	99	89	62	17	1.0	28	1,979
2007	1,357	174	121	94	59	23	1.0	28	1,857
2008	992	171	149	121	58	22	0.7	30	1,542
2009	813	176	108	118	73	19	0.6	28	1,334
2010	812	172	119	134	69	23	0.7	23	1,352
2011	1,200	220	151	134	52	28	0.5	29	1,815
2012	1,206	251	147	143	48	28	0.6	31	1,855
2013	1,274	250	165	132	23	35	0.6	33	1,912
2014	1,300	249	157	119	31	36	0.4	34	1,927
2015	1,323	242	127	92	53	40	0.1	36	1,913
2016	1,355	261	135	90	54	37	0.4	36	1,968
2017	1,361	253	132	79	64	38	1.1	39	1,968
2018	1,381	220	132	81	70	42	1.7	38	1,965
2019	1,411	198	128	79	57	55	3.1	26	1,956
Average	1,265	215	127	105	56	30	1	31	1,831

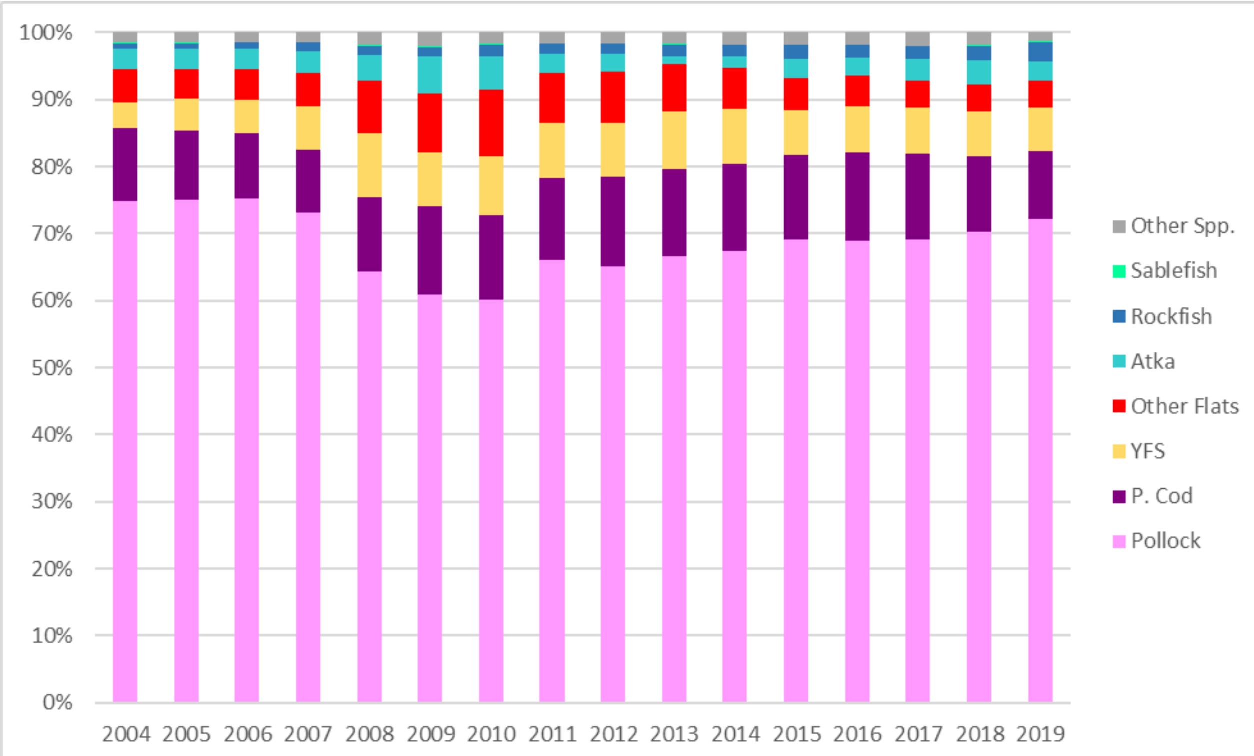


Figure 3-3 **Percentage share of total BSAI groundfish catch by species or species group (all gear types and sectors), 2004 through 2019.**

Additional information on Pacific cod and flatfish stocks is provided below to augment the information available in SAFE reports for consideration in the impacts of alternatives based upon the combination of stock trends, TAC-setting, and alternative halibut PSC limits for the A80 sector, which is sometimes operationally constrained by its allocation of the BSAI Pacific cod TAC.

3.1.1 Pacific cod

Pacific cod is distributed widely over the EBS as well as in the Aleutian Islands (AI) area. Tagging studies (e.g., Shimada and Kimura 1994) have demonstrated significant migration both within and between the EBS, AI, and GOA. However, recent research indicates the existence of discrete stocks in the EBS and AI (Canino et al. 2005, Cunningham et al. 2009, Canino et al. 2010, Spies 2012). Research conducted in 2018 indicates that the genetic samples from the NBS survey in 2017 are very similar to those from the EBS survey area, and quite distinct from samples collected in the Aleutian Islands and the Gulf of Alaska (Spies et al. 2019).

Although the resource in the combined EBS and AI (BSAI) region had been managed as a single unit from 1977 through 2013, separate harvest specifications have been set for the two areas since the 2014 season.

Cod was managed as a single BSAI stock through 2013 with an increasing population trend through 2012. Beginning in 2014 separate catch specifications have been set for the AI cod population and the Bering Sea (BS) cod population. Catch specifications and population estimates for AI cod are based on survey biomass trends in the AI which have increased slightly in recent years. Nevertheless, the OFL and ABC have remained constant since 2019 at 27,400 and 20,600 respectively (Thompson et al. 2019b).

Catch specifications for EBS Pacific cod – OFL, ABC, and TAC – have declined for the last several years due to overall estimated population declines (Table 3-2). In setting TACs for both the AI and BS, the

Council takes into consideration the State GHL fishery (See Section 3.1.1.2 for additional information on cod allocations and reductions for State GHL fisheries).

Table 3-2 Catch specifications for BS cod 2017-2020

Year	Age 0+ biomass	OFL	ABC	TAC
2017	1,260,000	284,000	239,000	223,704
2018	918,000	238,000	201,000	188,136
2019	824,000	216,000	181,000	166,475
2020	751,708	185,650	155,873	141,799

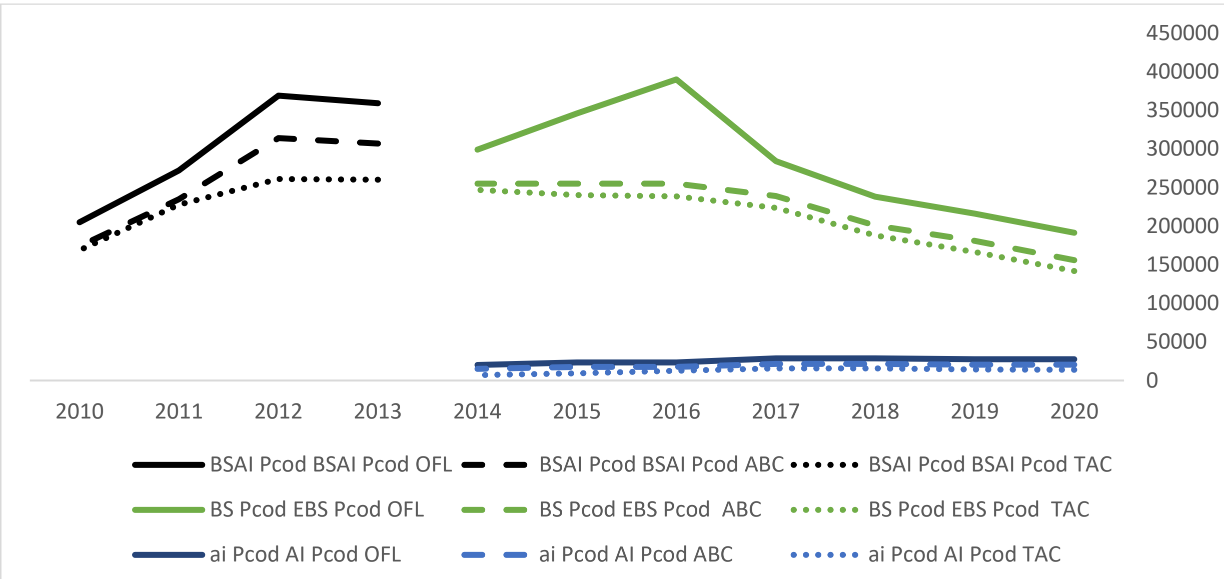


Figure 3-4 BSAI, Eastern Bering Sea (EBS) and Aleutian Island (AI) Pacific cod OFL, ABC and TAC 2010-2020 (break between 2013 and 2014 reflects the switch to specifying harvest by BS and AI separately).

3.1.2 Flatfish stocks

Key harvested flatfish species in the BSAI include yellowfin sole, northern rock sole, flathead sole and Alaska Plaice. All of these stocks are currently well above their target Bmsy stock size (Figure 3-1). TACs for flatfish stocks have been set well below their ABC levels due to a variety of harvesting constraints including both market and halibut bycatch considerations. Yellowfin sole continues to comprise the majority of flatfish harvested in the BSAI; northern rock sole the second is the second most harvested BSAI flatfish.

OFL, ABC and TACs in recent years for yellowfin sole and northern rock sole are shown in Figure 3-5 and listed in Table 3-3 and Table 3-4. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. With the exception of Greenland turbot, all flatfish stocks have specifications managed at the BSAI-wide level (Table 3-5).

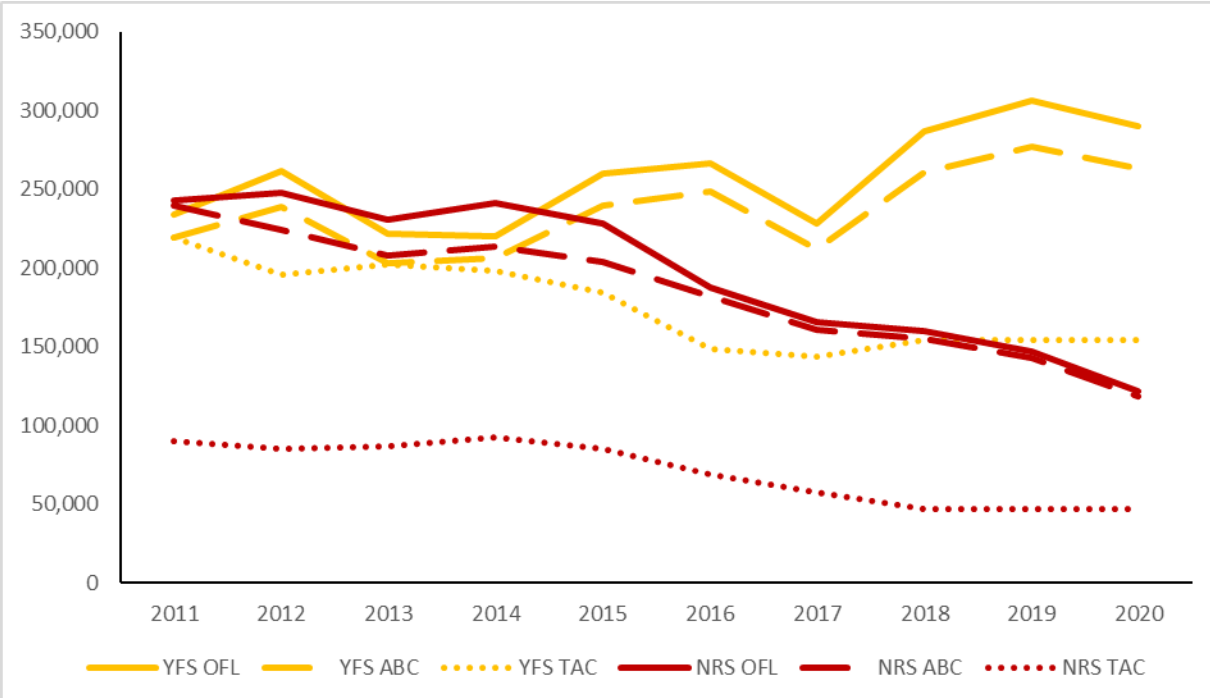


Figure 3-5 OFL, ABC and TAC levels for yellowfin sole and northern rock sole

Table 3-3 Catch specifications for yellowfin sole 2017-2020

Year	Age 6+ Biomass	OFL	ABC	TAC
2017	2,290,000	287,000	260,800	154,000
2018	2,553,100	306,700	277,500	154,000
2019	2,462,400	290,000	263,200	154,000
2020	2,461,850	287,943	260,918	150,700

Table 3-4 Catch specifications for northern rock sole 2017-2020

Year	Age 6+ Biomass	OFL	ABC	TAC
2017	1,000,600	159,700	155,100	47,100
2018	923,200	147,300	143,100	47,100
2019	828,000	122,000	118,900	47,100
2020	1,068,000	157,300	153,300	47,100

3.2 Management of the NMFS groundfish fisheries

3.2.1 Groundfish harvest specification process

This section provides an overview of the BSAI groundfish specifications and management process for all managed stocks as they are set in a single Council consideration during the December Council specifications process. This considers all groundfish sectors including pollock. Details on the A80 sector allocations and management are contained in a follow up section (Section 3.3).

The groundfish fisheries in Federal waters off Alaska are managed under the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP) and the Fishery Management Plan for Groundfish of the Gulf of Alaska (GOA FMP). In the BSAI and GOA, groundfish harvests are managed subject to annual limits on the amounts of each groundfish species or species group that may be taken. The annual harvest specifications also set or apportion the PSC limits. The annual limits are referred to as "harvest specifications," and the process of establishing them is referred to as the "harvest specifications process." The intended effect of these actions is to conserve and manage the groundfish resources in the BSAI in accordance with the MSA. The U.S. Secretary of Commerce approves the harvest specifications based on the recommendations of the Council. The goals of the harvest specifications process are to (1) manage fisheries based on the best scientific information available, (2) provide for adequate prior public review and comment on Council recommendations, (3) provide for additional opportunity for Secretarial review, (4) minimize unnecessary disruption to fisheries and public confusion, and (5) promote administrative efficiency.

Groundfish harvest specifications establish an over-fishing level (OFL), acceptable biological catch (ABC), and TAC by species and area in the BSAI. As shown in Table 3-5 some species are allocated TAC for the entire BSAI when the population structure indicates a single stock. Others, such as Pacific cod and sablefish have separate allocations by the BS subarea of the BSAI, and the AI subarea of the BSAI. Additionally, for some rockfish as well as Atka mackerel, allocations are further specified within regions for localized depletion concerns.

Table 3-5 2020-2021 OFLs, ABCs and TACs for BSAI Groundfish

Species	Area	2020 OFL	2020 ABC	2020 TAC	Catch as of 11/7/2020	Final 2021 OFL	Final 2021 ABC	Final 2021 TAC
Pollock	EBS	4,085,000	2,043,000	1,425,000	1,364,949	2,594,000	1,626,000	1,375,000
	AI	66,973	55,120	19,000	2,971	61,856	51,241	19,000
	Bogoslof	183,080	137,310	75	8	113,479	85,109	250
Pacific cod	BS	191,386	155,873	141,799	136,185	147,949	123,805	111,380
	AI	27,400	20,600	13,796	5,321	27,400	20,600	13,796
Sablefish	AK	50,481				60,426	29,588	
	BSAI		n/a	n/a	n/a	n/a	n/a	8,113
	BS	n/a	2,174	1,861	5,184	n/a	3,396	3,396
	AI	n/a	2,952	2,039	1,123	n/a	4,717	4,717
Yellowfin sole	BSAI	287,307	260,918	150,700	128,320	341,571	313,477	200,000
Greenland turbot	BSAI	11,319	9,625	5,300	2,312	8,568	7,326	6,025
	BS	n/a	8,403	5,125	1,639		6,176	5,125
	AI	n/a	1,222	175	673		1,150	900
Arrowtooth flounder	BSAI	84,057	71,618	10,000	10,265	90,873	77,349	15,000
Kamchatka flounder	BSAI	11,495	9,708	6,800	7,279	10,630	8,982	8,982
Northern rock sole	BSAI	157,300	153,300	47,100	25,762	145,180	140,306	54,500
Flathead sole	BSAI	82,810	68,134	19,500	9,001	75,863	62,567	25,000
Alaska plaice	BSAI	37,600	31,600	17,000	19,954	37,924	31,657	24,500
Other flatfish	BSAI	21,824	16,368	4,000	4,113	22,919	17,189	6,500
Pacific ocean perch	BSAI	58,956	48,846	42,875	36,303	44,376	37,173	35,899
	BS	n/a	14,168	14,168	8,895		10,782	10,782
	EAI	n/a	11,063	10,613	9,557		8,419	8,419
	CAI	n/a	8,144	8,094	7,966		6,198	6,198
	WAI	n/a	15,471	10,000	9,885		11,774	10,500
Northern rockfish	BSAI	19,751	16,243	10,000	8,362	18,917	15,557	13,000
Blackspotted/Rougheye Rockfish	BSAI	861	708	349	458	576	482	482
	EBS/EAI	n/a	444	85	125	n/a	313	313
	CAI/WAI	n/a	264	264	333	n/a	169	169
Shortraker rockfish	BSAI	722	541	375	214	722	541	500
Other rockfish	BSAI	1,793	1,344	1,088	996	1,751	1,313	916
	BS	n/a	956	700	293		919	522
	AI	n/a	388	388	703		394	394
Atka mackerel	BSAI	81,200	70,100	59,305	57,506	85,580	73,590	62,257
	EAI/BS	n/a	24,535	24,535	22,926		25,760	25,760
	CAI	n/a	14,721	14,721	14,588		15,450	15,450
	WAI	n/a	30,844	20,049	19,992		32,380	21,047
Skates	BSAI	49,792	41,543	16,313	17,221	49,297	41,257	18,000
Sculpins	BSAI	67,817	50,863	5,300	4,805	N/A	N/A	
Sharks	BSAI	689	517	150	179	689	517	200
Octopuses	BSAI	4,769	3,576	275	682	4,769	3,576	700
Total	BSAI	5,584,382	3,272,581	2,000,000	1,849,473	3,945,315	2,747,727	2,008,113

BSAI TAC setting is generally driven by tradeoffs between the availability of pollock, BS Pacific cod, key flatfish species and the constraint of the 2 million mt optimum yield cap. High value, low volume species such as sablefish and rockfish have TACs set equal to ABC while lower value flatfish stocks such as arrowtooth flounder have TACs set well below ABC for both market reasons and expected halibut bycatch rates. Trends in ABCs and TACs between three key stocks (EBS pollock, BS Pacific cod and yellowfin sole) are shown in Figure 3-6. At lower levels of pollock ABC (e.g., 2010-2012) the pollock TAC is set equal to the ABC. Since 2012, as the pollock ABC increased, the pollock TAC remained relatively stable thus allowing for higher TACs to be set for other BSAI groundfish species. BS Pacific cod ABC is reduced by the state guideline harvest level (GHL) prior to TAC being established (see Section 3.1.1.2 for more information on TAC setting and allocation for cod). As noted previously the Pacific cod ABC has been declining in recent years thus BS cod TAC levels have also been declining (Figure 3-6). TAC levels for yellowfin sole have been stable since 2015 following a declining during the 2010 to 2015 period.

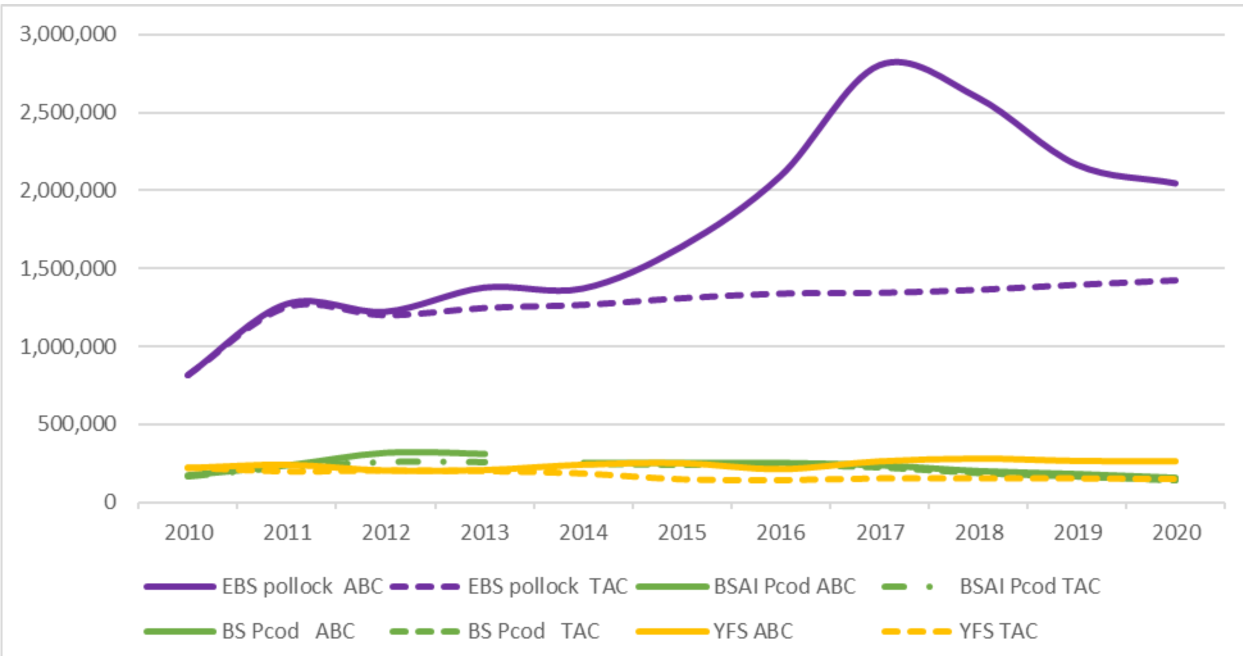


Figure 3-6 ABC and TAC for EBS pollock, BS cod and yellowfin sole (mt)

POP TACs have generally been set close to or equal to the ABC (Figure 3-7). Atka mackerel TACs have fluctuated due to a range of regulations limiting total catch in areas because the species is a Steller sea lion prey item.[18]

[18] NMFS Final Rule implementing Steller sea lion mitigation measures (79 CFR 70285, November 2014)

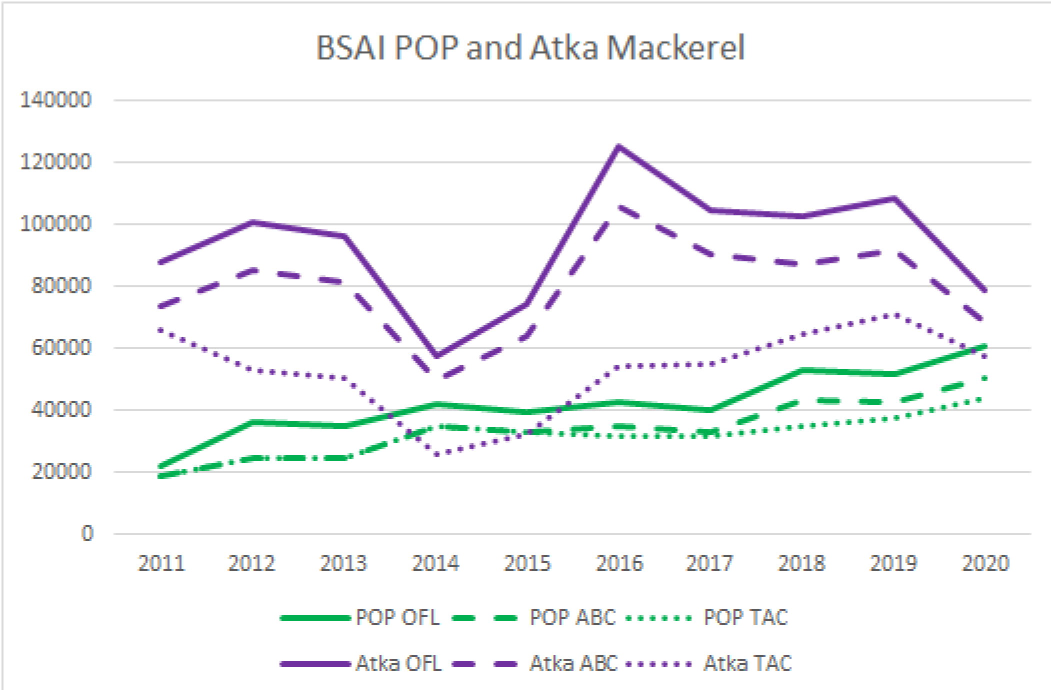


Figure 3-7 OFL, ABC and TAC levels for BSAI Pacific ocean perch (POP) and Atka mackerel

3.1.1.1 Flatfish flexibility exchange program

Beginning in the 2015 fishing year, an ABC reserve is annually specified for the flatfish species that are allocated to CDQ groups and A80 cooperatives – flathead sole, rock sole, and yellowfin sole. The ABC reserve is divided by CDQ groups and A80 cooperatives using the same formulas as in the annual harvest specifications process, ensuring that an entity exchanging one flatfish quota for another cannot result in exceeding an ABC or the 2-million-ton OY cap. The reserve for each species is specified by the Council's evaluation of the ABC surplus for each species (i.e., the difference between the ABC and TAC). The Council considers whether the reserve needs to be reduced by a discretionary buffer amount based on social, economic, or ecological considerations. The Council then designates some, all, or none of the ABC surplus as the ABC reserve. Figure 3-8 shows the ABC and TAC for the three stocks subject to the Flatfish Flexibility Exchange Program.

The purpose of the Flatfish Flexibility Exchange Program is to allow cooperatives or CDQ groups to increase their harvest opportunity and/or reduce halibut PSC through flexibility in their choice to target a certain flatfish species. Decisions to utilize the flexibility program might reflect halibut PSC rates in a certain target fishery or catchability and market conditions. Within the species subject to the program, a vessel is only required to hold quota for any of the three species.

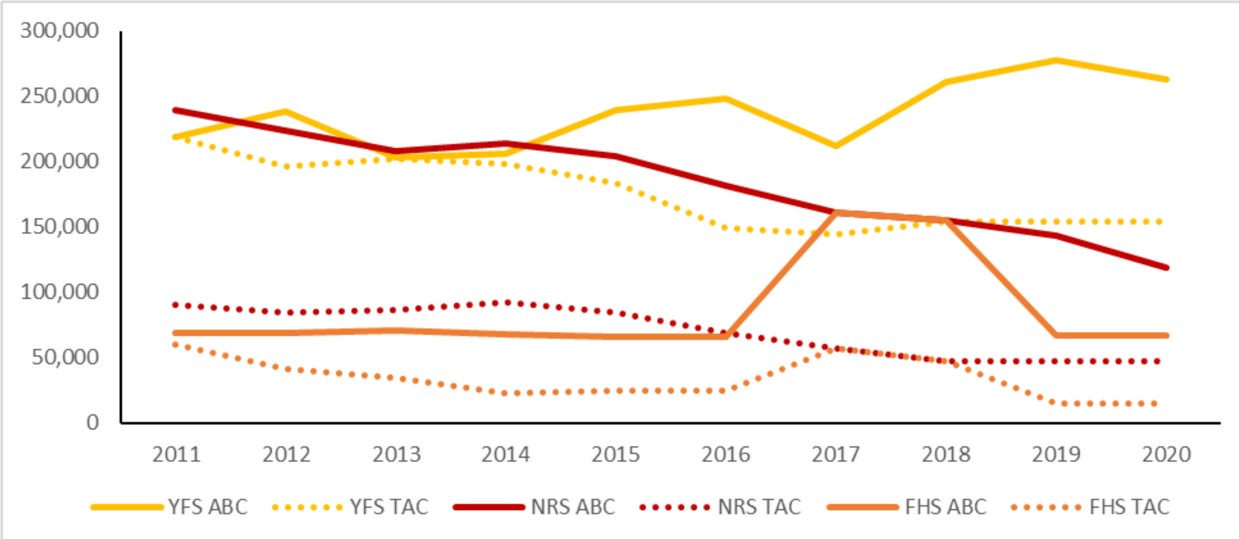


Figure 3-8 ABC and TAC levels for the three flatfish species managed under flatfish specifications: yellowfin sole (YFS), northern rock sole (NRS) and flathead sole (FHS).

NMFS annually provides the Council with a report on the flatfish exchanges made by the A80 cooperatives and CDQ groups. That report is made during the NMFS SF Inseason Management Annual Report at each December Council meeting, and an annually updated PDF of all flatfish exchanges is available on the NMFS Alaska Groundfish Harvest Specifications page.[19] These reports provide the Council with information to consider when deciding whether to establish a buffer by reducing the amount of the ABC reserve available to be exchanged by eligible entities in a future year.

In 2015 and 2016, net exchanges of flathead sole and rock sole for yellowfin sole. These exchanges resulted in roughly 11,000 mt and 9,500 mt of additional yellowfin sole TAC in each respective year. In 2017, net exchanges resulted in roughly 2,700 mt of TAC shifting from rock sole to yellowfin sole, with a negligible net change to the initial flathead sole TAC. Net exchanges in 2018 flowed from rock sole to both yellowfin sole and flathead sole, resulting in roughly 2,600 additional tons of flathead sole TAC and 1,950 additional tons of yellowfin sole TAC. The same pattern occurred in 2019, with rock sole being exchanged for the other species, resulting in 5,650 additional tons of flathead sole and 2,450 additional tons of yellowfin sole.

As one would expect, the bulk of exchanges are executed in September and October when TACs are more likely to be constraining or as entities adjust targets to meet business targets or to keep bycatch rates down to meet internal cooperative performance standards. As of August, there have been no flatfish exchanges in 2020. Fewer exchanges may be expected in 2020 due to lower overall flatfish harvest, and thus less need to exchange one eligible species to afford an opportunity to target another.

3.1.1.2 Pacific cod allocation

Pacific cod is allocated across state and federal fisheries and to various gear and operational type sectors within each management realm. Stock assessment and harvest specifications are made separately for the BS and AI areas due to population distinctions. Figure 3-9 provides a schematic of how BS and AI ABCs are first apportioned to the state-managed GHL fisheries in each area's state waters. After that, the TAC recommended by the Council is allocated to CDQ groups and finally the remainder is allocated to the federal non-CDQ groundfish sectors. The TAC that the Council recommends accounts for the BS and AI GHL allocations such that ABC is not exceeded, but the Council's TAC is not necessarily set at a level

[19] See, for example, "Further Allocations" at https://www.fisheries.noaa.gov/alaska/commercial-fishing/2020-2021-alaska-groundfish-harvest-specifications.

where TAC plus the GHL is equal to the ABC. TAC may be set lower based on policy decisions accounting for the state of all the BSAI groundfish stocks and the need to remain within the 2 million mt optimum yield cap. The allocation to the non-CDQ sectors is based on the summed BS and AI TACs. Those federal groundfish sectors include – in order of allocation percentage – the combined hook-and-line and pot sector, trawl CVs, A80, AFA trawl CPs, and jig gear. The allocation to the hook-and-line and pot sectors is subdivided between HAL CPs, HAL CVs ≥ 60’ length overall (LOA), HAL and pot CVs less than 60’ LOA, pot CPs, and pot CVs ≥ 60’ LOA.

The following subsections provide additional detail on the management of federal and state Pacific cod fisheries in the BSAI.

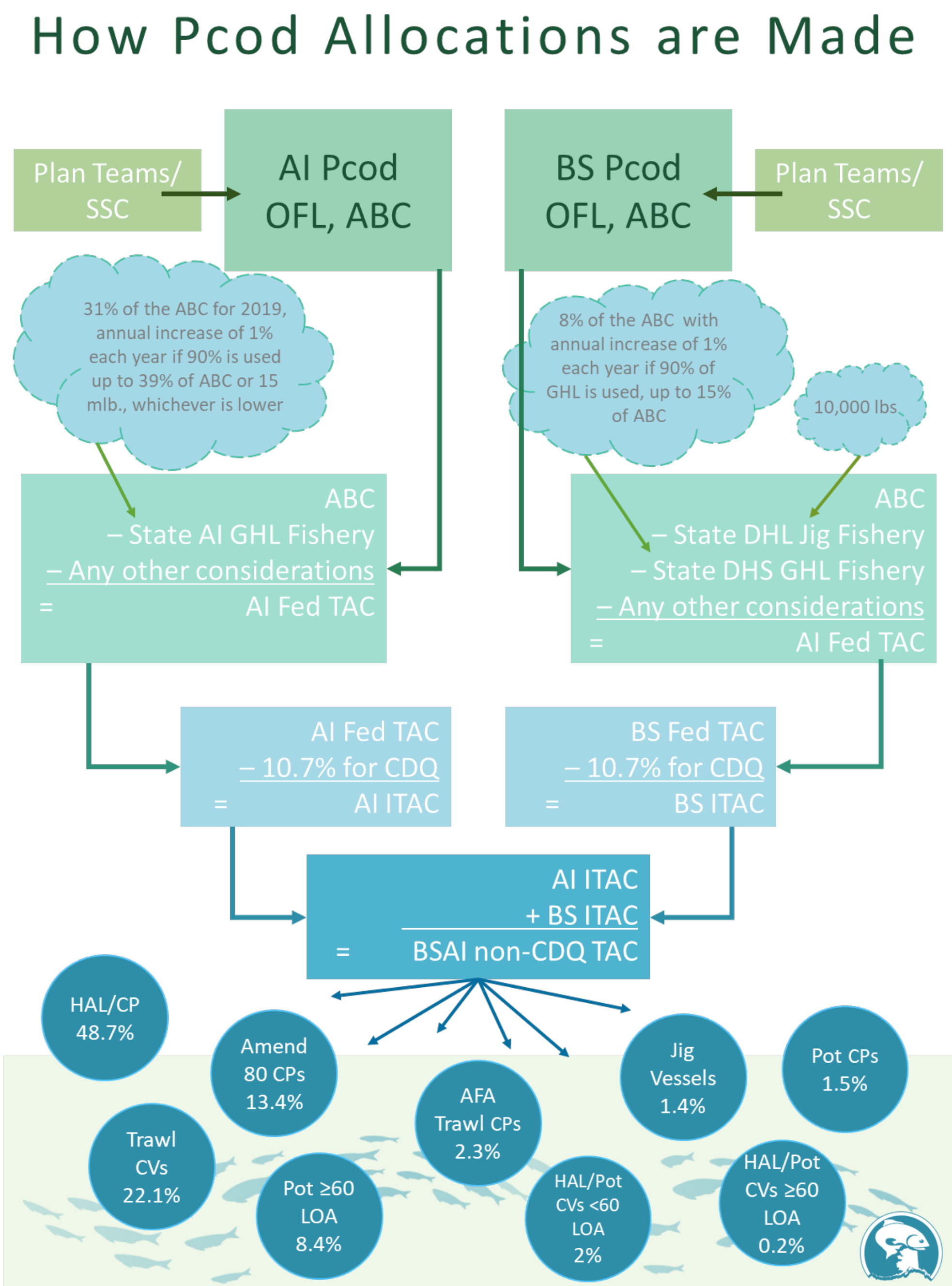


Figure 3-9 **BSAI cod allocation beginning with area-specific ABCs in BS and AI, deduction of the state GHL, CDQ allocations and recombined BSAI TAC for sector and seasonal allocations. Total of 34 separate allocations to sectors and seasons (seasons not depicted).**

State fisheries (guideline harvest level)

The State manages three GHL fisheries for Pacific cod. Two occur within state waters in the BS (pot and jig gear) and one occurs within state waters in the AI (pot and trawl gear).

In October 2018, the Alaska Board of Fisheries (BOF) made changes to the BS and AI GHLs that determine the available harvest in the state waters Pacific cod fisheries under its jurisdiction. Because the GHL is deducted from the BSAI Pacific cod ABC before any allocation to federal fisheries, increasing the GHL *may* reduce available harvest for groundfish harvesters, including the A80 sector and CDQ groundfish allocations. A higher GHL directly affects the TAC available to all federal sectors when TAC is set equal to the ABC minus the GHL; that has been the case in recent years, as Pacific cod ABCs are low. In some instances, the Council could recommend Pacific cod TACs that are less than "ABC minus GHL" to preserve room within the 2 million mt OY cap for the harvest of other groundfish species. This occurred in 2015.[20] In years when the difference (gap) between TAC and "ABC minus GHL" is greater than zero, the effect of an increased GHL percentage depends on the amount of that percentage and the size of the gap.

After deducting the GHL from ABC, the Council recommends TAC levels such that ABC is not exceeded; 10.7% of that TAC is allocated to CDQ groups before the remainder is allocated to gear and operational type harvest sectors. From that remainder, 13.4% is allocated to the A80 sector. Under current regulations and making the presumption that TAC is being set equal to "ABC minus GHL," shifting an additional pound of Pacific cod from the federal TAC to the GHL fisheries reduces the allocation to the A80 sector by 0.12 pounds. The same shift of one pound would reduce the CDQ allocation by 0.107 pounds.

The Dutch Harbor subarea (DHS) of the Bering Sea GHL fishery for Pacific cod was first opened in 2014. State regulations provided for a GHL of 3% of the BSAI Pacific cod ABC, which was subtracted from the BS ABC and accounted for when the Council recommended the federal BS TAC. Starting in 2016, the BOF changed the DHS GHL calculation to align with the split of the federal BSAI Pacific cod stock into separate BS and AI stocks. As part of those modifications, the DHS GHL was changed to 6.4% of the BS ABC. The DHS GHL was changed again at the October 2018 BOF meeting. The DHS GHL was increased to 8.0% of the BS ABC starting in 2019 and increased to 9.0% in 2020. If the GHL is fully harvested (90% considered fully harvested) then the limit is increased by 1% of the BS ABC each year until it reaches 15%.[21] The 15% GHL would continue unless changed by the BOF. Until 2019, the DHS fishery occurred in state waters between 164 degrees and 167 degrees west longitude. At its October 2018 meeting the BOF expanded the area to include waters between 162.30 degrees and 167.00 degrees west longitude.

The DHS fishery is open to vessels 58' or less using pot gear with a limit of 60 pots per vessel. The season opens seven days after the federal BSAI <60' pot/longline sector's season closure and may close and re-open as needed to coordinate with federal fishery openings. The 2020 season opened on January 26 and was closed on March 12 (47 days) because the GHL was projected to be taken. Since 2014, the season has opened between January 19 and February 12. Season length has ranged from 31 days in 2018 to 71 days in 2016 – setting aside the exceptional year of 2014 when the fishery remained open until September 1. The DHS pot gear fleet reached 40 vessels in 2020, which was the largest fleet size during the 2014 through 2020 period. Participation has increased steadily from 16 vessels in 2014 and 14 vessels in 2015. All of the catch is delivered to shoreside plants since it is harvested by pot vessels that are 58' or less.

When the DHS GHL for pot gear reaches 15% of the BS ABC, it will equate to a 134% increase from the 2018 GHL allocation. In poundage terms, the 2018 GHL (6.4%) was 28.36 million lbs. (12,864 mt); however, the pounds associated with a 15% DHS GHL – or any percentage in any future year – will depend on the level of the BS ABC.

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[20] BS ABC = 255,000 mt; BS GHL = 8,178 mt; BS TAC = 240,000 mt. In this case, the Council set the TAC 6,822 mt lower than it conceivably could have without exceeding the ABC after accounting for the GHL.
[21] From 2014 through 2020, the DHS GHL fishery was harvested at 97% of the GHL or greater.

The BOF also created a 100,000 lbs. (~45 mt) GHL jig gear fishery for Pacific cod in the DHS. That fishery began in May 2019.

The State of Alaska has managed a GHL fishery for Pacific cod in state waters in the AI subarea since 2006. The AI GHL was 3% of the federal BSAI Pacific cod ABC from 2006 through 2015. Beginning in 2016, the AI GHL changed to 27% of the AI ABC, with an annual 4% step-up provision that could bring the GHL to 39% of the AI ABC if the AI GHL is fully harvested on a continuing basis. The GHL is considered fully harvested if 90% is taken by November 15. The BOF capped the AI GHL at a maximum of 15 million lbs. (6,804 mt). At the BOF October 2018 meeting, the BOF included a four percent step-down provision if the AI GHL is not fully harvested (90% harvest) during two consecutive calendar years. The GHL may not be reduced below 15% of the AI Pacific cod ABC. The majority of the AI GHL state waters fishery has been harvested by vessels using trawl and pot gear (harvest information for this fishery is confidential during recent years due to the number of processor participants). In 2019, the AI GHL stepped up to 31% of the AI ABC and in 2020 the AI GHL capped out at 15 million lbs. or 6,804 mt, which was 33% of the AI ABC. The BOF had established the 2020 AI GHL at 35% of the AI ABC, which would have equaled 7,210 mt had the cap not been in place. In 2021 the AI GHL will be established at 39% of the AI ABC unless that amount is constrained by the 15 million lbs. GHL limit, which depends on where the ABC is set.

Federal fisheries (TAC)

Once the BS and AI TACs are established, regulations at § 679.20(a)(7)(i) allocate 10.7% of the Bering Sea Pacific cod TAC and 10.7% of the Aleutian Islands Pacific cod TAC to the CDQ Program for the exclusive harvest by Western Alaska CDQ groups. The remaining portion of TAC is the ITAC. An incidental catch allowance (ICA) is set for the HAL and pot gear sectors to cover catch while targeting non-cod species. The ICA is set based on NMFS's estimate of need and that amount is deducted from the aggregate allocation to HAL and pot sectors before suballocations are made to gear and size-based sectors. For the 2020 BSAI Pacific cod fishery, the ICA was 400 mt.

After subtracting the CDQ allocation from the BS and AI TACs, NMFS combines the remaining BS and AI TACs into one BSAI non-CDQ TAC, which is available for harvest by nine non-CDQ fishery sectors. Regulations at § 679.20(a)(7)(ii)(A) define the nine Pacific cod non-CDQ fishery sectors in the BSAI and specify the percentage allocated to each. Allocations for 2020 can be seen in Table 9 of the annual harvest specifications published in the **Federal Register**.[22] The non-CDQ fishery sectors are defined by a combination of gear type (trawl, HAL, pot), operation type (CV or CP), and vessel size categories (i.e., vessels greater than or equal to 60 ft in length overall, or less than 60 ft in length overall).

NMFS manages each of the non-CDQ fishery sectors to ensure that harvest of Pacific cod does not exceed their overall annual allocations. NMFS monitors harvests that occur while vessels are directed fishing for Pacific cod (specifically targeting and retaining Pacific cod above specific threshold levels) and harvests that occur while vessels are directed fishing in other fisheries and incidentally catching Pacific cod (e.g., the incidental catch of Pacific cod while directed fishing for pollock in the AFA fishery). For the non-AFA trawl CP sector (A80), NMFS allocates exclusive harvest privileges to vessels participating in an A80 cooperative and prohibits them from exceeding their cooperative allocation. For other non-CDQ fishery sectors, NMFS carefully tracks both directed and incidental catch of Pacific cod. NMFS takes appropriate management measures, such as closing directed fishing for a non-CDQ fishery sector, to ensure that total directed fishing and incidental catch do not exceed that sector's allocation.

An allocation to a non-CDQ fishery sector may be harvested in either the BS or the AI, subject to the non-CDQ Pacific cod TAC specified for the BS or the AI. If the non-CDQ Pacific cod TAC is reached in

[22] https://www.federalregister.gov/documents/2019/03/13/2019-04539/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-final-2019-and#p-45

either the BS or AI, NMFS will prohibit directed fishing for Pacific cod in that subarea for all non-CDQ fishery sectors, even if there is a positive remaining amount in the overall BSAI area.

Allocations of Pacific cod to the CDQ Program and to the non-CDQ fishery sectors are also apportioned by seasons. In general, regulations apportion CDQ and non-CDQ fishery sector allocations among three seasons that correspond to the early (A-season), middle (B-season), and late (C-season) portions of the year. Depending on the specific CDQ or non-CDQ fishery sector allocation, between 40 percent and 70 percent of the Pacific cod allocation is apportioned to the A-season, which is historically the most lucrative fishing season due to the presence of valuable roe in the fish and the good quality of the flesh during that time of year. The allocation of Pacific cod among the CDQ Program and the nine non-CDQ fishery sectors, as well as the seasonal apportionment of those allocations, create a large number of separate sectoral-seasonal allocations. To help ensure the efficient management of these allocations, regulations allow NMFS to reallocate (rollover) any unused portion of a seasonal apportionment from a non-CDQ fishery sector to that sector's next season during the current fishing year unless the Regional Administrator determines a non-CDQ fishery sector will not be able to harvest its allocation. The one exception where seasonal rollovers are not allowed is the jig gear sector.

3.2.2 Halibut PSC limit and discard mortality

The halibut PSC limits for BSAI groundfish sectors are described in Section 2.1. Under status quo regulations, the A80 sector is managed under a halibut PSC hard cap of 1,745 mt of mortality. NMFS has the ability to make a within-year reallocation of halibut PSC from the TLAS sector to the A80 sector as the Regional Administrator deems appropriate (50 CFR 679.91(f)(4)(i)). Any amount of halibut PSC that would be reallocated under this rule is first reduced by 5% to ensure some amount of PSC savings if the reallocated PSC is maximally used. This regulatory flexibility tool has been used only three times, in the late-year portions of 2010, 2013, and 2014 when the TLAS sector was largely winding down and the A80 sector was still prosecuting yellowfin sole. The historical use cases for this tool align with the highest A80 PSC use rates since 2010; however, the use of this in-season management tool was primarily an artifact of the two-cooperative A80 environment that existed at that time. Reallocated PSC is issued at the A80 cooperative level. In the cases when one of the cooperatives could benefit from a buffer to ensure their late-season fishing opportunity, it was more expedient to reallocate from a sector that was not utilizing its limit than to negotiate an intra-sector transfer of PSC. None of the years when this rule was utilized resulted in total A80 PSC mortality exceeding the limit at the time. The rule has not been utilized in recent years because the sector has reduced its PSC use relative to the limit and because the sector has consolidated into a single cooperative, thus eliminating operational barriers to intra-sector PSC transfers. The analysts note that the Council is not contemplating a change to this existing regulation under the ABM action.

The two subsections that follow describe how the estimated catch of Pacific halibut is translated to a mortality estimate that is then debited against a fishery or sector's PSC limit. The first subsection notes recent modifications to the discard mortality rate (DMR) estimation methodology and lists the resulting DMRs that have been applied to the A80 sector (BSAI non-pelagic trawl CPs, in this context) and other fisheries. The second subsection describes the methodology for estimating discard mortality when deck sorting is occurring. A80 deck sorting was developed under a series of Exempted Fishing Permits (EFPs) that were intermittent beginning in 2009 but ramped up to more robust sampling and greater vessel participation from 2015 to the present. As of 2020, deck sorting of halibut is implemented in regulation[23] and integrated into the Observer Program; data from deck sorted hauls is used in the Catch Accounting System (CAS). Section 3.4.4 provides additional information on the development of halibut deck sorting under the EFP and ties that into the broader context of the active halibut mortality mitigation measures that A80 has enacted since 2015.

[23] 50 CFR 679.120

Discard mortality rate estimation process

To monitor halibut bycatch mortality allowances and apportionments, NMFS uses observed halibut incidental catch rates, halibut DMRs, and estimates of groundfish catch to project when a fishery's halibut bycatch mortality allowance or seasonal apportionment is reached. Halibut incidental catch rates are based on observers' estimates of halibut incidental catch in the groundfish fishery. DMRs are estimates of the proportion of incidentally caught halibut that do not survive after being returned to the sea. The cumulative halibut mortality that accrues to a particular halibut PSC limit is the product of a DMR multiplied by the estimated halibut PSC. DMRs are estimated using the best scientific information available in conjunction with the annual BSAI stock assessment process. The DMR methodology and findings are included as an appendix to the annual groundfish SAFE reports.

The approach to establishing DMRs has changed in recent years. At the Council's request, a new methodology was presented to and approved by the Plan Teams, SSC and Council in December 2016. The most recent revisions to DMR estimation were presented to the Groundfish Plan Teams in September 2019.[24] Beginning in 2016, the fishery definitions for DMR estimates and application transitioned from species composition to vessel/gear operational characteristics causatively linked to halibut mortality. While the previous approach used a 10-year reference period for DMR estimates, the current process uses a reduced reference period (2-3 years) to better incentivize improvement in halibut handling practices. The shorter reference period provides fishery participants an opportunity to see a lower DMR estimate result from their efforts, which may come at a financial or operational cost (see Section 3.4.4).

The estimation process uses weighted averages of sampled halibut bycatch viability and mortality ("condition data" – sampled halibut are rated excellent, poor, or dead) to expand estimated DMRs from a sample to the haul, trip, and fishery following the sampling hierarchy. All computations are completed within each sampling stratum (full coverage, gear-specific partial coverage, and EM) before estimates are combined across the strata to produce final DMR estimates. Annual DMRs are presented to the Plan Teams, SSC and Council in conjunction with the annual specifications process.

Table 3-6 shows the halibut DMRs for all gear and operational type sectors that are specified across the BSAI and GOA for 2018 through 2020. The A80 sector falls under the "BSAI non-pelagic trawl (NPT)" CP sector. DMRs are specified for a two-year period (with the 2020 DMRs applying to 2021) however, as with the harvest specifications, DMRs are annually updated and published in the **Federal Register**.[25] Note that for some sectors where the number of viabilities collected (N_viabilities) or the number of vessels observed (not shown) was small the applied DMR is a proxy taken from a more robustly sampled sector. The A80 sector is subject to a DMR estimated based on viabilities sampled on A80 vessels. The A80 DMR has decreased from 84% to 75% from 2018 to 2020. Halibut catch and mortality rate estimates are discussed in greater detail in Section 3.4.

[24] See Halibut DMR Working Group Recommendations for 2020 (presented at September 2019 Groundfish Plan Team Meeting), provided by the inter-agency Halibut DMR Working Group.
[25] For 2020/2021 BSAI groundfish harvest specifications, see BSAI Table 18 at https://www.fisheries.noaa.gov/alaska/commercial-fishing/2020-2021-alaska-groundfish-harvest-specifications.

Table 3-6 Halibut DMRs in harvest specifications for groundfish fisheries by gear and sector, and the number of animal viabilities assessed in order to estimate DMR, 2018 through 2020

			2018		2019		2020	
Area	**Gear**	**Sector**	**DMR**	**N_viabilities**	**DMR**	**N_viabilities**	**DMR**	**N_viabilities**
BSAI	**NPT**	CP	84%	2,025	78%	2,844	75%	1,100
		CV	60%	2,456	59%	2,736	58%	2,353
	HAL	CP	8%	9,459	8%	6,756	9%	4,990
		CV	17%	14	4%	2	9%[a]	43
	POT	All	9%	548	19%	380	27%	266
GOA	**NPT**	CP	84%	132	79%	1,300	75%[b]	1,524
		CV	67%	755	67%	1,106	68%	710
		CV (RP)	62%	176	49%	388	52%	323
	HAL	CP	10%	1,608	11%	1,637	11%	1,010
		CV	17%	456	21%	416	13%	362
	POT	All	7%	602	4%	450	0%	119
All	**PTR**	All	*Specified at 100% (not estimated)*					

a Based on BSAI HAL CP; b Based on BSAI NPT CP
Note: NPT = non-pelagic trawl; PTR = pelagic trawl; CV (RP) = Central GOA Rockfish Program Catcher Vessels

Table 3-7 shows the actual DMRs that have been applied to the A80 sector dating back to 2010, illustrating the shift from species composition to operational type.

Table 3-7 Halibut DMRs that have been applied to the A80 sector, 2010 through 2020

Gear	Fishery/Sector	2010-13	2013-16	2016-17	2017-18	2018-19	2019-20	2020-21
Non-CDQ trawl	Alaska plaice		71	66				
	Arrowtooth flounder [1]	76	76	84				
	Atka mackerel	76	77	82				
	Flathead sole	74	73	72				
	Greenland turbot	67	64	82				
	Kamchatka flounder			84				
	Non-pelagic pollock	73	77	81				
	Pelagic pollock	89	88	88				
	Other flatfish [2]	72	71	63				
	Other species [3]	71	71	66				
	Pacific cod	71	71	66				
	Rockfish	81	79	83				
	Rock sole	82	85	86				
	Sablefish	75	75	66				
	Yellowfin sole	81	83	84				
Non-pelagic trawl	Mothership and catcher/processor				85	84	78	75

[1] Arrowtooth flounder includes Kamchatka flounder 2010-14
[2] "Other flatfish" includes all flatfish species, except for halibut, Alaska plaice, flathead sole, Greenland turbot, rock sole, yellowfin sole, Kamchatka flounder, and arrowtooth flounder.
[3] "Other species" includes skates, sculpins, sharks, squids, and octopuses.
Source: Alaska Groundfish Harvest Specifications https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-groundfish-harvest-specifications

NMFS Catch Accounting System methodology for halibut PSC estimation when deck sorting is occurring on an A80 vessel

When halibut deck sorting occurs on a non-pollock trawl CP or mothership, there are two components of the total halibut PSC in the CAS: (1) the weight and mortality of halibut sorted on deck; and (2) the weight and mortality of halibut in the factory.

Halibut sorted on deck: The current sampling protocols have been in place since 2019. When deck sorting occurs, the observer will determine which sampling design to implement based on the abundance of halibut. When halibut numbers are relatively low, observers employ a 1-in-5 (20%) simple random design to collect length and viability data. For hauls with high halibut numbers, the observer uses a 1 in 10 (10%) simple random design to collect length and viability data. If the observer feels that minimal halibut will be encountered, the observer collects length data for every halibut up to the first randomly selected assessment fish to ensure haul specific weight data is available. If they reach their randomly selected halibut, the extra lengths are deleted and are be factored in the halibut weight calculation. Occasionally, an observer is not able to recognize a high halibut bycatch event. In these situations, the observer may switch from a 1 in 5 design to a 1 in 10 design after halibut deck sort data collection has begun. When this occurs, data collected using the 1 in 5 design is corrected during debriefing to match the 1 in 10 rate. The lengths of all the sampled halibut are converted to a weight using the IPHC's length weight table. The average weight of the sampled halibut is calculated and multiplied by the number of unsampled halibut to estimate the total weight of unsampled halibut. The weight of the sampled and unsampled halibut comprise the total weight of deck sorted halibut. The total weight of deck sorted halibut reported by the observer is posted in CAS as discarded halibut.

Next a halibut DMR is applied to the halibut PSC. The observer identifies the viability, or health, of the halibut in the simple random sample. The qualitative viabilities assessed by the observer correspond to a quantitative post-capture mortality rate. For each deck sorted haul, a weighted average DMR based on the weight of halibut at each viability level is calculated. That average DMR is applied to the total weight of deck sorted halibut in the haul, calculating a halibut PSC weight, which is posted in CAS. In the rare event there are no viabilities collected for a deck sorted haul, an annual average DMR from the vessel's other deck sorted hauls is used. If it is the vessel's first deck sorted haul for the year, and there are no other hauls from which to generate an average, then an annual average DMR from the deck sorted hauls of all vessels in the year is used. As other deck sorted hauls are sampled throughout the year and additional viability data become available, the annual average DMRs will be recalculated and reapplied to the vessel's deck sorted haul that is missing viability data.

The conditional mortality probabilities for halibut sorted on deck are 20% for "Excellent," 55% for "Poor," and 90% for "Dead."

Halibut recovered in the factory: The second component follows the CAS PSC estimation process described in Cahalan et al (2014), and the weight of halibut in an observer's species composition samples in the factory are extrapolated to the entire haul. In 2015 through 2017, a standard DMR of 90% was applied to the halibut recovered in the factory. Beginning in 2018, a DMR is applied to the halibut recovered in the factory based on DMRs published in harvest specification tables in the **Federal Register** (see Table 3-6). The appropriate DMR is applied based on gear, sector, and year to calculate a halibut PSC mortality weight.

The sum of the two estimates – halibut mortality from the deck sorted fish plus the halibut mortality of fish from the factory – is posted in CAS.

3.2.3 Groundfish fishery closures for crab in Bristol Bay

Several closure areas for trawl gear are in place and may afford protection to halibut spawning and nursery grounds (Figure 3-10). Many of these overlap the IPHC Closed Area. The nearshore Bristol Bay Trawl Closure Area (Federal reporting areas 508 and 512) prohibits trawl fishing at all times, except seasonally in the Northern Bristol Bay Trawl Area. The Red King Crab Savings Area, which straddles reporting areas 509 and 516, is closed to non-pelagic trawling year-round (except for the subarea in certain years). There are also seasonal closures in the area. Federal reporting area 516 is closed to fishing with trawl gear from March 15 through June 15, and the subarea of the Red King Crab Savings Area is closed to non-pelagic trawling under certain conditions.

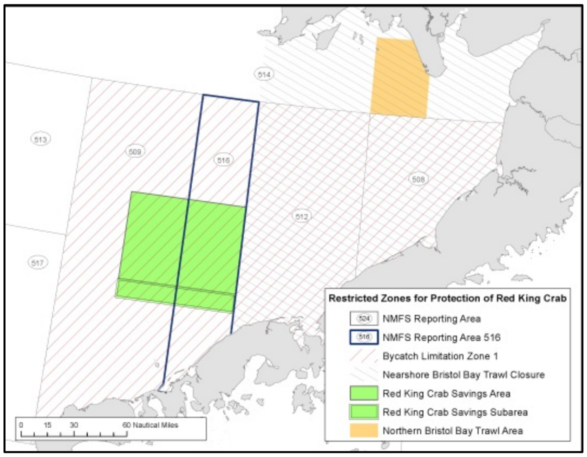


Figure 3-10 Bering Sea fishery closures for the protection of red king crab

3.2.4 Crab PSC limits and area closures

There are additional triggered time and area closures for Bristol Bay red king crab (BBRKC), Snow crab and Tanner crab in the Bering Sea. These measures are summarized below and affect trawl fisheries only. Zones 1 and 2 are closed to directed fishing when the crab PSC limits (red king crab and EBS Tanner crab) are attained in specified trawl fisheries (Figure 3-11). Zones 1 and 2 were established by Amendment 10 to the BSAI groundfish FMP, after being implemented by emergency rule by NMFS in 1986 (NPFMC 1986). These areas were initially based upon the trawl survey distribution of red king crab and Tanner crab stocks at that time. The stair step procedure for determining PSC limits for red king crab taken in Zone 1 trawl fisheries is based on modeled abundance of mature female BBRKC and effective spawning biomass (ESB) from the stock assessment (Table 3-8).

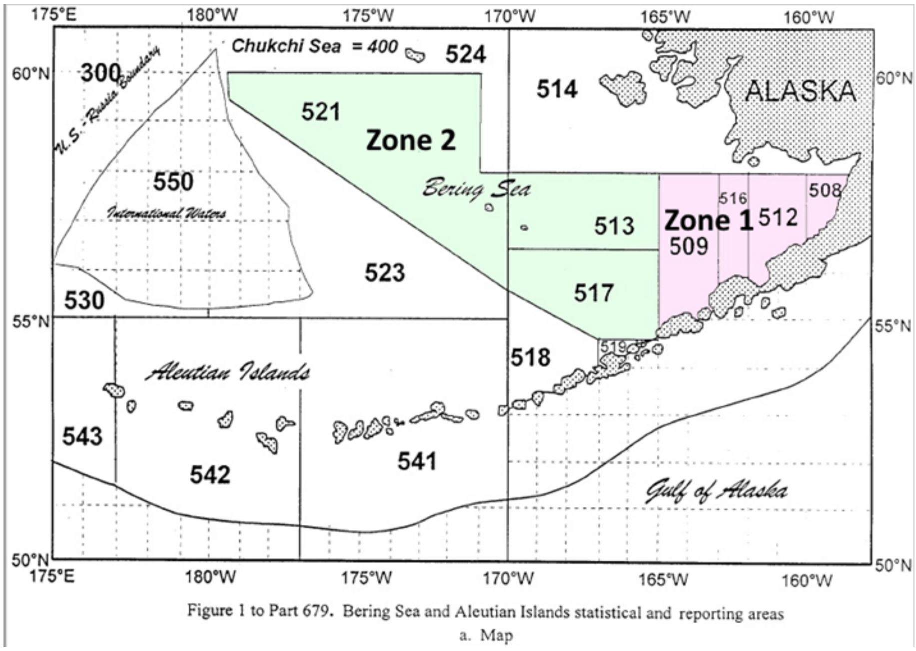


Figure 3-11 Zones 1 and 2 area for closures (Bristol Bay red king crab and EBS Tanner crab)

Table 3-8 PSC limits for Zone 1 red king crab (no Zone 2 red king crab)

When the number of mature female red king crab is …	**The zone 1 PSC limit will be …**
(A) At or below the threshold of 8.4 million mature crab or the effective spawning biomass is less than or equal to 14.5 million lb (6,577 mt)	32,000 red king crab
(B) Above the threshold of 8.4 million mature crab and the effective spawning biomass is greater than 14.5 but less than 55 million lb (24,948 mt)	97,000 red king crab
(C) Above the threshold of 8.4 million mature crab and the effective spawning biomass is equal to or greater than 55 million lb	197,000 red king crab

Source: 50 CFR 679.21(e)(1)(i)

A summary of all red king crab trawl closure measures in shown in Table 3-9.

Table 3-9 Red king crab trawl closures by NMFS reporting area

Area	Effective date	Closure
508	1997	• Closed to all trawl as part of Nearshore Bristol Bay Trawl Closure • Longline and pot vessels required to carry 100% observer coverage
509	--	• Open to trawling, except RKCSA (see below) • Closes, as part of Zone 1, to select target trawl fisheries when applicable red king crab PSC limits are reached by those fisheries
512	March 1987	• Closed to all trawl, first as the Crab and Halibut Protection Zone, and subsequently as part of Nearshore Bristol Bay Trawl Closure • Domestic Pacific cod trawl fishery allowed out to 25 fathoms, with 100% observer coverage, from 1987 to 1997
Eastern part of 514 *(east of 162º W)*	1997	• Closed to all trawl as part of Nearshore Bristol Bay Trawl Closure • Seasonal exemption for the Northern Bristol Bay Trawl Area, which is open to trawling from April 1 to June 15, annually[1]
516	1989	• Closes to all trawl from March 15 to June 15, annually, originally as a seasonal extension of the Crab and Halibut Protection Zone • Closes, as part of Zone 1, to select target trawl fisheries when applicable red king crab PSC limits are reached by those fisheries
Red King Crab Savings Area (RKCSA) *(straddles 509 & 516)*	1995	• Closed by emergency rule from Jan 20-April 19, 1995, to non-pelagic trawl (note, 516 portion of RKCSA also closed March 15-June 15) • Closed by inseason action to all trawl from Jan 20-June 15, 1996 • Closed by amendment to non-pelagic trawl beginning 1997 • Exemption for trawling allowed in the Red King Crab Savings Subarea, when a commercial fishery for Bristol Bay red king crab was allowed the previous year • 100% observer coverage required for all pot and longline vessels fishing in the RKCSA, and all trawl vessels fishing in the subarea

[1] Under a voluntary agreement between industry and members of the Togiak community, in place since 2009, the trawl fleet has agreed to cease fishing in the exempted Northern Bristol Bay Trawl Area by June 1, to avoid potential interactions with halibut.

There are two triggered closures in the trawl fishery to address trawl bycatch of Tanner crab. These are triggered time/area closures to trawl gear as shown in Figure 3-11. Trawl PSC trigger limits for EBS Tanner crab in Zones 1 and 2 are based on a percentage of the total abundance minus an additional reduction implemented in 1999 of Tanner crab as indicated by the NMFS trawl survey (Table 3-10).

Table 3-10 PSC limits for EBS Tanner crab

PSC limits for bairdi Tanner crab: Zone 1 and 2		
Zone	Abundance	PSC Limit
Zone 1	0-150 million crabs	0.5% of the total abundance minus 20,000 animals
	150-270 million crabs	730,000
	270-400 million crabs	830,000
	over 400 million crabs	980,000
Zone 2	0-175 million crabs	1.2% of the total abundance minus 30,000 animals
	175-290 million crabs	2,070,000
	290-400 million crabs	2,520,000
	over 400 million crabs	2,970,000

Source: 50 CFR 679.21(e)(1)(ii)(A)

There is an additional separate triggered time/area closure for trawl fisheries to protect snow crab stocks and their habitat. This closure is triggered if the PSC limit is reached in specified fisheries. The limit accrues for bycatch taken within the *C. opilio* Bycatch Limitation Zone (COBLZ). That area then closes for the fishery that reaches its specified limit. (Figure 3-12). The COBLZ area was specified under amendment 40 the FMP and was established in 1997.

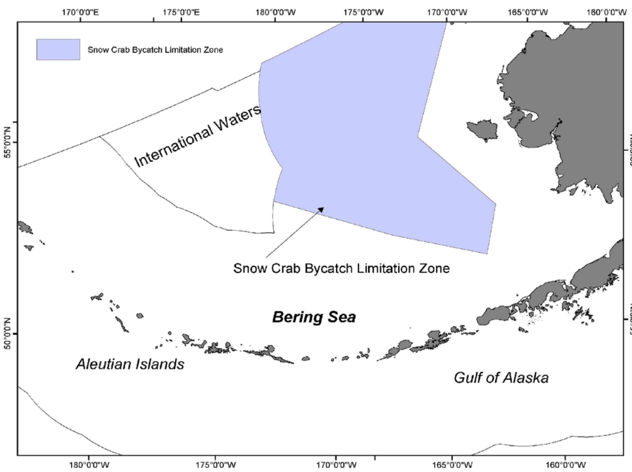


Figure 3-12 C. opilio Bycatch Limitation Zone (COBLZ)

EBS snow crab trawl PSC limits are based on total abundance of snow crab as indicated by the NMFS standard trawl survey. The cap is set at 0.1133% of the snow crab abundance index minus 150,000 crab, unless a minimum or maximum abundance threshold is reached. If 0.1133% multiplied by the total abundance is less than 4.5 million then the minimum PSC limit will be 4.350 million animals. If 0.1133% multiplied by the total abundance is greater than 13 million then the maximum PSC limit will be 12.850 million animals.[26] Snow crab bycatch that occurs outside of COBLZ does not accrue to the COBLZ limit.

A summary of all trawl closures, 2020 PSC limits, as well as other fixed closures to groundfish sectors and gears in the BSAI for crab bycatch management are shown in Table 3-11.

[26] 50 CFR 679.21(e)(1)(iii)

Table 3-11 Summary of groundfish fishery closures for crab PSC and habitat

Stock	Area	Gear type	Timing	For trigger closures: Allocation by sector or target fishery in 2020	How catch accrues	2020 PSC limit
Bristol Bay red king crab	Red King Crab Savings Area	nonpelagic trawl	closed year-round, except subarea	Up to 25% of Zone 1 PSC limit		
	Nearshore Bristol Bay Trawl Closure	nonpelagic trawl	closed year-round, except Togiak subarea open 4/15-6/15			
	Zone 1	all trawl	when limit is reached, area closes to target fishery	A80 sector yellowfin sole Pacific cod pollock/mackerel/ other species	RKC bycatch in Zone 1, by fishery	97,000 allocated among target fisheries
EBS Tanner crab	Zone 1	all trawl	when limit is reached, area closes to target fishery	A80 sector yellowfin sole rockfish Pacific cod pollock/mackerel/ other species	Tanner crab bycatch in Zone 1, by fishery	980,000 allocated among target fisheries
	Zone 2	all trawl	when limit is reached, area closes to target fishery	A80 sector yellowfin sole rockfish Pacific cod pollock/mackerel/ other species	Tanner crab bycatch in Zone 2, by fishery	2,970,000 allocated among target fisheries
Pribilof Islands blue king crab	Pribilof Islands Habitat Conservation Area	all trawl Pot fishing for Pacific cod	year-round			
EBS snow crab	*C. opilio* Bycatch Limitation Zone (COBLZ)	all trawl	when limit is reached, area closes to target fishery	A80 sector yellowfin sole rockfish Pacific cod pollock/mackerel/ other species	Snow crab bycatch in the COBLZ, by fishery	8,580,898 allocated among target fisheries
	Northern Bering Sea Research Area	nonpelagic trawl	currently year-round; fishing may resume in future under a research plan			
St Matthew blue king crab	St Matthew Island Habitat Conservation Area	nonpelagic trawl	year-round			

3.3 Amendment 80 fishery description

Note to the reader: CFEC/ADF&G Fish Ticket information and COAR data are not yet available for 2020 at the time of preparation. As a result, tables and figures that report revenue terminate in 2019.

Amendment 80 to the BSAI Groundfish FMP, implemented in 2008, facilitated the formation of fishery cooperatives for trawl CPs that are not eligible under the American Fisheries Act (AFA) to participate in directed pollock fisheries. A80 originally allocated five BSAI non-pollock trawl groundfish species to permit holders that formed a cooperative within the non-AFA trawl CP sector. The A80 sector is allocated a portion of the TAC for Pacific ocean perch in the AI, Atka mackerel, yellowfin sole, rock sole, and flathead sole in the BSAI, as well as an allowance of PSC quota for halibut and crab. Allocations were derived from the catch history of 28 original qualifying CPs from 1998 through 2004. Later, Amendment 85 allocated the A80 sector 13.4% of BSAI Pacific cod. Other eligible permit holders initially participated in a limited access fishery for the balance of the catch allocated to the sector.

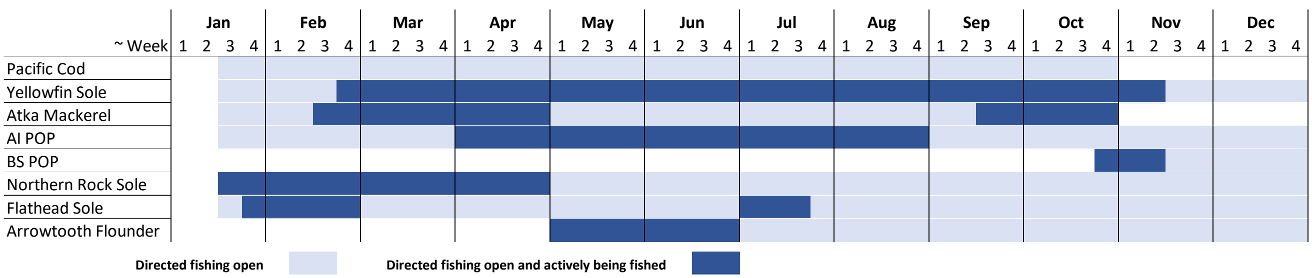
The Council adopted Amendment 80 to meet the following objectives: (1) improving retention and utilization of fishery resources by the non-AFA trawl catcher/processor fleet by extending the groundfish retention standard (GRS) to non-AFA trawl catcher/processor vessels of all lengths; (2) allocating fishery resources among BSAI trawl harvesters in consideration of historic and present harvest patterns and future harvest needs; (3) authorizing the allocation of groundfish species to harvesting cooperatives and establishing a limited access privilege program (LAPP) for the non-AFA trawl catcher/processors to reduce potential GRS compliance costs, encourage fishing practices with lower discard rates, and improve the opportunity for increasing the value of harvested species; and (4) limiting the ability of non-AFA trawl CPs to expand their harvesting capacity into other fisheries not managed under a LAPP.

Amendment 80 established criteria for harvesters in the sector to apply for and receive quota share, and for NMFS to initially allocate and transfer quota share. Vessels may choose to operate in a cooperative or in an open access fishery. Cooperative participants can consolidate fishing operations on a specific Amendment 80 vessel or subset of Amendment 80 vessels, thereby reducing monitoring, enforcement, and other operational costs, and permitting more efficient harvest. The ability to trade harvest privileges among cooperatives encouraged efficient harvesting and discouraged waste. A80 cooperatives receive an exclusive allowance of crab PSC and halibut PSC that may not be exceeded while harvesting groundfish in the BSAI. These halibut and crab PSC cooperative quotas are assigned to a cooperative in an amount proportionate to the groundfish quota shares held by its members; PSC quotas are not based on the amount of crab or halibut PSC historically removed by the cooperative members. The cooperative structure allows Amendment 80 vessel operators to better manage PSC rates relative to operators who must race to harvest groundfish as quickly as possible before PSC causes a fishery closure or causes companies/vessels to deviate from their optimal harvest strategy. By reducing PSC through more efficient cooperative operations (e.g., gear modifications, "hot spot" avoidance, deck sorting, or the relative flexibility afforded in the timing of fishing), Amendment 80 vessel operators may also increase the harvest of valuable targeted groundfish species and improve revenues that would otherwise be forgone.

The A80 sector initially included a set of vessels that formed a cooperative (the AKSC) and a set of vessels that fished in a competitive limited access fishery. Amendment 93 modified the requirements for a group of vessels to form a cooperative, removing unanticipated barriers, and also prevented "persons" (companies) from participating in both a cooperative and the A80 limited access fishery (Final Rule published at 76 FR 68354, November 4, 2011). This meant that a company could not fish its full amount of cooperative quota while also placing one company owned vessel in the A80 limited access fishery to harvest fish that would not have been allocated to that company based on qualifying catch history. The rule eliminated barriers for vessels fishing A80 limited access to form a cooperative and removed incentives for vessels that were in a cooperative to limit membership. The net effect was to increase cooperative participation and the associated benefits, such as more efficient targeting of catch, enhanced ability to avoid bycatch time and area combinations, and opportunities for improved product quality and value. Since 2011, the A80 sector has been prosecuted exclusively by vessels operating as part of a cooperative. From 2011 to 2017 there were two cooperatives; since 2017, all active A80 vessels are part of a single cooperative (the AKSC). Though the single-cooperative model creates an environment for highly organized fishing and shared investment in bycatch avoidance research, the analysts note that the cooperative is still made up of five independent for-profit companies. Industry reports indicate that intra-cooperative in-season transfers of quota for constraining species – i.e., halibut PSC or Pacific cod – occur very rarely, if ever.

Figure 3-13 shows the typical BSAI non-pollock groundfish seasons for the species allocated to the A80 sector and several that are important unallocated catch (e.g., arrowtooth flounder and BS Pacific ocean perch). The trawl fisheries generally open on January 20 and close by regulation on November 1. For the A80 sector Pacific cod is—broadly speaking—an allocated, constraining non-target species that is encountered in multiple aspects of the sector's operations. A80 vessels might have trips that are recorded as directed fishing for Pacific cod in certain circumstances. However, in many cases, they are caught as an expected and commercially valuable incidental species along with other targeted groundfish. This is in contrast to other BSAI groundfish sectors such as the hook-and-line (HAL) CP sector and the trawl CV limited access sector (TLAS), both of which target Pacific cod primarily.

The other non-pollock groundfish species highlighted in Figure 3-13 are mainly targeted by A80 vessels (except yellowfin sole, which is also targeted by the TLAS). The figure reflects the A80 sector's revealed preference for catching particular species at different points during the calendar year. For example, some flatfish species are more desirable or more valuable when roe is present – e.g., northern rock sole. In some cases, the sector might focus on a particular flatfish species when fish aggregation and CPUE are expected to be higher. Lower value species such as arrowtooth flounder might show up as "actively fished" during gap periods between more valuable species as vessels seek to keep their platforms productive while also retaining valuable secondary species within regulatory limitations. Finally, the reader should note that the non-pollock/non-cod species include both flatfish and roundfish (e.g., Atka mackerel and Pacific ocean perch [POP]). These flatfish and roundfish are both allocated to A80 companies on the basis of qualifying historical catch and, while intra-sector transfers are possible, companies' portfolios are not necessarily balanced between the two types of species in a uniform manner (see Figure 3-15). The figure should not imply that any A80 company would have an unrestricted choice to make between yellowfin sole, rock sole, flathead sole, Atka mackerel, AI POP or Pacific cod at a given point during the year. A company's species quota allocations are the key element of how it plans its fishing year, but companies must also consider the capacity and the capability of their vessels to fish in certain areas (e.g., farther west in the Aleutians), the timing of when fish will be aggregated in fishable areas, and the times when both fish quality is high and the market demands them. To the latter point, a company might start one species later in the A season one year versus another if prices are low due to holdover inventories from the previous season.



Source: https://www.fisheries.noaa.gov/alaska/resources-fishing/federal-fishery-seasons-alaska (Accessed August 2020; last updated 4/12/2019)

Figure 3-13 Typical seasons for selected A80 target fisheries.

The whole of Section 3.3 gives evidence that the A80 sector has been in a near-constant state of change during the analyzed period and that the way in which historical fishery data are used for impact analysis in Section 5.3.2 should be carefully considered. The shifting factors that underly the sector include the natural environment, external management (e.g., regulations, TACs, PSC limits), and internal management (e.g., cooperative structure, bycatch avoidance strategies).

Section 3.3 covers some of the exogenous factors that have influenced A80 sector operations and will likely continue to do so in the near-term. That section recognized that the natural environment plays an important role in how fisheries occur – from stock status to fish aggregation (and CPUE). One small but important part of the underlying natural environment for these fisheries is the presence or absence of the Bering Sea "cold pool." Recent ocean temperature anomalies have likely impacted – or may impact in the future – the movement of target and non-target species. To the extent that fishery participants must reckon with this change, historical fishery data on catch, location, bycatch encounter rates, and CPUE might become less representative of the future state of the fishery.

The sector has experienced regulatory changes ranging from which species it might target on the margins (i.e. flatfish flexibility; Section 3.1.1.1) to how halibut encounter is estimated as PSC mortality (i.e.

discard mortality rates and fish handling procedures like deck sorting; Sections 0 and 3.4.4). Some pre-existing regulations have built-in uncertainty that affects A80 operational decisions on an annual basis, such as crab conservation areas that might be open or closed to non-pelagic trawling from one year to the next (Section 3.2.4).

Participants in the A80 sector are linked to other groundfish fisheries to varying degrees. For example, a subset of A80 companies or vessels might also have direct linkages to the TLAS sector or to CDQ groups through ownership or at-sea processing relationships (Section 3.3.4). Recent changes in the regulations governing at-sea processing of CV catch (mothershipping) have shaped or limited revenue diversification opportunities for the A80 sector, and potential regulatory changes to the BSAI trawl CV sector (TLAS) could convey harvest privileges on CVs that deliver to A80 vessels in a mode that would not be affected by PSC limits subject to ABM.

Internally, the A80 sector has evolved since its establishment in 2008. Section 3.3.1 describes how the sector evolved from a mix of cooperatives and limited access participants to a single cooperative. That evolution involved companies exiting the sector or merging with the current managing cooperative, which is diverse in its mix of business plans but has made coordinated steps as a group to prioritize halibut mortality reduction on a progressive basis (Section 3.4.4). In certain years, these business transitions may have affected the catch and bycatch rates that the analysts can report at the sector level.

Recognizing the dynamics of the A80 sector, the analysts attempt to present time series data that reflect the shifts in internal and external management while acknowledging the stochastic effects of exogenous environmental factors. The full time series of A80 history is instructive in terms of how the sector arrived at the operational point where it currently exists, but in some cases the analysts have determined that the most recent set of years (e.g., 2017 through 2019) is most representative of the sector for the purpose of considering future outcomes under the considered ABM alternatives. Data from 2020 are included to the extent that they are currently available – i.e., for catch but not for revenue – with the caveat that the 2020 fishery encountered unique operational challenges and constraints due to the COVID-19 pandemic.

Throughout this document the analysts focus on fishery data for the years 2010 through 2020. The analysts sought to use as much data as possible to identify trends and historical events, while relying on years for which high-quality estimates are available and during which data are comparable across years. Years were also selected to focus on the period that best represents the current state of BSAI groundfish fishery management. While efforts to collect and process better data are always ongoing, it was determined that 2010 marks the earliest year after the implementation of Amendment 80 – as it is related to effects on other fisheries like TLAS and AFA – that the benefits of the eLandings system were achieved. The eLandings system began in 2006, but it took several years for it to be fully utilized and for its benefits to be realized in catch accounting and PSC estimation. The implementation of Amendment 80 in 2008 represented much change for managers as well as for fishery participants. Improvements in data collection and estimation procedures for the A80 sector were made in 2008 and 2009. In addition to eLandings and A80 implementation, the analysts note that NMFS Catch Accounting System (CAS) was modified over the course of 2013 and 2014; the current version of CAS is best applied to the years from 2010 to present. While CAS can still be used to query data from before 2010, the catch and bycatch estimates for earlier years were generated using a different set of programming procedures than the current practice. As a result, any data "fixes" needed to retroactively tag fishing activity to a sector definition that was developed specifically for this analysis would be difficult and potentially unreliable before 2010. In consultation with the Alaska Fisheries Information Network (AKFIN) and NMFS, the analysts determined that data beginning in 2010 offers the best achievable quality and consistency of sourcing, while also providing a 10-year sample through 2019 for revenues.

3.3.1 Fleet composition

Since 2010, the A80 fleet has consisted of 18 to 20 catcher processors, four to eight of which have also participated in the CDQ fishery in a given year (Table 3-12).[27] A majority of these vessels are owned by companies registered in Washington. Nine A80 CPs acted as motherships taking at-sea deliveries from the BSAI trawl CV limited access fishery (TLAS) in 2018, 2019, and 2020. NMFS has recently limited the number of CPs that can receive deliveries of TLAS Pacific cod (BSAI FMP Amendment 120, 84 FR 70064, December 2019) and the CVs that can deliver TLAS yellowfin sole to CPs acting as motherships (BSAI FMP Amendment 116, 83 FR 49994, October 2018). Only one A80 CP is allowed to receive TLAS Pacific cod deliveries (as is one AFA CP). Eight CVs are able to deliver TLAS yellowfin sole to CPs acting as motherships. The majority of those eight CVs are owned by A80 companies that also own the CP mothership to which they would likely deliver.

Table 3-12 Active A80 vessels that harvested A80 and CDQ allocations

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
A80	19	20	19	18	18	18	19	19	19	20	19	23
CDQ	7	8	7	6	6	4	6	7	8	8	7	12
Total	19	20	20	18	18	18	19	19	19	20	19	23

From 2010 through 2017, A80 consisted of two cooperatives that received annual allocations from NMFS, the AKSC[28] and the Alaska Groundfish Cooperative (AGC). In 2017 the Fishing Company of Alaska began the process of terminating operations and selling its vessels, leading to the sector consolidating into a single cooperative, the AKSC. Apart from this, vessel ownership and cooperative membership has remained relatively stable through the years (Figure 3-16) and appears likely to remain stable in the foreseeable future. For some A80 companies, acquiring more of the limited number of permits is constrained by quota share ownership caps. While the sector has experienced a recent wave of newly built or refurbished vessels, total fleet transformation to high-capacity platforms may be tempered by the availability of catch (TAC), bycatch constraints (halibut PSC and others), and market demand for U.S. flatfish volume.

A80 companies vary in the A80 permits that they control, the number of CPs they own, whether or not they own the CVs with which they partner in the TLAS fisheries (vertical integration), and – importantly – the portfolio of groundfish species and PSC limits available to them each year. The cooperative receives annual catch allocations and PSC limits for specific species. Subsequently the cooperative calculates individual vessel harvest shares and PSC limits and establishes a mechanism for quota transfers within the cooperative and with the other A80 cooperative (if applicable). AKSC manages allocations by "initially apportion(ing) its annual NMFS-issued allocation to individual companies or vessels. Subsequently, AKSC companies can engage in transfers with other AKSC companies or vessels to maximize harvesting efficiencies. Because allocations are managed under hard caps, some portion of each of AKSC's allocations will be left unharvested to serve as a buffer prior to reaching allocation amounts" (Concepcion and Fina 2019). The A80 fleet sorts roughly into companies or groups of vessels that focus more on flatfish or roundfish based on the qualified catch history associated with their permits.

Figure 3-14 shows the relative distribution of quota share for allocated A80 species associated with each of the 22 permits issued for the 2020 fishing year.[29] The allocation to 15 of the 22 permits is at least 50% flatfish. Only three of the permits are comprised of mostly roundfish (AI POP and Atka mackerel,

[27] The F/V Golden Fleece qualified for a small amount of A80 cooperative quota based on 1998-2004 catch history but has elected not to participate in the sector (does not apply for quota) so that it is not subject to A80 sideboards on fishing in the GOA FMP area where it is historically highly engaged and reliant.
[28] http://www.alaskaseafoodcooperative.org/
[29] Source: https://www.fisheries.noaa.gov/alaska/commercial-fishing/permits-and-licenses-issued-alaska. The annual NMFS report shows the gross number of quota share units associated with each permit. Fifteen of the permits were allocated an average of 56 million QS units while five permits were allocated seven million or fewer QS units.

excluding Pacific cod). Overall, 56% of QS units are for flatfish, 29% are for AI POP or Atka mackerel, and 15% are for Pacific cod. The QS units associated with a given permit does not reflect how a particular vessel will fish within the sector. Companies own multiple permits, and allocated pounds are transferable within the A80 cooperative(s).

Figure 3-15 illustrates the contrast between the five A80 fishing companies that are operative in 2020 in terms of the species mix upon which they rely. The vertical axis expresses the percentage that a species or species group comprises of a company's total catch or gross wholesale revenue over the entire 2010 through 2019 period. The figure defines companies by the historical catch of the vessels for which they claim current ownership in the most recent A80 Cooperative Report provided to NMFS and the Council. Data are obscured to preserve confidentiality; the purpose of the figure is to show that the A80 sector includes companies with different levels of dependence on flatfish and roundfish, and thus different degrees of exposure to expected PSC rates when bycatch is constraining as well as a different set of options in terms of how they might continue their operation in the context of an effectual halibut limit. For example, it was noted above that companies have not historically transferred halibut PSC with one another, but at some point, a greatly reduced PSC limit could force a company to either tie up vessels until lower-PSC fishing opportunities become available or pay what would presumably be a steep price for the ability to keep vessels working; a company in that situation is more likely to be one whose quota portfolio is tilted towards Bering Sea flatfish.

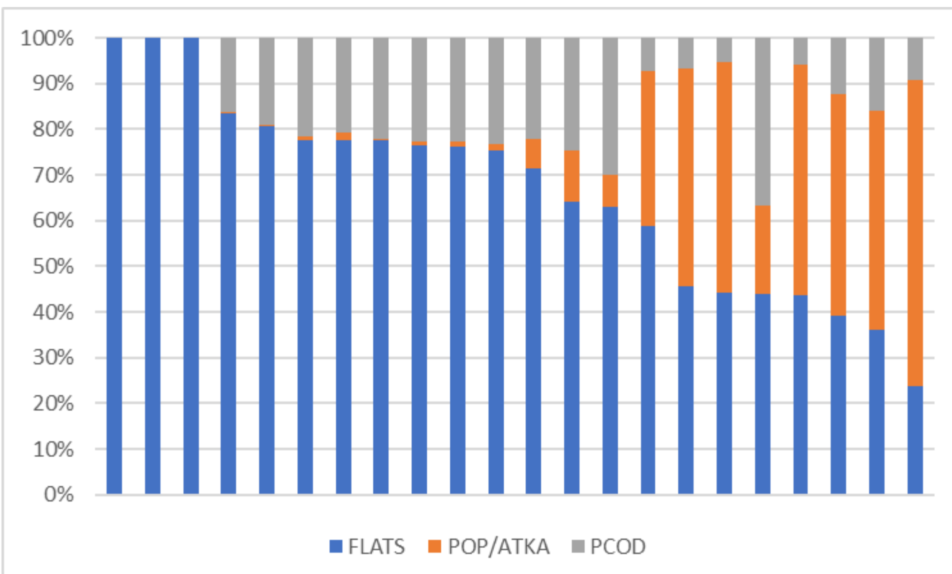


Figure 3-14 **Proportion of species allocated on the 22 A80 quota share permits issued in 2020, by allocated species (FLATS = YFS, FHS, and NRS)**

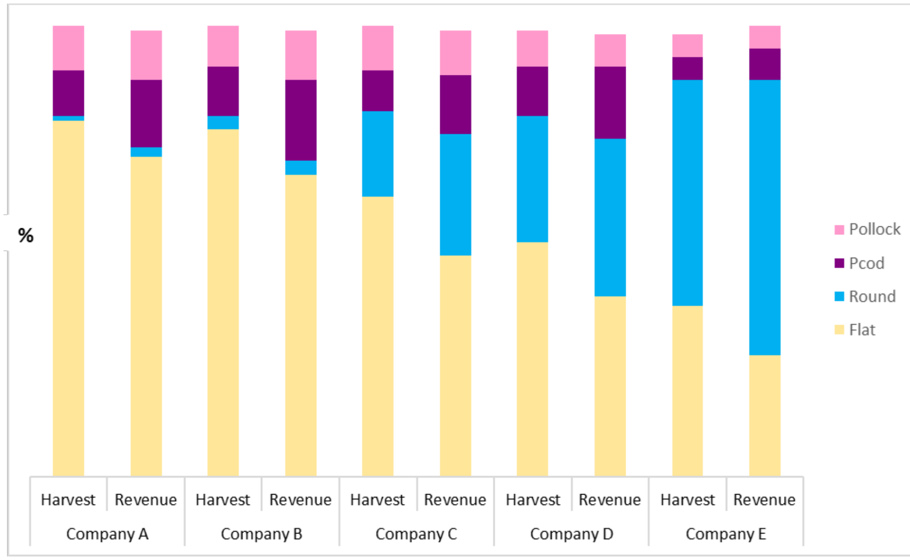


Figure 3-15 Aggregate 2010-2019 percentage of A80 harvest (mt) and gross wholesale revenue ($) by species group for fishing company fleets as comprised in 2020 (Sources: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; Vessel company affiliations taken from AKSC Reports).

Figure 3-16 identifies the 28 CPs that have been enrolled in the A80 sector since 2010 by company and cooperative affiliation. Five of those 28 vessels were enrolled in a cooperative but have not actively fished in A80 during the analyzed period. Nevertheless, they are shown in the figure because they appear on a cooperative roster; a vessel may be enrolled in the cooperative but not fishing due to the initial vessel-based-allocation structure of the A80 program so that quota pounds can be fished on active platforms.[30] Inactive vessels might also be enrolled in a cooperative to meet the minimum requirements for a cooperative to be formed. One additional vessel that has been listed on a cooperative roster is not shown because it has not ever fished within A80. Vessels that drop out of the figure in more recent years (e.g., Alaska Voyager, Tremont, Ocean Alaska, Ocean Cape, and Alliance) have either been sold to another company or remain owned but are not active in the sector and their permit has been assigned to an active A80 vessel. Some of those permits were reassigned to vessels that only appear in recent years (e.g., Seafreeze America, Araho, and America's Finest), which are newly built vessels.

[30] The vessel-based initial structure of A80 also explains why the Alaska Ranger, which sank in 2008, appears in the figure; the permit and associated catch history linked to that vessel remained in the cooperative until the controlling company's assets were transferred in 2017.

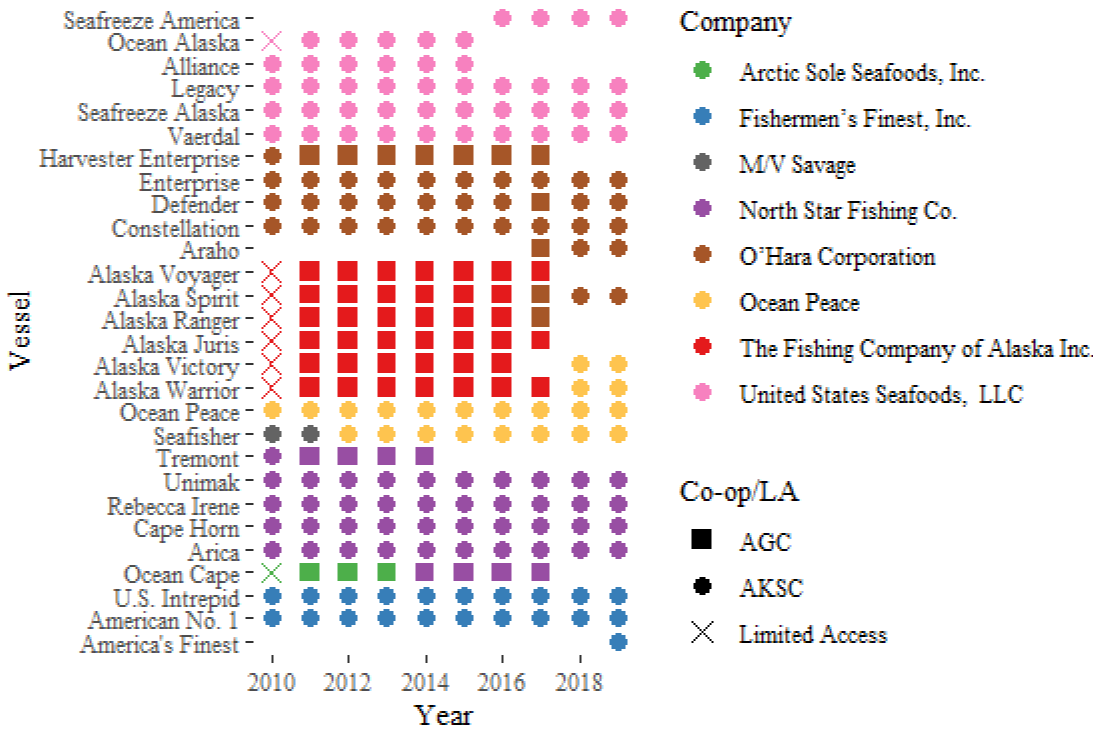


Figure 3-16 A80 Vessels by Company and Cooperative, 2010-2019. (Source: Adapted from information published in annual A80 Cooperative Reports and NMFS Permits & Licenses Issued)

The crew onboard A80 CPs typically includes between 30 and 40 individuals at a given time, and crews are rotated onto a vessel during a fishing year. From 2015 through 2019, the annual number of people who worked on A80 vessels ranged between 1,729 and 2,181. In 2018, the average number of workers by position on an A80 vessel was roughly five deck crew, 27 processing workers, and 8 "others" comprising the officers, engineers, and cooks. Section 10.2 of the SIA details the crew data that are available from the A80 Economic Data Reporting (EDR) program. Crew size on A80 vessels tends to be higher than that of other BSAI groundfish sectors. HAL CP vessels typically carry around 20 individuals while trawl and HAL CV vessels, including directed halibut CVs, tend to have a crew of around four people.

3.3.2 Catch and Revenue

A80 CPs target an array of flatfish and roundfish species and retain secondary groundfish species for commercial use. In addition to the six species for which BS and/or AI TAC is allocated to A80 QS holders – yellowfin sole (YFS), northern rock sole (NRS), flathead sole (FHS), AI Pacific ocean perch (POP), Atka mackerel (Atka), and Pacific cod (Pcod) – A80 vessels also catch and process arrowtooth flounder (ATF), Alaska plaice (AKPL), sablefish (Sabl), and pollock (Plck). The "Other" category shown throughout this section includes northern and other rockfish, Kamchatka flounder, Greenland turbot, "other" flatfish, skates, sculpins, squids, sharks, and octopuses.[31]

Table 3-13 reports the total gross revenues and catch by all A80 sector vessels during the 2010 through 2020 period; dollar values are standardized to 2018 values to better isolate productive value without the effect of inflation across the broader economy.[32] Revenue data for the 2020 fishing year are not available

[31] During the three most recent years (2017-2019) the "Other" category is comprised by volume (mt) of roughly 44% Northern and other rockfish, 26% Kamchatka flounder, 13% Greenland turbot, 12% skates, 5% other flatfish, and negligible amounts of other listed species.
[32] In this section and throughout the document (including the analysis of revenue impacts), dollar values are indexed to 2018 based on the U.S. Bureau of Economic Analysis, Gross Domestic Product: Chain-type Price Index, which is

at the time of publication. Typically, the highest grossing species for the sector in terms of cumulative gross value are YFS, Atka mackerel, and rock sole. Figure 3-17 shows catch (mt) and gross first wholesale value (2018$) by individual species or species group from 2010 through 2019. Figure 3-18 reports the utilization rate of the A80 allocated species, showing stable high proportion of catch relative to TAC across both flatfish and roundfish species.[33] A80 vessels are not uniform in the mix of species that they catch. Figure 3-14 showed the diversity of allocated species across A80 QS permits. As those permits are assigned to vessels and as A80 companies deploy quotas across their fleets, certain vessels might be more or less dependent on flatfish versus roundfish in a given year. The difference in fishing portfolios across companies and vessels can also mean that individual companies or vessels are more or less exposed to potential halibut bycatch (refer to Figure 3-15 for rough depiction of company portfolios and to Table 3-20 in Section 3.4 for halibut PSC rates by target species).

NMFS's Catch Accounting System categorizes A80 vessels' catch by trip target. A trip for a CP captures a week of harvesting activity and a target species is assigned based upon the predominate species caught.[34] According to the Council's BSAI Pacific cod allocation review (NPFMC 2019c), most of the targeted Pacific cod originates from test tows for other A80 species that were not intended as Pacific cod target tows. In some instances, however, a vessel could target Pacific cod to facilitate that vessel's mothership processing activity as it works with trawl CVs operating in the TLAS sector. The ability to target Pacific cod is limited by the relatively small allocations of that species to A80 QS holders (13.4% of the BSAI TAC) and the need to reserve Pacific cod quota to cover incidental catch of cod while targeting other A80 species throughout the fishing year. The amount of Pacific cod allocated to the A80 sector is small relative to the tonnage allocated or accessed from the nonspecified reserve for some other species, but it is utilized at a high rate (Figure 3-18). Figure 3-20 shows that while cod is a small component of total A80 catch it occurs throughout the year concurrent with primarily targeted species (e.g., rock sole and yellowfin sole). Figure 3-35 shows that cod catch occurs throughout the geographic range prosecuted by A80 vessels.

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also the method most commonly applied by the Alaska Fisheries Science Center. . 2018 was the most recent year available when drafting the first version of this DEIS (presented at the October 2018 Council meeting) and has continued to be used as the index year in subsequent versions for consistency.
Citation: U.S. Bureau of Economic Analysis, Gross Domestic Product: Chain-type Price Index [GDPCTPI], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/GDPCTPI, August 24, 2020. Available at: https://fred.stlouisfed.org/series/GDPCTPI.

[33] Note that this information was drawn from A80 cooperative reports that are not available for 2020 at the time of publication.

[34] A trip is categorized as a flatfish target trip if the sum of flatfish catch (YFS, NRS, FHS, and other flatfish) is dominant over other species in the total catch. For YFS to be assigned as the trip target, the YFS catch must be greater than or equal to 70% of total catch. If that bar is not met on a flatfish target trip then the target is designated as the one of the other three flatfish species that made up the largest proportion of the trip's catch.

Table 3-13 **A80 gross first wholesale revenue (2018 dollars) and catch (mt), 2010 through 2020. Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA**

Year	Revenue (2018$)	Total Harvest (t)
2010	323,787,060	305,192
2011	385,153,549	302,157
2012	397,530,330	307,406
2013	307,582,132	306,775
2014	316,928,372	308,022
2015	290,450,269	289,169
2016	306,495,840	298,443
2017	359,357,539	278,771
2018	379,443,654	290,173
2019	335,260,125	288,302
2020		290,382

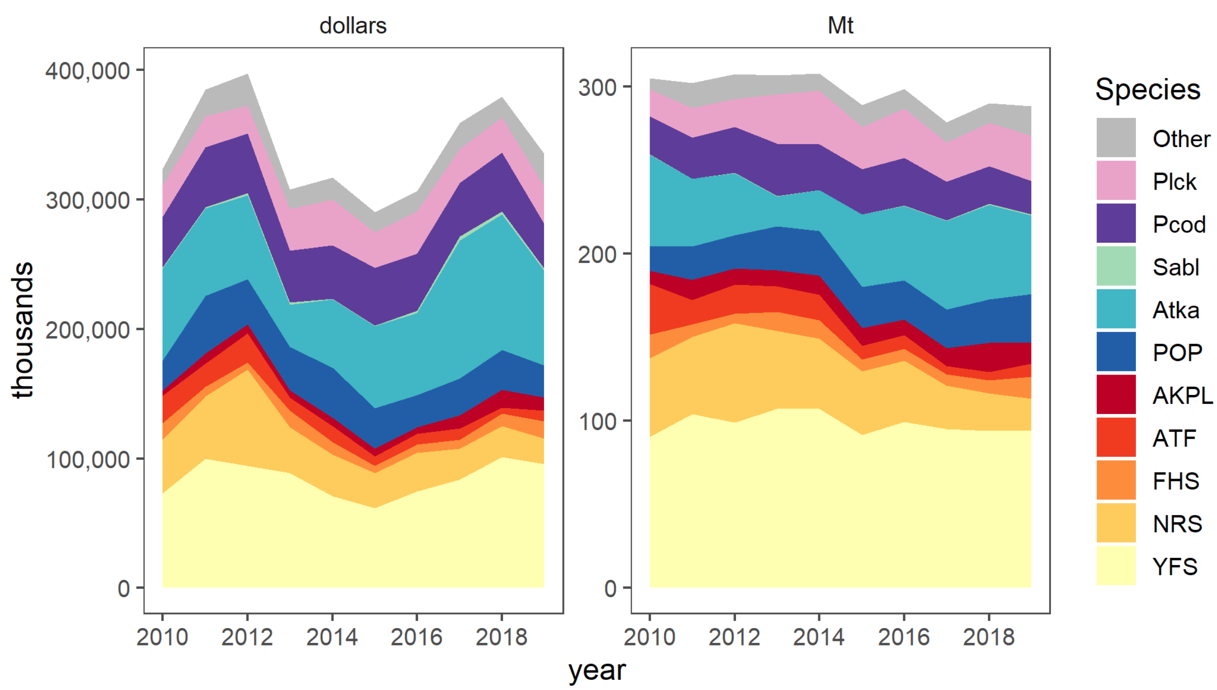

Figure 3-17 **A80 gross first wholesale revenue (2018 dollars) and catch (mt) by species, 2010 through 2019. Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA**

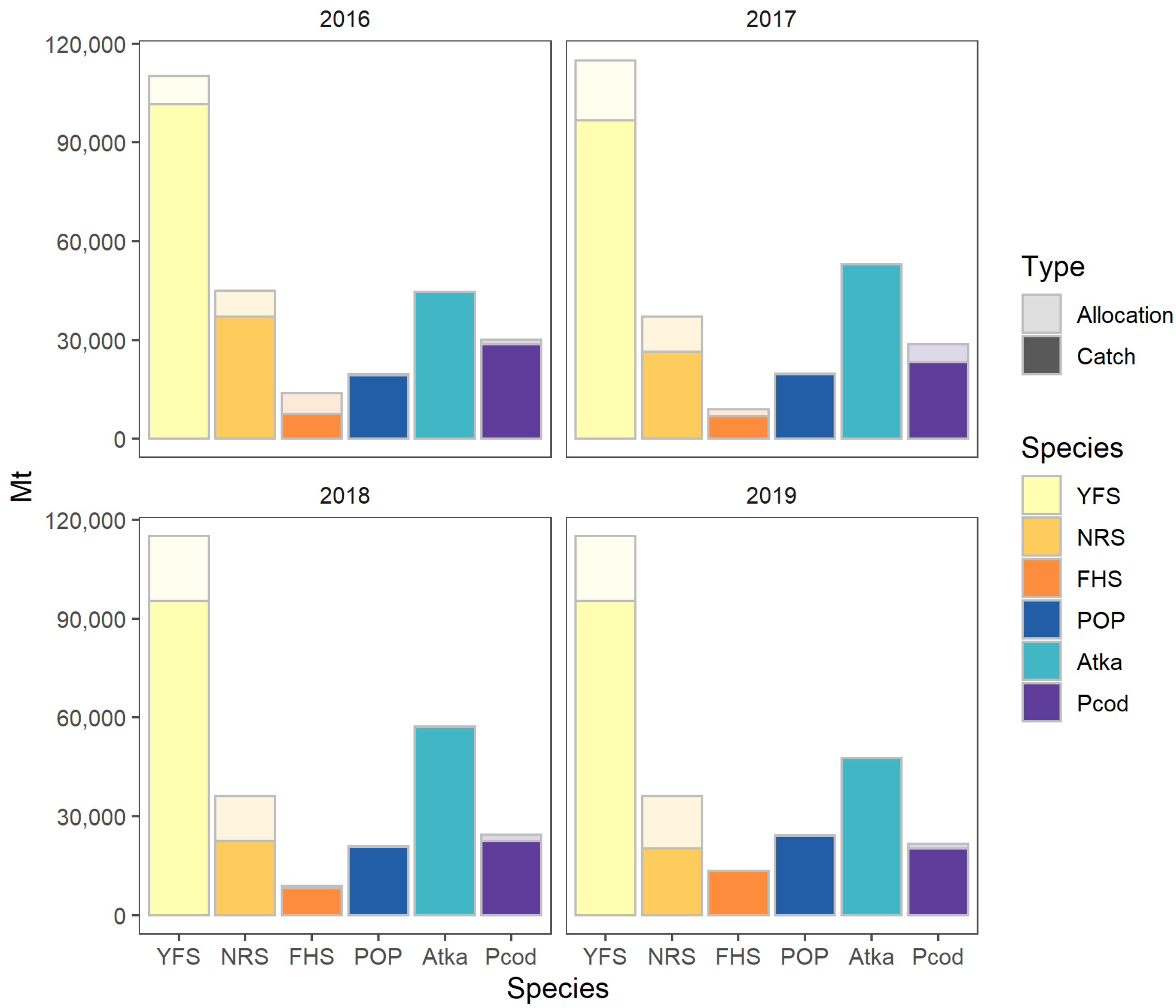

Figure 3-18 A80 allocation and catch 2016 through 2019. (Source: Adapted from information published in annual Cooperative Reports)

Consideration of first wholesale versus ex-vessel values for the A80 sector

In this document, A80 catch values are reported as gross first wholesale revenues. These values are derived from prices taken by AKFIN from Commercial Operators Annual Reports (COAR) that are then are linked to round weights and product weights by product type and linked to a specific processor by production reports. The first wholesale price is the market price of the primary processed fishery product. This is the value of a processed product when sold by a processor to an entity outside of their affiliate network; it is typically equivalent to the value of product as it leaves Alaska (AFSC 2019). The first wholesale value is the most appropriate value to represent A80 revenues given the typical supply-chain of A80 product. While there is some variation across operations and for specific groundfish species/products, most A80 product is exported to secondary processors as frozen head and gut product.

For fisheries harvested by catcher/processors, there is no reliable ex-vessel price generated from the sale of raw fish by a harvester to a primary processor. Approximate conversions can be made and are, in some cases, used in the fishery management world. Two examples where estimated ex-vessel values are imputed from A80 catch are NMFS cost recovery and the application of the State of Alaska’s Fishery Resource Landing Tax. However, those estimates do not claim to represent real product values for catcher/processors and it is generally accepted that ex-vessel estimates have varying degrees of accuracy across species and product types. For the purposes of cost recovery and taxation, the estimate is based on the value of processed products from catcher/processors (from COAR) divided by the retained round-weight (unprocessed weight) of catch and then multiplied by a factor of 0.4 to correct for the value added to the fish product by processing (NOAA Fisheries 2020). This document generally does not report wholesale to ex-vessel value conversions for A80 due to the imprecision of a generic conversion factor and the relative lack of utility in characterizing a catcher/processor fishery in ex-vessel terms. One exception to this is Section 3.3.2 (A80 fishery taxes). In that section, the analysts estimate the ex-vessel value of A80 catch from 2010 through 2019 (2018$) to reflect the order of magnitude for fishery taxes paid to the State of Alaska (Table 3-16). A reader who is intent on viewing the value of A80 catch in terms of ex-vessel revenue will find it there and is advised to apply all appropriate caveats to those estimates. The reader may find a different estimate – the total A80 fishery value used to calculate the cost recovery fee – in Section 3.3.2.

Diversification of revenue on A80 vessels

This subsection looks at the proportion and scale of gross wholesale revenues that A80 vessels generate from their allocated quotas (and secondary catch associated with that fishing), from acting as a mothership to CVs, from partnering with CDQ groups to harvest CDQ allocations, and from fishing in the sideboarded GOA trawl CP fishery. (Note that the operational relationship between A80 and the CDQ sector, as well as catch/revenue outcomes, is further described in Section 3.3.4).

In general, the A80 fleet is highly focused on BSAI non-pollock groundfish. That said, only two of 24 vessels active between 2010 and 2020 fished *exclusively* within the A80 sector. Table 3-14 shows the seven different fishery combinations that active A80 vessels displayed over the entire period considered, and in 2019 as a snapshot. In 2020, there were 19 active A80 vessels; seven fished CDQ (9,550 mt of groundfish catch), nine operated as a mothership, and nine fished in the GOA. The analysts note that revenue derived from catching and processing CDQ fish, processing at-sea deliveries as a mothership, and operating in the GOA would not be directly "at risk" if the ABM alternatives result in A80 halibut PSC limits that suppress the reliable productivity of fishing the annual A80 cooperative quota and associated marketable secondary species.

Table 3-14 Modes of operations by A80 vessels active during 2010-2019: entire period and 2019 (M = mothership)

	Period	2019
A80	2	6
A80-CDQ	1	
A80-M-CDQ	1	4
A80-M-CDQ-GOA	6	2
A80-CDQ-GOA	4	2
A80-M-GOA	3	3
A80-GOA	7	3
Total	**24**	**20**

None of the currently active A80 vessels derive any revenue from Washington, Oregon, or California groundfish fisheries.[35] One A80 vessel is qualified as an AFA pollock CP. That vessel has not fished AFA pollock in the five most recent years reported and, while catch or revenue data cannot be reported for an individual vessel, pollock fishing did not comprise a significant portion of its activity during the analyzed period.

Figure 3-19 shows total gross first wholesale revenues for all A80 vessels that were active during the 2010 through 2019 period. For the entire period, A80 vessels generated 80% of total wholesale revenues

[35] One A80-qualified vessel that is no longer active in the sector had catch history in the West Coast region.

from the catch and processing of quotas allocated to the sector and catch of unallocated species or marketable secondary species that was made on A80 trips. On an annual basis, that proportion never reached higher than 84% (2010) or fell lower than 76% (2017).

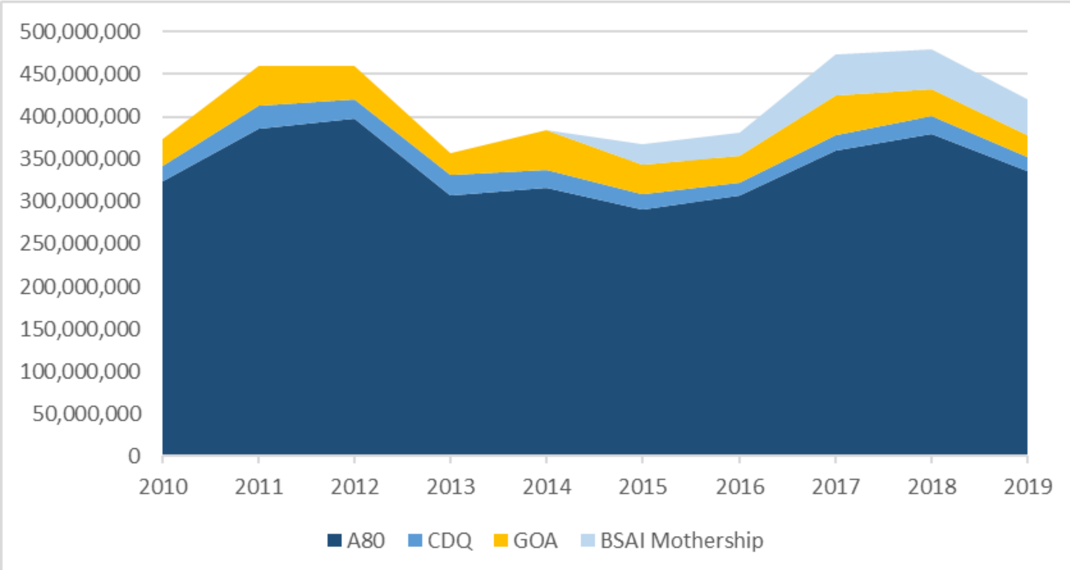

Figure 3-19 Total gross first wholesale revenues for A80 vessels across all activities (2018$), 2010 through 2019. (Note: BSAI mothership activity occurred from 2010 through 2014 but revenues are not shown because the data include fewer than three vessels.)

Since 2010, 10 different A80 vessels have acted as a mothership, processing Pacific cod and yellowfin sole target fishery catch delivered by CVs. Some of the CV catch delivered to A80 mothership vessels may have been catch of CDQ fish, but the analysts consider this mothership activity as opposed to the catching and processing of CDQ fish all on an A80 platform, which is described below and captured as "CDQ" in Figure 3-19. Only two A80 vessels participated in mothership processing from 2010 through 2014. From 2015 through 2019, the number of A80 vessels taking at-sea deliveries from CVs increased to six, seven, eight, nine, and nine in those years sequentially.

As noted in the previous section, recent regulatory changes now allow only one A80 CP to process Pacific cod as a mothership (Amendment 120) and only eight CVs may deliver yellowfin sole to motherships (Amendment 116). The latter regulation effectively caps A80 vessels' activity as yellowfin sole at-sea markets to those owned by companies that are associated with these eight CVs through direct ownership or existing business arrangements. The vessels that have acted as motherships are owned by three of the five current A80 companies. From 2017 through 2020, the number of A80 CPs that took yellowfin sole target deliveries from CVs was eight or nine vessels each year. Seven or eight A80 CPs took target Pacific cod deliveries from CVs in 2017 through 2019, but under the newly implemented regulation only one such vessel is currently able to do so.[36]

The estimated gross wholesale value generated by A80 mothershipping activity increased from around $24.7 to $27.6 million in 2015 and 2016 to $49.6 million in 2017 and then declining to $46.8 million and $42.6 million in 2018 and 2019 respectively (2018$). The tailing off of mothershipping revenue in 2019 could be an effect of the recent regulations limiting mothership activity but is more likely reflecting lower unit values for key mothership species (Table 3-15). In 2019, the average mothershipping wholesale

[36] CPs acting as a mothership that are not permitted to function as an at-sea Pacific cod market may still receive and process cod up to an MRA, since Pacific cod is a maximum retention species. It is possible that a CP that is excluded from Pacific cod mothershipping might show up in observer data as having a mothership Pacific cod target if vessels targeting other species delivered more cod than intended, but the mothership's retention limit is still expected to be applied as fish are sorted in the processing factory.

revenue among the nine participants was $4.7 million but the median was $2.1 million, indicating that a few vessels are highly engaged in this mode of operation. In 2019 the average revenue from mothership processing among the three most highly engaged vessels was around $11.3 million. As a group, those three vessels generated 36% of their combined 2019 total gross wholesale revenues across all activities from processing as a mothership.

As shown in Table 3-12, 12 A80 vessels have harvested CDQ fish between 2010 and 2019. In recent years, the number of A80 vessels working with CDQ groups to harvest their non-pollock groundfish – either through a royalty arrangement or joint ownership – has been between six and eight vessels. Since 2010, three A80 companies have caught and/or processed CDQ fish; company-level participation cannot be reported over a smaller set of years due to confidentiality. Figure 3-23 reports that the average total annual wholesale revenue from CDQ catch on A80 vessels has been in the range of $17 million to $21 million in recent years. From 2017 to 2019, the average wholesale revenue generated by an A80 vessel's harvest and/or processing of CDQ fish was between $2.2 million and $2.7 million (2018$). In aggregate, the eight A80 vessels that have partnered in CDQ harvest from 2017 to 2019 generated between 8% and 9% of their total wholesale revenues from that activity.

From 2010 to 2019, 20 of 24 A80 vessels that were active at some point generated wholesale revenue when operating in the GOA. Sixteen A80 vessels fished the GOA from 2010 through 2012; no more than 13 A80 vessels fished the GOA since 2013, and in three most recent years it was eight or 10 vessels.[37] All five of the current A80 companies were represented by at least one vessel in the GOA during the 2019 fishing year. At the sector level, GOA wholesale revenues accounted for between 6% and 12% of total A80 revenues annually, with the lowest proportion occurring in 2019. The average annual proportion was 8% of total sector revenue. The period average total GOA wholesale revenue for A80 vessels (2018$) was $35.8 million (median = $32.8 million). The highest value occurred in 2014 ($47.8 million) and the lowest values occurred in 2013 and 2019 (~$25.6 million). The PSC limitations governing A80 vessels fishing in the GOA are described in Section 3.3.3.

Market information for selected A80 species

Table 3-15 reports the average annual gross first wholesale value per pound of the groundfish species that make up the bulk of A80 catch and revenue reported in Figure 3-17. The NMFS At-Sea Production Reports that underly the table are pulled only from vessels fishing within the A80 sector so, for instance, values reported for at-sea pollock production do not reflect AFA CP activity. The values aggregate across all product forms for each species that might come out of the A80 sector. Value-per-pound is reported here in nominal terms, meaning no adjustment for inflation has been made. A species for which external determinants of nominal value are stable would be expected to display a slightly upward trend over a period of years, without placing too much importance on small year-on-year variations. The principal factors that influence average wholesale values per pound include the strength of international demand relative to supply for a species (or a group of highly substitutable species), the at-sea processors' emphasis on producing higher-value product forms, and the strength of the global market for U.S.-produced seafood in the context of currency valuations, tariffs, and competition from foreign fisheries that produce similar types of fish. The time series of available data does not capture market shifts related to disruptions from the 2020 global health and trade crisis, which is likely to impact the marginal value of A80 products in the near-term.

The first four species listed in Table 3-15 are the ones that make up the greatest proportion of sector-level catch and gross revenue. Of those, POP diverges the most from the expect upward trend over the full time series. Prices for marketable non-target species such as pollock are likely not reflective of the general market of at-sea pollock because A80 platforms are not necessarily set up to produce and market the

[37] This does not include one A80-qualified vessel that has opted out of receiving cooperative quota share so that is not subject to A80 sideboards in the GOA, where that vessel conducts all of its fishing.

higher value products forms that would increase average annual unit prices. Sablefish makes up a small amount of total A80 catch but is notable for a recent sharp decline in nominal wholesale unit value. While no single explanation is apparent, it is likely that sablefish prices are down due to smaller average fish size and a general softening in demand markets. Unlike many flatfish species or species primarily allocated to the A80 sector (e.g., Atka mackerel), Alaska sablefish prices could be influenced by the ability of the hook-and-line sectors to catch their quotas and the prices at which they set the market.

Table 3-15 Annual average gross wholesale value (nominal $/lb. for selected A80 groundfish species, 2010 through 2019. Order of species roughly reflects total A80 catch by volume in 2019.

Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Yellowfin sole	0.53	0.64	0.62	0.50	0.45	0.48	0.54	0.65	0.82	0.77
Atka mackerel	0.84	1.03	1.13	1.22	1.39	1.03	1.00	1.37	1.36	1.15
Pacific ocean perch	1.17	1.74	1.41	1.07	1.20	1.06	0.93	1.13	1.05	0.81
Northern rock sole	0.61	0.77	0.92	0.57	0.55	0.55	0.61	0.71	0.90	0.83
Pollock	0.61	0.73	0.69	0.65	0.57	0.55	0.88	0.46	0.52	0.60
Pacific cod	1.07	1.34	1.18	0.85	1.00	1.18	1.12	1.37	1.73	1.45
Alaska plaice	0.46	0.51	0.58	0.49	0.48	0.43	0.44	0.80	0.63	0.64
Flathead sole	0.69	0.90	0.93	0.85	0.70	0.62	0.74	0.86	0.98	0.86
Arrowtooth flounder	0.48	0.72	0.86	0.63	0.83	0.74	0.84	1.30	0.87	0.86
Greenland turbot	1.52	2.19	1.89	1.45	1.60	1.56	2.05	2.00	2.00	2.04
Kamchatka flounder	-	0.70	1.00	0.55	0.74	0.67	0.83	1.48	1.28	0.99
Sablefish	5.61	6.28	3.76	4.31	5.10	4.93	4.66	4.67	2.89	2.88

Source: NMFS Alaska Region At-Sea Production Reports, data compiled by AKFIN in Comprehensive_WPR.

Notes: Greenland turbot and Kamchatka flounder are part of the “Other Species” category in previous catch/revenue figures. No average annual value for 2010 Kamchatka flounder was retrieved from NMFS At-Sea Production Reports by AKFIN.

The remainder of this subsection are adaptations from three Economic Performance Reports (EPR) on A80 species or species groups that were produced by the Alaska Fisheries Science Center’s Resource Ecology and Fisheries Management Division (REFM). The most recent available reports were produced in 2020 and focus on the 2019 fishing year as a baseline for retrospective trend analysis. The Groundfish Plan Teams recommend that stock assessment authors incorporate EPRs as an appendix to the assessment chapter, though that may not happen in cases when an assessment is in an “off-year” or if the EPR is for a broad species complex such as BSAI Flatfish. The three 2019 EPRs excerpted below are for BSAI flatfish, BSAI rockfish, and Atka mackerel.[38] The analysts caution that these reports do not necessarily represent the status of BSAI groundfish markets in the unique circumstances of the 2020 fishing year.[39]

BSAI Flatfish 2019 Economic Performance Report

BSAI FMP flatfish are predominantly caught in the Eastern Bering Sea by catcher/processors in the A80 Fleet. The two most significant flatfish species in terms of market value and volume are yellowfin and rock sole. These two species accounted for 64% and 12%, respectively, of the retained flatfish catch. Flathead sole, arrowtooth flounder, and Kamchatka flounder are also caught in significant quantities accounting for approximately 5-10% of the retained flatfish. The remainder of the catch volume is comprised of other flatfish which includes Alaska plaice and Greenland turbot.

First-wholesale value in the BSAI flatfish fisheries decreased 1% to $209.8 million with a 4% decrease in yellowfin sole price, a 6% decrease in the rock sole price, an 11% decrease in the flathead sole price, and

[38] Source: B. Fissel. AFSC REFM Division, personal communication, February 2021.

[39] One publicly available in-season tracker of fishery performance is a monthly report distributed by the McKinley Group for the Alaska Seafood Marketing Institute. That report draws on NMFS Office of Science and Technology (OST) data. Once 2020 value and export data are reconciled in 2021, analysts will be able to provide a more thorough analysis of the unique effects of 2020 on fishery value. Because NMFS OST data are not disaggregated by sector, management area, or even region of the county, the analysts continue to rely primarily on data provided directly by AKFIN for the analysis of impacts.

an 8% decrease in the arrowtooth flounder price.[40] Prices for most flatfish were at a decadal high in 2018 and the marginal decreases in 2019 left prices at a high level relative to prices over the last decade.

Flatfish are primarily processed into the headed-and-gutted (H&G) and whole fish product forms and changes in production largely reflect changes in catch. The export volume of yellowfin sole and rock sole is approximately 75-90% of the annual volume of processed products.[41] Exports are primarily destined for China and South Korea, with China typically accounting approximately 80-85% of total exports. In 2019 China's share of exports dropped to 71% and South Korea's share of value increased from approximately 15% to 20% in 2019. A significant share of this product is re-processed into fillets and re-exported to North American and European markets. Flatfish can serve as a substitute for other higher priced whitefish products, and price changes for these other species can influence flatfish demand. Some rock sole is processed as H&G with roe, which is a higher priced product which is primarily destined f or Japanese markets.

The Alaska flatfish fishery became MSC certified in 2010 and received the Responsible Fishery Management (RFM) certification in 2014. Certification provides access to some markets, particularly in Europe, and may enhance value. Some media reports have attributed the price increase in 2011 to the MSC certification and Asian markets where demand is expected to increase with growth in the middle class population. Reduced fishing opportunities in 2013-2014 for higher valued Atka mackerel may have diverted additional fishing effort towards flatfish increasing catch in these years. Increased supply and inventories from the additional catch put downward pressure on prices. As Atka mackerel fishing resumed more normal levels in 2015 and later, flatfish supply and inventories were reduced, prices began to rise. Atka mackerel catches were high in 2017 and 2018 which may have contributed to the reduced catch of flatfish despite high prices. Because of China's significance as a re-processor of flatfish products, the tariffs between the U.S. and China have put downward pressure on flatfish prices and may inhibit value growth in some flatfish markets. Industry lacks immediate alternative reprocessing options to China. Export quantities of yellowfin sole and rock sole increased in 2019 from 2018 and the share of exports to China decreased despite rising export prices.

BSAI Rockfish 2019 Economic Performance Report

Rockfish catch in the BSAI increased in 2019 from 2018 with a total catch of 54 thousand mt and a retained catch 49.8 thousand mt with significant catch increases for both of the primary rockfish species: northern rockfish and Pacific ocean perch. Catch levels in 2019 were the highest observed over the 2003-2019 time series analyzed and were 30% higher than the previous high in 2018. Rockfish are an important component of the A80 fleet's catch portfolio. First-wholesale value of rockfish was down 2% in 2019 to $42.5 million despite the increased catch and production as first-wholesale prices decreased 21% to an average of $0.80 per pound.

The most significant rockfish species caught in the BSAI in terms of volume and value is Pacific ocean perch, which typically accounts for approximately 90% of the total BSAI rockfish value. In 2019, Pacific ocean perch's value share fell to 80% as it's price declined was larger than other rockfish species. Northern rockfish, which typically accounting for under 10% of the value, increased to 14% in 2019. Other rockfish, such as rougheye and shortraker rockfish are caught in significantly smaller quantities.

Rockfish are among the more valuable species caught by the A80 fleet with an average price per pound is typically higher than the flatfish prices (though this was not the case in 2019), however the volume of catch is significantly smaller than flatfish catch. Rockfish are typically harvested close to the total allowable catch (TAC) and TACs for Pacific ocean perch are set close to the Allowable Biological

[40] Because BSAI flatfish are primarily targeted by catcher/processor vessels there is not a substantive ex-vessel market.

[41] Yellowfin sole and rock sole are the only species with species specific trade data. The other primary BSAI flatfish are aggregated into a non-species specific flatfish category.

Catches (ABC). Because of this, annual changes in catch and production largely reflect changes in abundance and TAC. In recent years approximately 90-95% of the total rockfish catch has been retained.

First-wholesale prices decreased 22% for Pacific ocean perch to \$0.80 per pound and decreased 12% for northern rockfish to \$0.69 per pound. Increases in catch and production were not enough to offset the decrease in price for Pacific ocean perch and first-wholesale values were down to \$34 million. Northern rockfish value increased to \$5.9 million.

The majority of rockfish produced in the U.S. are exported, primarily to Asian markets. Pacific ocean perch is the only rockfish species with specific information in the U.S. trade data. Other species are aggregated into a non-specific category. Approximately 70% of the Pacific ocean perch exported from the U.S. went to China in 2019. This is an increase relative to recent years where approximately 60% of exports went to China. Exported H&G rockfish to China is re-processed (e.g., as fillets) and re-exported to domestic and international markets. Rockfish are also sold to Chinese consumers, as whole fish. The U.S. has accounted for just over 15% of global rockfish production in recent years and 85-90% of global Pacific ocean perch production. Global production of rockfish has increased 15% from the 2010-2014 average to 337 thousand mt in 2018 and global production of Pacific ocean perch has increased 22%. Global production of Atlantic redfish, a market competitor to Pacific ocean perch, increased slightly to 52 thousand mt but in recent years has remained relatively stable at roughly 50 thousand mt. The U.S. dollar was relative stability in 2019 against other currencies, such as the Chinese Yuan, which mitigates its potential impact on market price. Because of China's significance as a re-processor of rockfish products, the tariffs between the U.S. and China have put downward pressure on rockfish prices and has inhibited value growth in rockfish markets. Industry lacks immediate alternative reprocessing options to China. Export quantities of Pacific ocean perch decreased in 2019 from 2018 and the share of exports to China increased despite declining export prices and increased production.

Atka Mackerel 2019 Economic Performance Report

Atka mackerel is predominantly caught in the Aleutian Islands, and almost exclusively by the A80 fleet. Atka mackerel is an important source of revenue for A80 because of its high price relative to other species. In 2019 Atka mackerel total catch decreased to 58.5 thousand mt and retained catch decreased to 57.5 thousand mt. Catch levels peaked in 2018 after significant reductions in the TAC in 2012 and 2013 when catch levels were low due to area closures to protect endangered Steller sea lions, and survey-based changes in the spatial apportionment of TAC. The 2019 decrease in the catch is a result of a reduction in the Allowable Biological Catch and TAC. Commensurate with the change in catch, first-wholesale production decreased to 34 thousand tons. The decrease in production coupled with a 14% decrease in price to \$1.16 resulted in a 34% drop in first-wholesale revenue to \$86.6 million.

The U.S. (Alaska), Japan and Russian are the major producers of Atka mackerel.[42] Typically, approximately 90% of the Alaska caught Atka mackerel production value is processed as head-and-gut (H&G) products, the remainder is mostly sold as whole fish. In 2019 99% of the catch was processed as H&G as whole fish production dropped off. Virtually all of Alaska's Atka mackerel production is exported, mostly to Asian markets. In Asia it undergoes secondary processing into products like surimi, salted-and-split and other consumable product forms. Industry reports that the domestic market is minimal, and data indicate U.S. imports are approximately 0.1% of global production.

The upward trend in first-wholesale and export prices through 2018 had been influenced by international factors. Global supply of Atka mackerel was in decline because of substantial decreases in catch volume in Japan. In 2018 catch volumes in Japan began to increase, coupled with increasing supply from the U.S. in 2018, which may be putting downward pressure on prices that carried through into 2019. Despite the decrease, Atka mackerel prices remain high relative to pre-2017 levels.

[42] Japan and Russia catch the distinct species Okhotsk Atka mackerel which are substitutes as the markets treat the two species identically.

Global production dropped from an average of 226 thousand mt between 2008-2012 to an average of 108 thousand mt between 2015-2017. The reductions in international supply meant that the U.S. has captured a larger share of global production in recent years relative to the 2008-2012 average. The global supply reductions put upward pressure on the price which is reflected in the higher price after 2011. Additionally, the opening of previously restricted areas off the Aleutians has given industry more access to larger fish which yield a higher price per pound in the market. The increased price of Atka mackerel in recent years has helped to increase first-wholesale value. International production of Atka mackerel was on the decline because of reductions in Japanese, and Russian catch and production which were particularly severe in 2015. The U.S. supplied 55% of the global market of Atka mackerel in 2018. This resulted in increased demand for U.S. Atka mackerel in Japan where it is used to make surimi among other products. Because Atka is primarily exported to Japan, which constitutes roughly 70% of the export value, the U.S. exchange rate can influence first-wholesale prices, and the exchange rate has remained stable since 2016.

A80 fishery taxes

The A80 sector's production generates taxes that are important revenue sources for communities, boroughs, and the State of Alaska. That production includes the catch and processing of A80 groundfish species, the catch and processing of CDQ groundfish on A80 platforms, and the processing trawl limited access sector (TLAS) catch on A80 platforms. In addition to taxes paid, the A80 sector remits cost recovery fees to NMFS to defray direct costs of management, data collection, and enforcement. This section summarizes the taxes levied on the A80 sector's fishing activity and estimates the fish tax liability and cost recovery payments incurred by the sector in recent years. Additional analysis of tax revenues related to the ABM action is provided in Section 10.4 of the SIA attached to this DEIS. Taxes and other fees that pertain to the directed commercial halibut fishery are addressed in Section 4.5.1.3 of this DEIS.

There are two main sources of fishery taxes in Alaska: shared taxes administered through the State of Alaska – described below – and municipal fisheries taxes independently established and collected by select municipalities. Municipal fish taxes are typically levied on raw fish landings, and thus would not apply to vessels that catch and process BSAI groundfish at-sea. A80 vessels contribute to municipal tax bases through non-fishery tax programs related to marine fuel sales and transfer, port usage, sales tax related to provisioning, and bed and other commerce taxes related to crew rotation through Alaska communities. There is no single source for data on these revenue streams and available municipal-level tax summaries do not disaggregate non-fishery tax payments by business sector (i.e. fisheries), much less by fishery management sector (e.g., A80). The Alaska Department of Commerce, Community, and Economic Development (DCCED) provides a summary of municipal taxes.[43] Port calls by A80 vessels are a rough measure of the sector's interaction with Alaskan communities and the potential for local taxes on spending by the vessel and its crew, but they are the best available proxy. Section 4.5.3 of the SIA attached to this DEIS summarizes A80 port calls by community (Table 6). The SIA reports that the A80 sector typically makes between 215 and 250 port calls each year. Since 2015, the prevalent trend in port calls has been roughly 67% to Unalaska, 12% to Adak, 7% to Togiak, and a small number of calls to St. Paul, Atka, and Sand Point. According to Observer Data, roughly 10% of port calls are attributed to "Other/Unknown Community. Transfers at sea are rare in the A80 sector; dating back to 2010 only five are documented (four in 2010 and one in 2016). A transfer at sea could be relevant to State of Alaska taxation if it occurs outside of the 3nm state boundary.

The two State of Alaska fish taxes paid by the A80 sector are the Fishery Resource Landing Tax and the Seafood Marketing Assessment.

[43] The 2019 Alaska Taxable Supplement is available at https://www.commerce.alaska.gov/web/Portals/4/pub/OSA/Official%202019%20Alaska%20Taxable.pdf. At that site the reader can refer to Table 1A ("Reported Tax Rates") for sales tax and other commerce taxes and revenues for 2019.

The Fishery Resource Landing Tax (FRLT) is levied on fish processed outside the 3-mile limit but, within the U.S. EEZ, and first landed in Alaska. The tax liability is based on the estimated unprocessed (ex-vessel) value of the resource. The State determines the unprocessed value for CP production by multiplying a statewide average price per pound of unprocessed fish – as derived from ADF&G data – by the unprocessed weight. The tax is collected primarily from CPs that bring their products into Alaska for transshipment and applies whether the product is destined for local consumption or shipment abroad. Under Alaska Statute (AS) 43.77, CPs and motherships are required to pay this tax at a rate that is equivalent to rates paid by catcher vessels and shore-based processors under the Fisheries Business Tax (AS 43.75). The levy is set at 3.0% for fisheries classified by ADF&G as "established," as would be the case for the A80 sector. According to state statute, all revenue from the Fishery Resource Landing Tax is deposited in the state's General Fund but half of the revenue is available for sharing with the municipalities where fishery resources are landed. If the offload or landing occurs at a community in an "un-organized borough" (as is the case for communities like Unalaska and Adak), the fish taxes are shared primarily between that community and State; a small portion could go to other communities in the un-organized borough. This tax was established in 1994. The State of Alaska Department of Revenue reports that the FRLT brought in between $9.72 million and $9.95 million from 2016 through 2018, and $12.47 million in 2019, though it should be noted that much of that revenue was likely generated in the at-sea sector of the AFA pollock fishery.[44] The footnoted report shows that the amount of the FLRT that is shared with municipalities is highly variable by year. Table 3-16, described below, provides an estimate for the order of magnitude in tax payments generated by A80 vessels.

The State of Alaska also levies a Seafood Marketing Assessment of 0.5% on all seafood processed or first landed in Alaska and any unprocessed fishery products exported from the state (AS 16.51.120).[45] Revenues from the Assessment are deposited in the State's General Fund by statute but are historically appropriated to the Alaska Seafood Marketing Institute.

Table 3-16 provides an estimate of the State of Alaska tax revenues generated on A80 vessels from 2010 through 2019. The estimated tax rate of 3.5% is the sum of the FRLT and the Seafood Marketing Assessment. AKFIN uses a proxy value to estimate the unprocessed value of A80 catch because the sector does not trade in unprocessed fish by definition. The AKFIN estimate of ex-vessel value is based on an assumed 40% relationship between ex-vessel value and first wholesale value. That assumption is augmented, when possible, by ADFG Fish Tickets that are not required of A80 vessels but may be submitted with the vessel's own estimate of unprocessed value. The reader should be aware that the values presented in Table 3-16 are not the same values used by the State of Alaska to calculate fish tax liabilities. From 2010 through 2019, AKFIN estimates the average annual unprocessed value of production on A80 vessels at roughly $158 million (2018$). At a 3.5% tax rate accounting for the FRLT and the Seafood Marketing assessment, the A80 sector would have paid roughly $5.5 million per year in Alaska fish taxes (2018$).

[44] Alaska Department of Revenue – Tax Division: Fishery Resource Landing Tax Annual Report Data: http://www.tax.alaska.gov/programs/programs/reports/AnnualData.aspx?60631, accessed August 2020.

[45] Processors or harvesters who produce less than $50,000 worth of seafood products during the year are exempt.

Table 3-16 **Estimated ex-vessel value of production on A80 CP vessels and estimated State of Alaska tax revenues, 2010 through 2019. Estimated tax based on sum of Fishery Resource Landing Tax and Seafood Marketing Assessment (3.5%).**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Sector					Estimated Ex-Vessel Value (2018$)						
A80	134.2M	154.3M	161.9M	128.8M	123.7M	116.3M	125.4M	144.8M	150.6M	140.7M	1,380.6M
CDQ	8.3M	12.5M	11.7M	10.2M	8.3M	8.2M	9.0M	11.5M	10.8M	11.0M	101.5M
TLAS	3.7M	9.5M	10.5M	9.7M	8.0M	8.8M	8.9M	16.0M	13.8M	12.7M	101.5M
Total Ex-Vessel	146.2M	176.3M	184.1M	148.7M	140.0M	133.3M	143.3M	172.2M	175.2M	164.3M	1,583.6M
Sector					Estimated Tax at 3.5% Rate (2018$)						
A80	4.7M	5.4M	5.7M	4.5M	4.3M	4.1M	4.4M	5.1M	5.3M	4.9M	48.3M
CDQ	0.3M	0.4M	0.4M	0.4M	0.3M	0.3M	0.3M	0.4M	0.4M	0.4M	3.6M
TLAS	0.1M	0.3M	0.4M	0.3M	0.3M	0.3M	0.3M	0.6M	0.5M	0.4M	3.6M
Total Tax	**5.1M**	**6.2M**	**6.4M**	**5.2M**	**4.9M**	**4.7M**	**5.0M**	**6.0M**	**6.1M**	**5.8M**	**55.4M**

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

The activity on A80 vessels captured in Table 3-16 includes the harvest of groundfish quotas allocated to CDQ groups (Sector = CDQ). Under AS 43.77.040, a taxpayer – i.e., an A80 company or the LLC associated with an A80 permit holder – may claim as a credit *up to* 45.45% of the tax liability on CDQ fish revenues if contributions are made to one of a set of qualifying purposes defined in the statute. Qualifying purposes include scholarships for in-state study related to fisheries management or related business, training in the state for employment in the seafood industry, capital contributions to fishery infrastructure construction or improvement, or Alaska fisheries research grants. This provision does not mean that CDQ fish are taxed by the State of Alaska at a lower rate; rather, those gross revenues may be offset to a limited extent by voluntary tax-deductible contributions to qualifying purposes.

NMFS Cost Recovery

The A80 sector is subject to NMFS cost recovery fees assessed on the estimated ex-vessel value of catch. The MSA authorizes the collection of cost recovery fees for LAPPs, the CDQ program, and the halibut/sablefish IFQ program (MSA 304(d)(2)). Cost recovery fees recover actual costs directly related to the management, data collection, and enforcement of the programs. The MSA mandates that cost recovery fees do not exceed 3% of the annual ex-vessel value of fish harvested by a program subject to a cost recovery fee (MSA 305(d)(2)(B)). The fee calculation is based on NMFS standard prices for the species relevant to a fishery subject to cost recovery. NMFS's Cost Recovery and Fee Programs web page[46] links to the **Federal Register** notice announcing each subject fishery's standard prices and fee percentages by year through 2019, as well as to cost recovery annual reports by sector for 2016 through 2019. Fees are determined by dividing direct program costs by the value of the fishery's landings. The factors and methods that go into the fee calculation are described at 50 CFR 679.95(c)(2). Table 3-17 reports cost recovery fees for selected programs from 2017 through 2020.[47] From fiscal year 2017 through fiscal year 2020, direct costs for A80, which is the amount paid by the sector, increased from $836,924 to $962,757 to $1,048,481 to $1,058,662. For those years, respectively, the assessed fishery value in estimated ex-vessel terms was $118.2 million, $127.7 million, $111.6 million, and $89.2 million. (Note that these values differ from what is shown in Table 3-16 due to the difference between the NMFS standard pricing methodology, which incorporates rolling average annual species values, and the method that AKFIN utilizes to estimate CP ex-vessel value from at-sea production reports and ADFG Fish Tickets that are supplied by A80 vessels.)

[46] https://alaskafisheries.noaa.gov/fisheries/cost-recovery-fee-programs

[47] 2020 cost recovery fee percentages for A80 and CDQ are published at 85 FR 77180 (December 2020); the 2020 cost recovery fee percentage for IFQ is published at 85 FR 82442 (December 2020).

Table 3-17 NMFS cost recovery fees for selected fisheries (Source: NMFS Cost Recovery Reports)

Cost Recovery Program	Year Implemented	2017 Rate	2018 Rate	2019 Rate	2020 Rate
A80	2016	0.71%	0.75%	0.94%	1.19%
CDQ	2016	0.55%	0.66%	0.70%	0.84%
Halibut/Sablefish IFQ	2000	2.20%	2.80%	3.00%	3.00%

For CP sectors such as A80, there is no reliable ex-vessel price generated from the sale of fish from a harvester to a processor. Therefore, NMFS estimates the ex-vessel price for those species using reported information on the first wholesale price from CPs that harvest A80 species. The first wholesale price is the market price of the primary processed fishery product. The estimated standard ex-vessel price is the value of processed products from CPs divided by the retained round-weight (unprocessed weight) of catch and multiplied by a factor of 0.4 to correct for the value added to the fish product by processing. NMFS calculates an annual standard price for A80 Pacific cod using volume and value data reported in the Pacific Cod Ex-Vessel Volume and Value Report, which includes data from January 1 through October 31. Each landing made under the program is multiplied by the appropriate NMFS standard price to arrive at an ex-vessel value for each landing. These values are summed together to arrive at the total ex-vessel value of the A80 fishery.

3.3.3 Operations and Annual Planning

A qualitative understanding of the A80 fishing year – and the diversity of company-level business plans and vessel-level fishing plans within the sector – is especially important because the sector works with a highly varied portfolio of allocated target species and marketable unallocated groundfish species compared to other BSAI sectors. Annual data on harvest volume and gross revenue – either by Catch Accounting System (CAS) "target species" or by individual species (see Figure 3-17) – do not reflect how species are physically comingled or, critically, the decisions that vessel operators make to derive value from a trawl tow. For example, CAS might retrospectively show that fishing occurred in the arrowtooth flounder or flathead sole target based on the relative proportion of catch, but the fishing was made profitable by the value of other retained species. Annual data also smooth over calendar-based decision factors like roe content, flesh quality, aggregation (CPUE), fishing conditions (e.g., water temperature or lunar cycles), market demand, the timing of in-season reallocations from other fisheries (e.g., non-pollock TAC from AFA, PSC from TLAS), and unallocated fishing opportunities that may be opened by NMFS in-season managers at unpredictable times based on TAC that would otherwise go unharvested (e.g., BS POP or WGOA rockfish).

The information in this section is bolstered by anecdotal information and local knowledge offered by A80 company and vessel managers as well as skippers. The analysts have verified information about the timing and location of fishing using available catch data. The inclusion of this narrative description of A80 sector operation is important for understanding the factors that can dictate a company or a vessel's response to external constraints, which includes – but is certainly not limited to – halibut PSC limits. This section represents one of the analysts' best tools to characterize the *practicability* of maintaining historical levels of groundfish fishing under severely reduced PSC limits, and how the amount of the PSC limit reduction would be experienced across the diversity of business/fishing plans that exists within the sector. That said, the analysts do not contend that this qualitative information allows the reader to draw "bright lines" where a sector-level PSC limit of, say, 1,350 mt is "practicable" but a limit of 1,300 mt is not (See also Section 5.3.2.3)

Skippers make in-season decisions about targeting and location based on expected halibut PSC rates associated with a given target, area, or time of year. At the same time, a vessel operator must manage an annual allocation of important "choke species" such as Pacific cod or risk losing the opportunity to keep the vessel working later into the year in other profitable targets that have an intrinsic cod encounter rate. Section 3.1.7.2 of the Amendment 80 Program 5-Year Review (Northern Economics & NPFMC 2014) describes how allocation of Pacific cod transitioned the species from a target to an incidental catch species and how that reality influences vessels' annual fishing plans. After Pacific cod was allocated to A80 cooperatives, fleet managers have had to calculate the amount of cod their vessels will need in fall fisheries and adjust their targeting decisions in the earlier part of the year.

The A80 5-Year Review noted that 55% to 75% of the fishery's Pacific cod was taken in a CAS "target" fishery before the program's 2008 implementation, whereas recently cod "targeting" accounts for less than 10% of the sector's cod catch. The Review cited as examples that effort in high cod-rate fisheries like flathead sole has declined in favor of arrowtooth and Kamchatka flounder, for which directed fishing is not opened until May 1. Among the key allocated A80 species, YFS has a relatively low cod catch rate, as do roundfish like Atka mackerel and POP. While cod rates are low in the YFS fishery, managing cod quota is important due to the high TAC for YFS relative to other flatfish species. Rock sole, which can be a higher-value flatfish species during the early-year roe season, has among the highest cod rates. It is important to acknowledge that cod can drive decision-making as much as halibut, and that each company or vessel enters the fishing year with a different intra-cooperative cod allocation based on the qualifying catch history of the permits they hold.

A80 companies and vessel operators work within constraints other than halibut PSC and allocations of choke species like Pacific cod. Trawl vessels are excluded from certain areas by regulation – e.g., crab protection zones (see Section 3.2.4) or Steller sea lion critical habitat – and might be excluded de facto if fishing grounds are preempted by fixed-gear vessels (including crabbers) in Federal or state-waters fisheries. Vessel operators might not be able to follow an aggregation of "clean" (low-bycatch) A80 species if it moves into a prohibited or preempted area. Some areas are only prohibited in certain years, dependent on exogenous factors. For example, the Subarea along the southern edge of the Bristol Bay Red King Crab Savings Area is open or closed annually based on BBRKC stock status (Figure 3-10). Other constraints might be temporal.

A80 companies and vessels respond to bycatch constraints in the context of other non-regulatory factors that determine when and where vessels target certain groundfish species. The allocation of BSAI non-pollock species to A80 CPs has allowed companies to plan for groundfish fisheries that span most of the calendar year and has insulated companies that want or need to pursue late-year opportunities from the effects of other participants whose incidental catch or PSC might have otherwise closed the entire sector. Many vessels strive to stay working from January 20 to November. Most overall catch occurs from February through October with catches falling off November through January (Figure 3-20). Other monthly patterns include higher catches of POP in the summer months (particularly July) and a larger proportion of Pacific cod and rock sole earlier in the year (February through April or May) (Figure 3-20). The focus on cod and rock sole early in the year is driven in part by fish aggregation (cod) and roe content (rock sole).

An A80 vessel that is experiencing unacceptable Pacific cod bycatch or halibut PSC rates in an early-season flatfish target might switch focus to an unallocated target. Those unallocated species might include arrowtooth/Kamchatka flounder or Greenland turbot which open on May 1, or BS POP which is only opened to directed fishing as the BS pollock fishery winds down in the fall. Some flatfish species might be technically open before May but the fish are not aggregated or catchable until later in the year (e.g., flathead sole). "Fall-back" opportunities for A80 vessels when early season fisheries are utilizing too much of a constraining species vary depending an operation's ability to target roundfish – particularly in the AI – or its endorsement to fish in the GOA (arrowtooth flounder in the spring or the Central GOA Rockfish Program after May 1). Variation across A80 companies in terms of access to roundfish are illustrated in Figure 3-15; diversification of total revenue across A80 cooperative fishing, mothershipping, CDQ partnerships, and fishing in the GOA are described in Section3.3.2. Broadly speaking, alternatives to BS flatfish for A80 vessels are not an option for some vessels to consider until May or June.[48] Prior to that, a company with limited options might have no better response to high PSC rates than to deck sort aggressively and testing different locations. Accessibility to non-flatfish species can also vary within a company if, for instance, the smaller vessels are not equipped with the fuel, horsepower, or packing capacity to fish safely and effectively in the Aleutians.

While this analysis does not estimate companies' operational costs or their net profitability, participants report that most A80 companies rely on a full and varied season to run their business. When constraints such as high Pacific cod or halibut bycatch rates emerge, vessel operators do not have the option to cease fishing completely because cost accrual on such large platforms would be unsustainable. Participants also noted that a mid-year stand down could result in crew-retention issues. Moreover, it was noted that shutting down and restarting a CP factory could actually cause mechanical challenges, spinning off new costs. As a result, A80 operators do not follow a uniform progression from one target to the next over the course of the season. Annual fishing plans are designed with contingency in mind, and when all options are suboptimal the response is often to stay active and look for areas with the right species combinations even if it is in a time/area that history would not have predicted. Participants noted that "looking" for the right fish does not necessarily require a net in the water, and that it is better to continue learning the present situation on the grounds than to leave and have to reestablish that knowledge later. Vessels have increasingly utilized shorter test-tows to gauge haul composition and the presence of limiting species, though. Vessels are likely evaluating the benefit of a test tow in light of the cost of running a factory at less than full capacity and also the risk of bringing in a haul of constraining or PSC-limiting species. Regardless of these complicating factors, A80 vessels are unlikely to preemptively cease fishing due to an unpredicted mid-year constraint.

The annual planning process begins the preceding fall with harvest specifications. The A80 sector has a unique consideration in the harvests specifications flexibility procedure where the cooperative(s) (and CDQ groups) can exchange TAC of YFS, rock sole, or flathead sole for TAC of another species from that group, up to the limit of the ABC and the 2 million mt cap. It is possible that flexibility exchanges could be made with expected bycatch rates in mind if the PSC limit were to become the preeminent decision-driver for the sector. In practice, flatfish specification flexibility has mostly been used in recent years to maximize the availability of species that are catchable. For example, in years when the early season rock sole roe fishery does not materialize to the point that all TAC is harvested, the cooperative might utilize specifications flexibility to exchange rock sole TAC for YFS TAC that can be prosecuted later in the year.

A80 operators tend to spend the early months of the year in the BS, striking a balance between CPUE, profitability, and market demand while managing Pacific cod and halibut bycatch to preserve opportunities to fish later in the year. Some opportunities are only available early in the year, such as the rock sole roe fishery (and its associated Pacific cod bycatch rate). Monthly catch data display this pattern with generally higher catch of rock sole and Pacific cod early in the year, tailing off by May (Figure 3-20). The timing of YFS targeting is more variable and can be opportunistic depending on the availability of other species and bycatch rates. In some cases, vessels might target YFS earlier in the year in the Togiak/Bristol Bay area; that activity can include bycatch of other flatfish species like Alaska plaice that is marketable at a lower value. The optimal timing of allocated species catch is also driven by market quality. Markets for flatfish and roundfish can differ, meaning that not all companies are facing the same decision-set when selecting targets at a given time of year. In some years, holdover inventories from the previous year's market might incentivize a company to delay harvest of a certain species until prices rebound, but that option might not be available if a vessel does not have viable alternative target

[48] While 2020 data are incorporated into this analysis to the extent they are available, the analysts note that market disruptions due to international trade relations and a global health pandemic affecting demand for A80 species might have shaped companies' business plans as much or more than halibut PSC rates.

opportunities at the time or if a company plans to deploy that vessel in other areas/targets later in the season.

Operators must also manage their catch of unallocated species that NMFS accounts for under the "non-specified reserve." NMFS In-season management uses this reserve to account for unallocated species on a BSAI-wide basis, meaning that bycatch in other fisheries (e.g., AFA pollock) can affect how much of a species like BS POP is available for a directed fishing allowance by A80 CPs at a given point in the calendar year. For example, the availability of turbot as a secondary species might determine whether arrowtooth flounder is a viable fall-back fishery if other targets are yielding high halibut or cod bycatch. If incidental catch causes the TAC for an unallocated species such as skates to be exceeded, NMFS may use the non-specified reserve from other species to cover that catch under the 2 million ton cap. Drawing down the reserve could, in some instances, reduce the opportunity to catch species that are typically of more value to the sector later in the year, such as BS POP.

May through August is typically when A80 vessels might branch out to the GOA or to the AI depending on their area endorsements – to the CGOA Rockfish Program, or to other GOA rockfish and flatfish participation. YFS fishing can remain productive and clean through May or June until they spawn and disaggregate. Opportunities to diversify in the case of constraining bycatch expand for some participants in June and July as AI rockfish are pursued. Summer fishing for Atka mackerel tends to offer lower CPUE, so after rockfish vessels might move back into BS flatfish before returning to the AI for the mackerel B season. Vessels that overuse cod or other allocations early in the year might be forced to trade within the cooperative to fish in the fall. Similarly, vessels that accrue halibut in spring or summer fisheries might jeopardize their ability to fish YFS in October and November. Because some fall fisheries for unallocated species such as BS POP are reliant on usage in other fisheries, companies might plan their business strategy and bycatch usage differently from one year to the next.

Many A80 vessels will return to allocated species in the fall, with the fleet breaking down across YFS vessels and Atka mackerel vessels depending on the history that they brought to the cooperative. These patterns can be seen in monthly catch figures with the year bookended by relatively high YFS catch in February through May and again in September through October (Figure 3-20). The 2020 fishing year followed the familiar pattern in terms of target catch by month. One difference from the most recent years was that catch in the rock sole target tilted earlier in the year, similar to the timing seen from 2010 through 2015.

A80 companies are not uniform in their area endorsements or their cooperative allocations of flatfish and roundfish, and thus might have different levels of exposure to a lower halibut PSC limit (Figure 3-15). Operators that have greater Atka mackerel and AI POP allocations are more able to move out of the BS if early-year halibut bycatch rates are unusually high. Flatfish-oriented operations might only have the option to remain in the BS or to move into the GOA. The ability to fish in the GOA is limited in regulation by endorsements and season-date limitations but can also be limited by halibut PSC limits in that area. The number of A80 vessels that have fished in the GOA and the relative proportion of their total revenues generated in that fishery were discussed in Section3.3.2; that section demonstrates that GOA revenues are likely not enough to replace what would be lost if an A80 company with no BSAI alternatives to flatfish was effectively closed out early by PSC. GOA CPs and CVs share seasonal halibut PSC apportionments, and GOA deep-water complex flatfish fisheries could be closed if effort and bycatch by GOA CVs targeting arrowtooth flounder are high. It is possible that an A80 vessel could move to the GOA due to poor fishing in the BS but would exhaust its GOA opportunities well before the end of the year and have no alternative to returning to the BS and search for fish.

Finally, A80 companies differ in their engagement in fishing CDQ groundfish through partnerships and in acting as a mothership for CVs, as detailed in Section3.3.2.

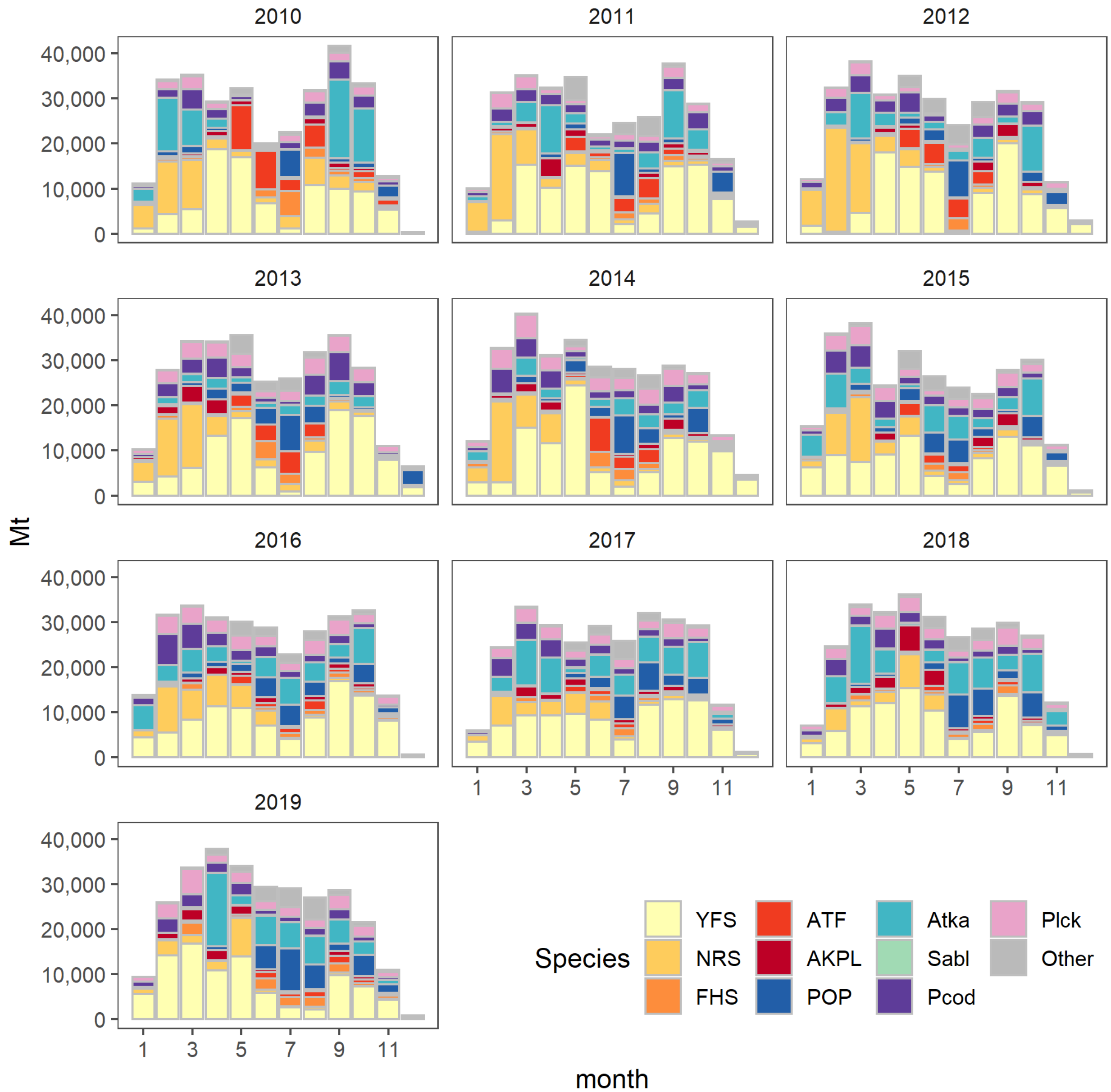

Figure 3-20 Amendment 80 monthly catch (mt), 2010 through 2019. (Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA)

There are several important caveats to any notion that companies with access to roundfish quotas in the AI can easily move into those fisheries if PSC is high or catch rates are low elsewhere. Aside from the limitations of quota allocation and area endorsements, the AI region is heavily restricted in the amount of area open to trawl gear (Figure 3-21). AI Atka mackerel fishing is even more restricted than AI rockfish because it is a designated prey species for Steller sea lions (SSL), leading to additional area closures of directed fishing and a seasonal split of the TAC. In 1993, NMFS established critical habitat (CH) for SSLs in the GOA, AI, and BS. Directed fishing for Atka mackerel and other SSL prey species is prohibited within some CH areas (grey areas in Figure 3-21). In 2005 the Council adopted additional closures to conserve essential fish habitat (EFH) in the AI, prohibiting all bottom trawling in the AI except in small, discrete open areas where bottom trawling had previously occurred in order to minimize the effects of fishing on EFH (red areas in Figure 3-21). In total, over 95% of the AI management area is closed to bottom trawling. In addition to area closures, AI trawl fishing is spatially constrained by practical factors like untrawlable bottom surfaces, grounds preemption by fixed-gear vessels (e.g., WAI golden king crab), or just the size of the "open" areas relative to what an A80 vessel needs to tow. Some of the relatively smaller A80 vessels may not have the option to fish quotas in the western AI due to range capacity or the operational and safety issues of larger seas. The fishery is temporally constrained by seasonal TAC allocation and the movement of target fish inshore to closed areas before spawning. Together, this means that AI fishing could not likely support an influx of all the vessels with mackerel quota in a short span. As it stands currently, Area 541 accounts for the largest share of AI TAC and has the most spatially concentrated fishing area. Moreover, the behavior of roundfish like Atka mackerel in the presence of trawl nets is said to mean that additional effort would reduce catch on a rate basis (CPUE) for all participants in a localized open area.

For evidence of the spatial concentration in the AI, even relative to the limited open areas shown in Figure 3-21, NMFS Habitat Conservation Division provided the analysts with spatial catch data from 2003 through 2020. By the numbers, roughly 42,000 km^2 are open to non-pelagic trawling across all of Areas 541/542/543. Roughly half of that area (21,000 km^2) is open to directed Atka mackerel fishing. Since 2003, there were 4,247 observed tows with an Atka mackerel designation in areas open to directed mackerel fishing. Drawing on VMS data, it was shown that the total area contacted by the fishery was 1,672 km^2. That means that the footprint of the fishery during that span covered only 8% of the area that was open to it.

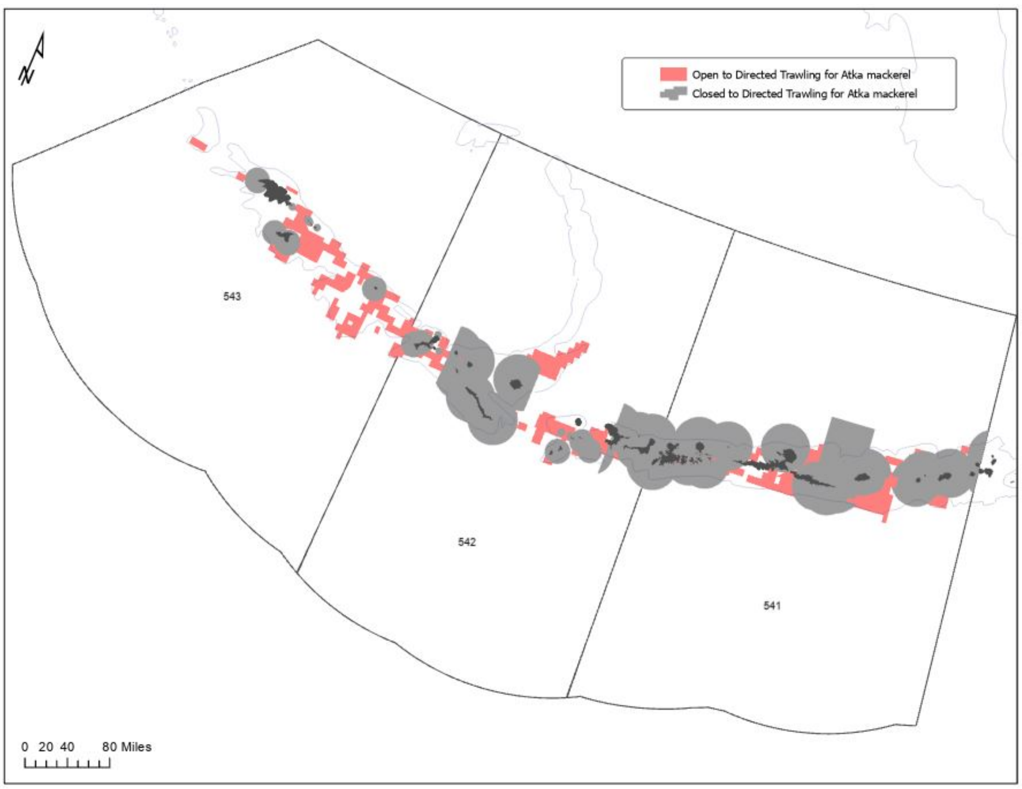

Figure 3-21 **Aleutian Islands areas open/closed to directed trawl fishing for Atka mackerel; White area is closed to all trawl fishing, Grey areas are closed due to SSL critical habitat protection measures (Source: NMFS AKRO Habitat Conservation Division)**

3.3.4 Community Development Quota (CDQ) program as related to the A80 sector

This section provides a brief description of the CDQ Program and accounts for the amount of CDQ harvest activity that occurs on A80 vessels. The halibut PSC limit that applies to CDQ hauls on A80 vessels is not subject to change under the considered alternatives, but the overall business sustainability of those vessels is necessary for CDQ groups to be able to access the portion of their allocations of non-pollock groundfish that is typically caught with trawl gear. The SIA attached to this DEIS provides greater detail on CDQ communities and their organizing non-profit entities' engagement and reliance on a variety of commercial and subsistence fisheries off Alaska.

The CDQ Program was established by the Council and NMFS in 1992 and authorization for the Program was incorporated into the Magnuson-Stevens Act in 1996. The purpose of the CDQ Program is (1) to provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the BSAI, (2) to support economic development in western Alaska, (3) to alleviate poverty and provide economic and social benefits for residents of western Alaska, and (4) to achieve sustainable and diversified local economies in western Alaska (16 U.S.C. § 1855(i)(1)(A)). The CDQ Program consists of six different non-profit managing organizations (CDQ groups) representing different geographical regions in Western Alaska. The CDQ Program receives annual apportionments of total allowable catches (TACs) for a variety of commercially valuable species in the BSAI groundfish, crab, and halibut fisheries, which are in turn allocated among the six CDQ groups.

The six CDQ groups represent 65 eligible villages in Western Alaska. Geographically dispersed, the member communities extend westward to Atka on the Aleutian Islands chain and northward along the Bering Sea coast to the village of Wales near the Arctic. CDQ communities generally are remote, isolated places with relatively few commercially valuable natural assets with which to develop and sustain a viable, diversified economic base.

Aleutian Pribilof Island Community Development Association (APICDA) represents the villages of: Akutan, Atka, False Pass, Nelson Lagoon, Nikolski, and Saint George.
Bristol Bay Economic Development Corporation (BBEDC) represents the villages of: Aleknagik, Clark's Point, Dillingham, Egegik, Ekuk, Ekwok, King Salmon, Levelock, Manokotak, Naknek, Pilot Point, Port Heiden, South Naknek, Togiak, Twin Hills, and Ugashik.
Central Bering Sea Fishermen's Association (CBSFA) represents the village of Saint Paul on Saint Paul Island.
Coastal Villages Region Fund (CVRF) represents the villages of Chefornak, Chevak, Eek, Goodnews Bay, Hooper Bay, Kipnuk, Kongiganak, Kwigillingok, Mekoryuk, Napakiak, Napaskiak, Newtok, Nightmute, Oscarville, Platinum, Quinhagak, Scammon Bay, Tooksook Bay, Tuntutuliak, and Tununak.
Norton Sound Economic Development Corporation (NSEDC) represents the villages of Brevig Mission, Diomede, Elim, Golovin, Gambell, Koyuk, Nome, Saint Michael, Savoonga, Shaktoolik, Stebbins, Teller, Unalakleet, Wales, and White Mountain.
Yukon Delta Fisheries Development Association (YDFDA) represents the villages of Alakanuk, Emmonak, Grayling, Kotlik, Mountain Village, and Nunam Iqua.

Under the CDQ Program, a portion of the federal TAC for commercially important BSAI species — including pollock, crab, halibut, and various groundfish — is allocated to participants in the CDQ Program. In 1992, CDQ groups received their initial allocations of pollock based on population, quality of proposed economic development plans, and dependence on fisheries. Since 1992, the CDQ Program has expanded several times and now includes allocations of pollock, halibut, sablefish, crab, all of the remaining groundfish species (cod, Atka mackerel, flatfish, and rockfish), and prohibited species catch (i.e., as bycatch allowances for salmon, halibut, and crab). The percentage of each annual BSAI catch limit allocated to the CDQ Program varies by species and management area. Currently, the CDQ Program is allocated approximately 10.7% of the groundfish directed fisheries. The percentage of other catch limits allocated to the CDQ Program (as CDQ reserves) is determined by: the BSAI Crab Rationalization Program (10% of crab species, except for Norton Sound red king crab, which is 7.5%); the BSAI Fishery Management Plan for all other groundfish and prohibited species (7.5%, except 20% for fixed-gear sablefish); and 50 CFR part 679 for halibut (20% to 100%, depending on IFQ management area – see Section 4.5.1.1 of this document). These allocations position CDQ groups as stakeholders in both the directed halibut fishery and the groundfish fisheries that encounter halibut as a limited bycatch species.

Annual CDQ allocations provide a revenue stream for CDQ groups through various channels, including the direct catch and sale of some species and the leasing of quota to various harvesting partners. CDQ groups receive royalty payments on each allocation harvested by a partnering firm. In addition to direct and indirect participation in fishing, CDQ group earnings are also derived from investments distributions in subsidiary companies and vessels. Since the implementation of the CDQ Program, individual groups have made large capital investments in vessels, infrastructure, processing capacity, and specialized gear.

Local programs purchase limited access privileges in a fishery and acquire equity position in existing fishery businesses including halibut, sablefish, and crab. CDQ groups have invested in peripheral projects that directly or indirectly support commercial fishing for halibut, salmon, and other nearshore species. These projects include seafood branding and marketing, quality control training, safety and survival training, construction and staffing of equipment maintenance and repair facilities, and assistance with bulk fuel procurement and distribution.

Investments by individual CDQ groups include ownership interest in the at-sea processing sector and in catcher vessels and are made with the expectation of financial gain or expanding equity in the fishing fleet. Investments in subsidiaries, such as limited liability corporations, allow CDQ groups to wholly or partially own vessels directly related to fisheries, including in the A80 sector. These vessels provide revenue through the direct catch and sale of target species and, in some cases, vessel ownership increases a subsidiary's holdings of quota in fisheries, such as BS pollock. In addition, investments in harvesting and processing capacity provide revenue through profit sharing, contractual agreements to harvest other CDQ groups' quota, and chartering commercial fishing vessels to government agencies conducting stock assessment surveys. Vessel ownership varies by CDQ group, target species, and affiliation with subsidiary corporations.

CDQ revenue also supports permit brokerages and revolving loan programs that build and sustain fisheries development within their regions. Such programs are intended to retain limited entry salmon permits within CDQ communities, provide the financing necessary for resident fishermen to purchase new boats and gear, and supporting market development for locally-harvested seafood products.

CDQ catch and revenue is dominated by pollock harvest in the AFA fishery (Figure 3-22). Halibut PSC caught when directed fishing CDQ pollock accrues to the CDQ halibut PSQ. CDQ non-pollock, non-IFQ groundfish catch is dominated by Pacific cod, yellowfin sole, and to a lesser extent Atka mackerel and northern rock sole. Non-pollock, non-IFQ CDQ groundfish catch is driven early in the year by Pacific cod in the HAL CP sector and rock sole on A80 platforms. Later in the year this category of CDQ harvest shifts more toward yellowfin sole on A80 platforms. Figure 3-23 and Figure 3-24 detail the CDQ harvest and revenue generated on A80 vessels. Figure 3-22 provides a relative sense of how much CDQ activity occurs on A80 vessels; the "Other_GF" category includes non-trawl gear types and trawl CVs that harvest CDQ fish. Note that the revenues reported in Figure 3-22 are AKFIN's estimates of ex-vessel revenue; ex-vessel revenue is not the natural metric for at-sea operations but is necessary to incorporate revenue data from crab fishing which is an important piece of the CDQ portfolio. The wholesale revenue estimates for CDQ catch on A80 vessels (Figure 3-23) are recently in the range of $17 million to $21 million (2018$). Total CDQ non-pollock, non-IFQ groundfish wholesale revenue (also excluding crab) across all platforms has been around $70 million to $75 million in recent years.

A80 vessels that harvest CDQ fish must record whether a haul is a CDQ haul within two hours after completion of weighing all catch in the haul (679.5(c)(4)(ii)(B)(2)). This may be advantageous for A80 vessels fishing CDQ alongside their cooperative quota as they can more flexibly manage to which sector tows are allocated based on different operational portfolios and allocations. Halibut PSC that occurs on a

CDQ haul accrues to the CDQ halibut PSC limit (315 mt), which is not being considered for change under this action.

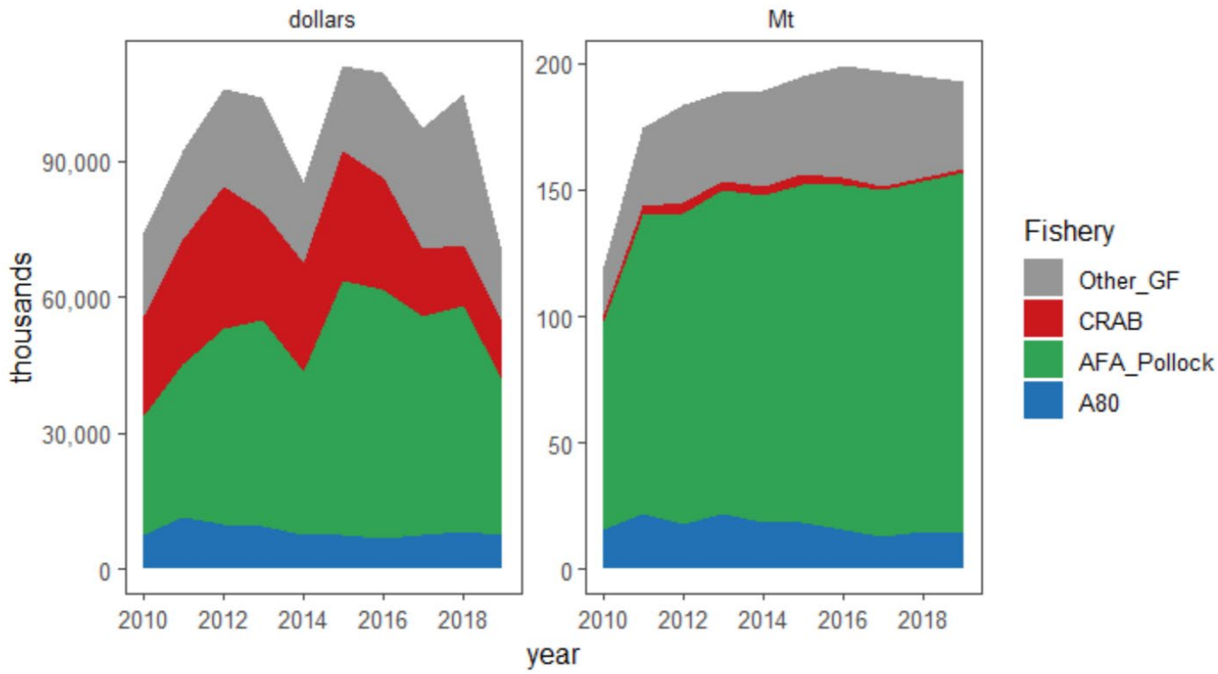

Figure 3-22 Distribution of CDQ estimated ex-vessel revenue (2018 dollars) and catch (mt) by fishery or fishery group, 2010 through 2019. (Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA)

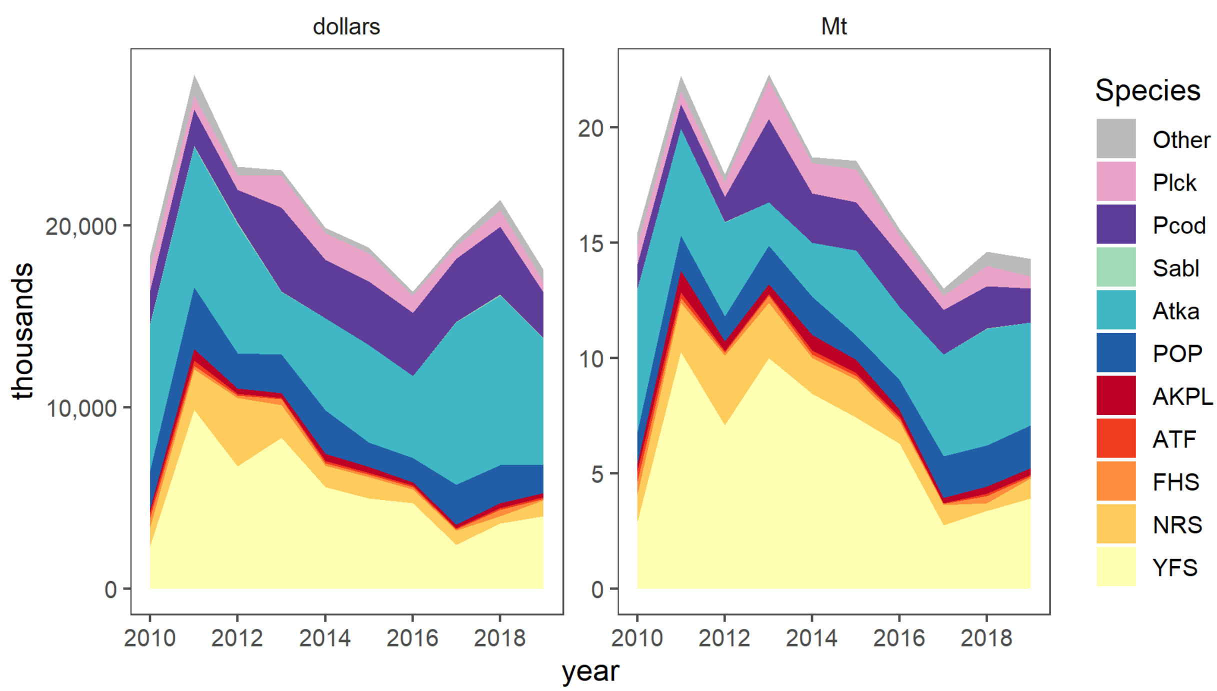

Figure 3-23 CDQ harvest on Amendment 80 vessels: gross first wholesale revenue (2018 dollars) and catch (mt) by species, 2010 through 2019.
(Source:NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA)

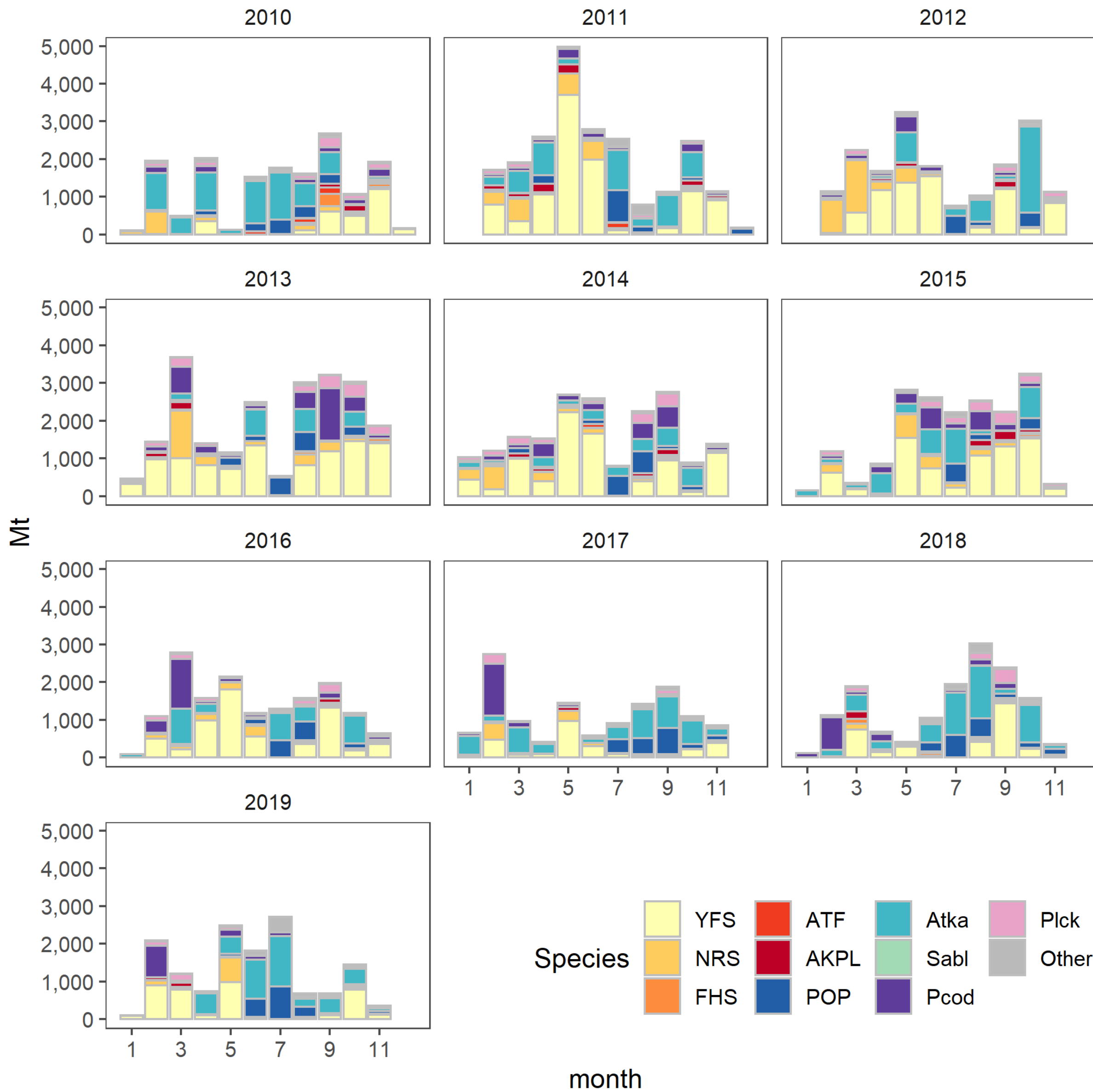

Figure 3-24 Monthly CDQ harvest on A80 vessels (mt), 2010 through 2019.
(Source:NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA)

The volume of commercial halibut harvested by CDQ stakeholders is reported in Section 4.1.1.

3.4 Amendment 80 Pacific halibut bycatch

This section details the A80 sector's direct interaction with Pacific halibut as a PSC species, focusing on the period from 2010 through 2020. For this draft, displays that are linked to revenue data terminate in 2019; revenue data are not presently available for 2020. This section presents data on final assessed halibut PSC totals, halibut encounter rates, and effective mortality (mortality divided by catch). Spatial data on effort and halibut PSC are presented to compare the A80 fishery to the EBS trawl survey. Halibut PSC is also described in terms of A80 revenue generated per mt of PSC at the sector level and by groundfish target species.

This section also summarizes publicly available information regarding the A80 cooperative's effort to reduce bycatch mortality by minimizing catch or improving catch handling procedures to the extent practicable on a high-volume platform.

3.4.1 Amendment 80 halibut PSC summary

The total assessed Pacific halibut mortality to the A80 sector in mt, defines the relationship between the PSC limit and the sector's operation, irrespective of halibut encounter and mortality rates. Table 3-18 places the A80 sector in context with regard to the other BSAI groundfish sectors. For reference, the current mortality limit for A80 halibut PSC is 1,745 mt, the TLAS limit is 745 mt, the CDQ limit (all gears) is 315 mt, and the non-trawl limit that covers both HAL CP and HAL CV is 710 mt. From 2010 through 2020, the A80 sector has accounted for roughly 60% of BSAI groundfish PSC mortality. This total is not surprising given the species mix that that A80 sector catches and the associated halibut PSC rates (Table 3-20). Table 3-19 compares A80 halibut catch and PSC mortality to other BSAI groundfish sectors from 2010 through 2019. In 2020, the A80 sector recorded 2,031 mt of halibut catch and was credited with 1,097 mt of halibut PSC mortality, which was the lowest total during the analyzed period (see also Figure 3-25).

Examining trends in A80 halibut PSC catch and mortality is complicated by the fact that many variables that affect these metrics have changed in recent years.[49] PSC limits, DMR estimation methods, and halibut handling procedures have all changed to varying degrees since 2010. PSC limits have decreased multiple times since 2010, most significantly in 2015 with the implementation of Amendment 111. Figure 3-25 illustrates that A80 sector annual halibut mortality has declined since 2014 and, more notably, has declined relative to total halibut catch since 2015. Halibut catch – sometimes referred to as encounter – is the weight of halibut caught before the DMR is applied. The ratio of estimated halibut PSC mortality to halibut catch is defined here as "effective mortality rate." Effective mortality in the A80 sector declined from 2015 to 2019, breaking from a consistent relationship between catch and mortality. The effective mortality rate increased slightly in 2020, but that is largely an artifact of the greatly reduced encounter rate shown in Figure 3-25. The 2015 breakpoint coincides with the implementation of proactive strategies by the A80 sector in response to the request of the Council as it made its final action recommendation on BSAI Amendment 111 in June 2015 (Figure 3-26). The published DMRs – shown in Table 3-7 might differ from the sector-level effective mortality rate when fishery data with and without deck sorting is combined since deck-sorted hauls have a specific DMR applied based on sampling.

The specific measures taken by the A80 sector to reduce halibut PSC mortality are described in Section 3.4.4 of this document. Those measures are not limited to deck sorting of halibut bycatch, but Figure 3-27 provides a compelling correlation of deck sorting effort to effective mortality. Effective mortality rates also capture the effect of reduced halibut DMRs achieved through deck sorting, noting the reduced reference period for halibut DMR estimation that rewards bycatch handling performance on a more immediate timeline – as described in Section 3.2.2 (refer to Table 3-7).

Table 3-18 Proportion of Pacific halibut mortality by BSAI groundfish sectors (2010 through 2019)

A80	TLAS	HALCP	CDQ	HALCV	*POT**	*AFA**
60.3%	16.1%	11.1%	6.9%	0.1%	*0.1%*	*6.3%*

* The Pot and AFA sectors' halibut mortality does not accrue to annual PSC limits.

[49] In 2015, the first year of implementation of the deck sorting exempted fishing permit (EFP), deck sorted PSC was only reported through logbooks and is not available in the usual specificity of observer data. As a result, PSC data in 2015 is only available as a total metric. Any tables and figures of the overall total annual PSC of A80 from 2015 are correct, however for tables and figures that include PSC in more discrete categories (i.e., target species, monthly totals), 234 mt of total PSC is not included. This does not apply to any year other than 2015.

Table 3-19 Bycatch of Pacific halibut by year and sector by estimated catch (mt) and PSC mortality (mt)

Year	Measure	A80	TLAS	HALCP	CDQ	HALCV	Total
2010	Catch	**2,808**	399	4,814	837	37	8,895
	Mortality	**2,243**	286	482	151	4	3,166
2011	Catch	**2,277**	469	4,698	844	22	8,310
	Mortality	**1,810**	346	470	203	2	2,831
2012	Catch	**2,469**	824	5,380	796	20	9,489
	Mortality	**1,944**	606	538	258	2	3,348
2013	Catch	**2,676**	669	5,280	817	40	9,482
	Mortality	**2,165**	503	476	253	4	3,401
2014	Catch	**2,667**	673	4,523	604	74	8,541
	Mortality	**2,178**	508	407	224	7	3,324
2015	Catch	**1,719**	508	3,313	339	20	5,899
	Mortality	**1,638**	381	299	122	2	2,200
2016	Catch	**1,965**	689	2,192	451	1	5,298
	Mortality	**1,412**	488	198	165	0	2,263
2017	Catch	**1,976**	654	2,133	436	5	5,204
	Mortality	**1,167**	394	171	147	1	1,880
2018	Catch	**2,556**	649	1,440	412	25	5,082
	Mortality	**1,343**	412	115	148	4	2,022
2019	Catch	**3,067**	880	975	418	39	5,379
	Mortality	**1,461**	539	78	189	2	2,270

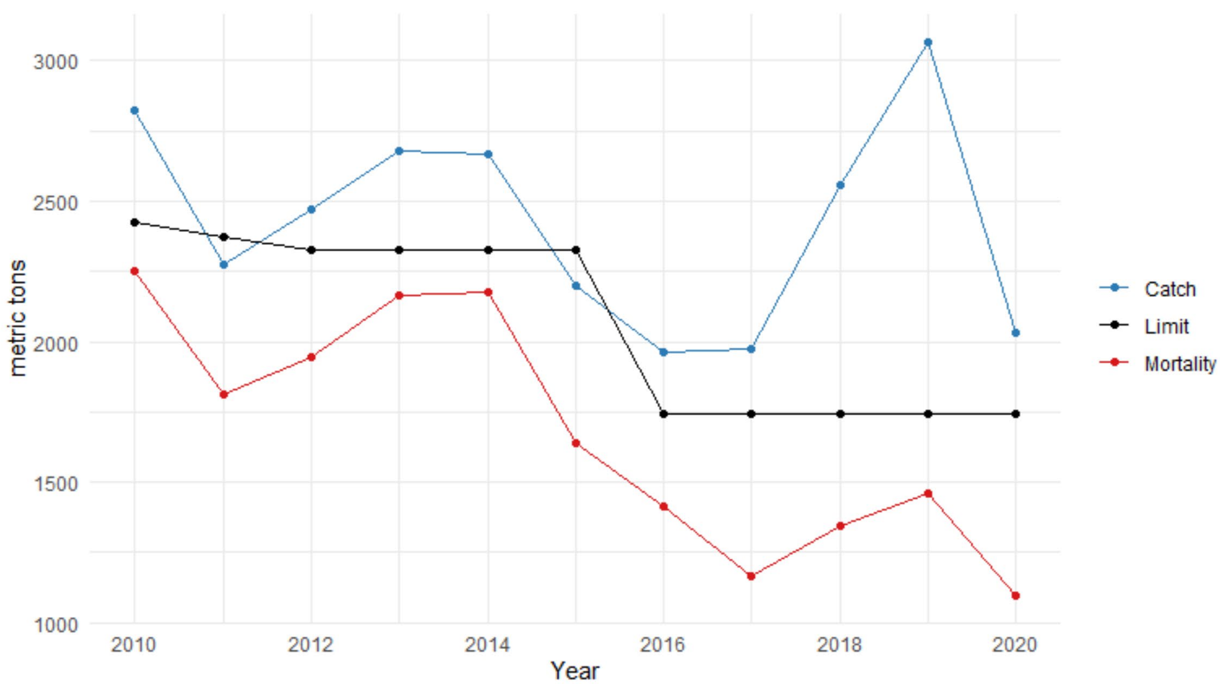

Figure 3-25 A80 halibut PSC limit, catch, and mortality, 2010 through 2020

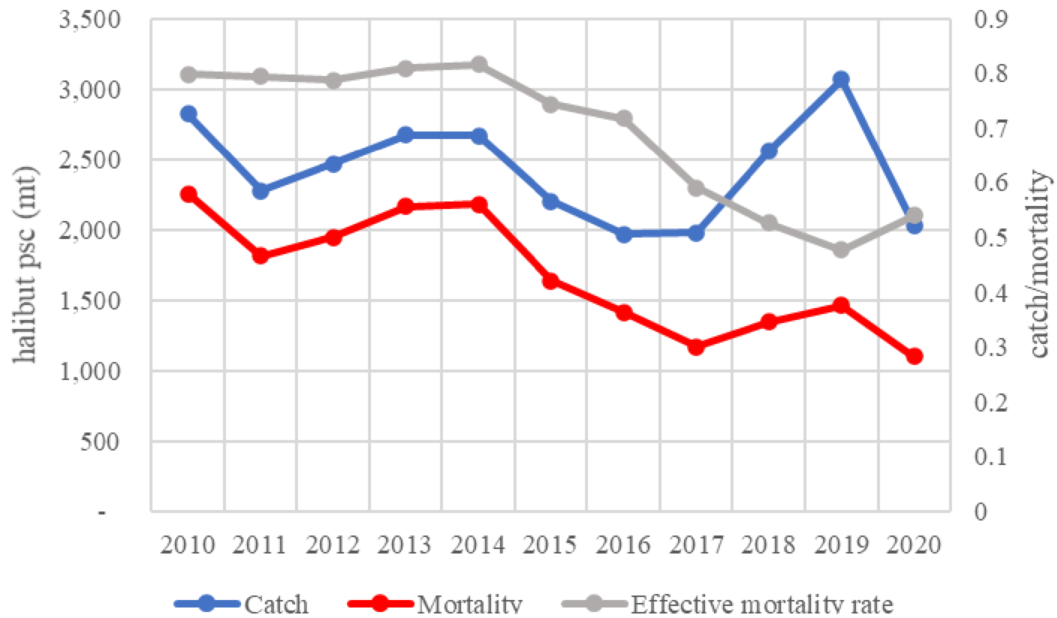

Figure 3-26 A80 sector effective mortality rate: function of halibut catch and mortality (2010 – 2020)

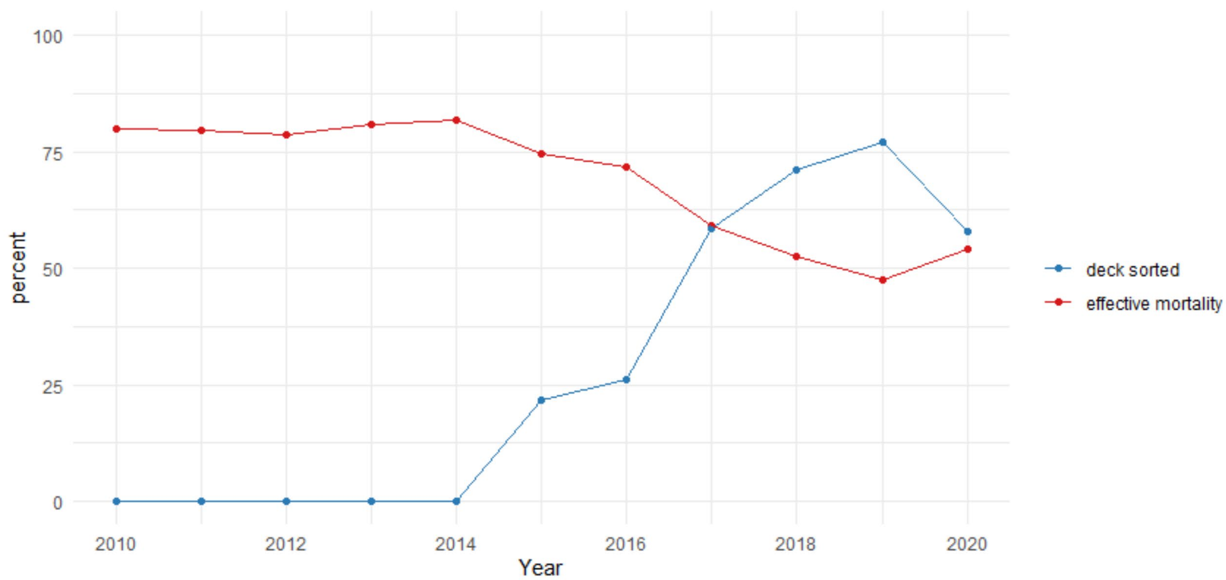

Figure 3-27 A80 halibut PSC effective mortality (%) versus percent of PSC catch receiving deck sorting DMR estimate, 2010 through 2020

Figure 3-28 plots the A80 halibut encounter rate by target species for 2010 through 2019. Yellowfin sole target fishing clearly accounts for the highest groundfish catch volume and the highest halibut encounter rate, followed by northern rock sole. After those two, halibut encounter drops off due to either lower effort (other flatfish) or lower PSC rates (Atka mackerel and POP). Refer to Figure 3-14 for the relative proportion of allocated flatfish versus roundfish species on A80 permits and refer to Table 3-20 for PSC rates by target species.

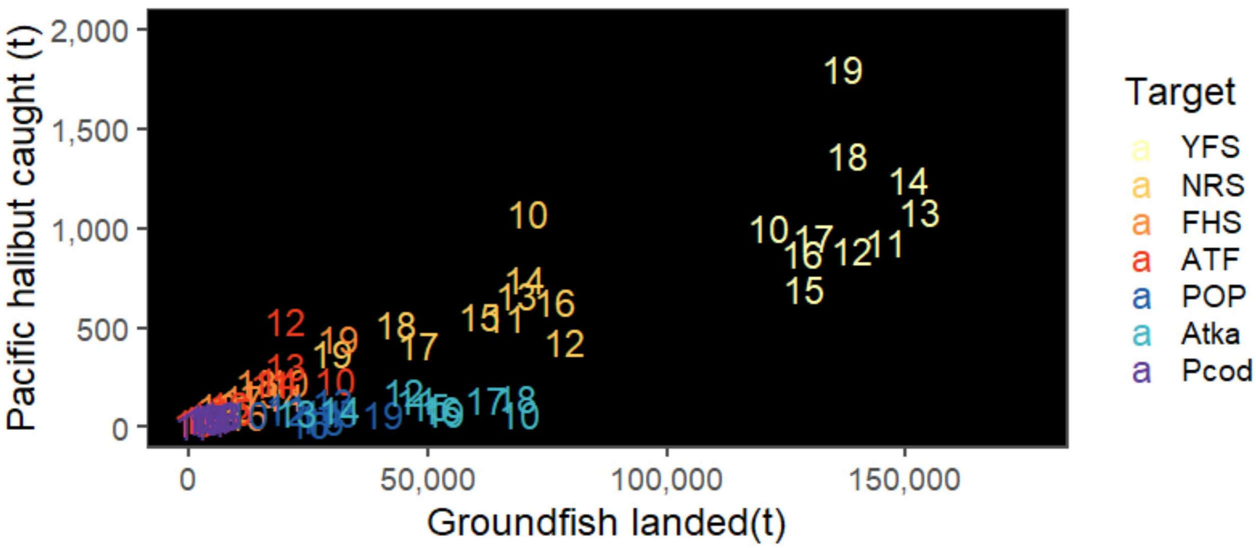

Figure 3-28 A80 sector bycatch of Pacific halibut (mt) versus groundfish catch by target species, 2010 through 2019.

Table 3-20 lists the halibut PSC rate for selected A80 targets species, shown as kilograms of halibut PSC mortality per mt of groundfish catch. The species are ordered descending by the target with the highest PSC rate. The order is unchanged whether looking at average or median values over the entire period or only at the three most recent years. The table omits species that are sometimes assigned as an A80 trip target in the CAS but are not typically explicitly targeted by A80 vessels – e.g., Pacific cod, “other flatfish,” sablefish, and pollock.

Table 3-20 A80 Pacific halibut PSC mortality rate by selected groundfish target species (kg halibut mortality per mt of groundfish catch), 2010 through 2019

Target	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Arrowtooth flounder	6	10	20	12	10	7	9	9	13	8
Northern rock sole	13	7	4	8	9	8	7	5	6	7
Flathead sole	8	9	14	9	6	4	6	5	7	6
Yellowfin sole	7	5	5	6	7	4	5	5	5	6
Alaska Plaice	2	3	2	5	16	1	3	4	5	5
POP/Rockfish	4	4	3	3	2	2	1	1	1	1
Atka Mackerel	1	2	3	3	2	2	1	2	1	1

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

Figure 3-29 and Figure 3-30 break down A80 PSC mortality by month for the entire 2010 through 2019 period and by year. The figures demonstrate the predominance of halibut PSC in flatfish targets relative to other targets, and also reflect annual fishing patterns within the flatfish category; for example, northern rock sole tend to be targeted earlier in the year for valuable roe content. Halibut PSC by target fishery tends to reflect effort as translated through the PSC rates reported in Table 3-20; there are no surprising results where the analysts can point to an outlier species-specific PSC rate for a given month. The yearly panels in Figure 3-30 reflect the sector-wide reduction in halibut PSC beginning in 2016, which is generally attributed to the investment of time and resources in halibut avoidance and mortality rate mitigation (i.e., deck sorting). Lower gross levels of halibut PSC in the later months of the year might also be attributable to the sector’s Halibut Avoidance Plan (HAP) that requires vessels to maintain a certain rate-performance standard regardless of where the sector stands in relation to the annual limit of 1,745 mt (Section 3.4.4). Additional detail on targeting patterns during the course of the A80 fishing year are included in Section 3.3.3. The most notable deviation from the recent trend in 2020 was the reemergence of PSC attributed to the arrowtooth flounder target, which largely occurred in May and June. This likely has more to do with more trips being counted in CAS as arrowtooth trips due to catch rates than a change in fishing strategy or time/location, since arrowtooth is generally a commercial bycatch species. Flathead sole catch was low in 2020; some of the PSC that occurred in that target fishery around July-September of 2019 shows up in roughly similar magnitudes in 2020 but attributed to the yellowfin sole and rock sole targets.

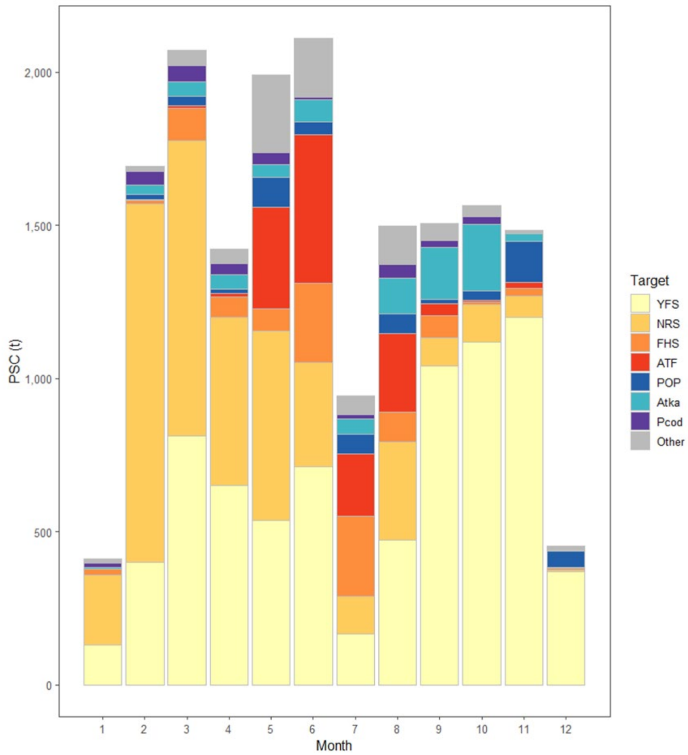

Figure 3-29 A80 Pacific halibut PSC mortality (mt) by month and target fishery, aggregated over 2010 through 2019.

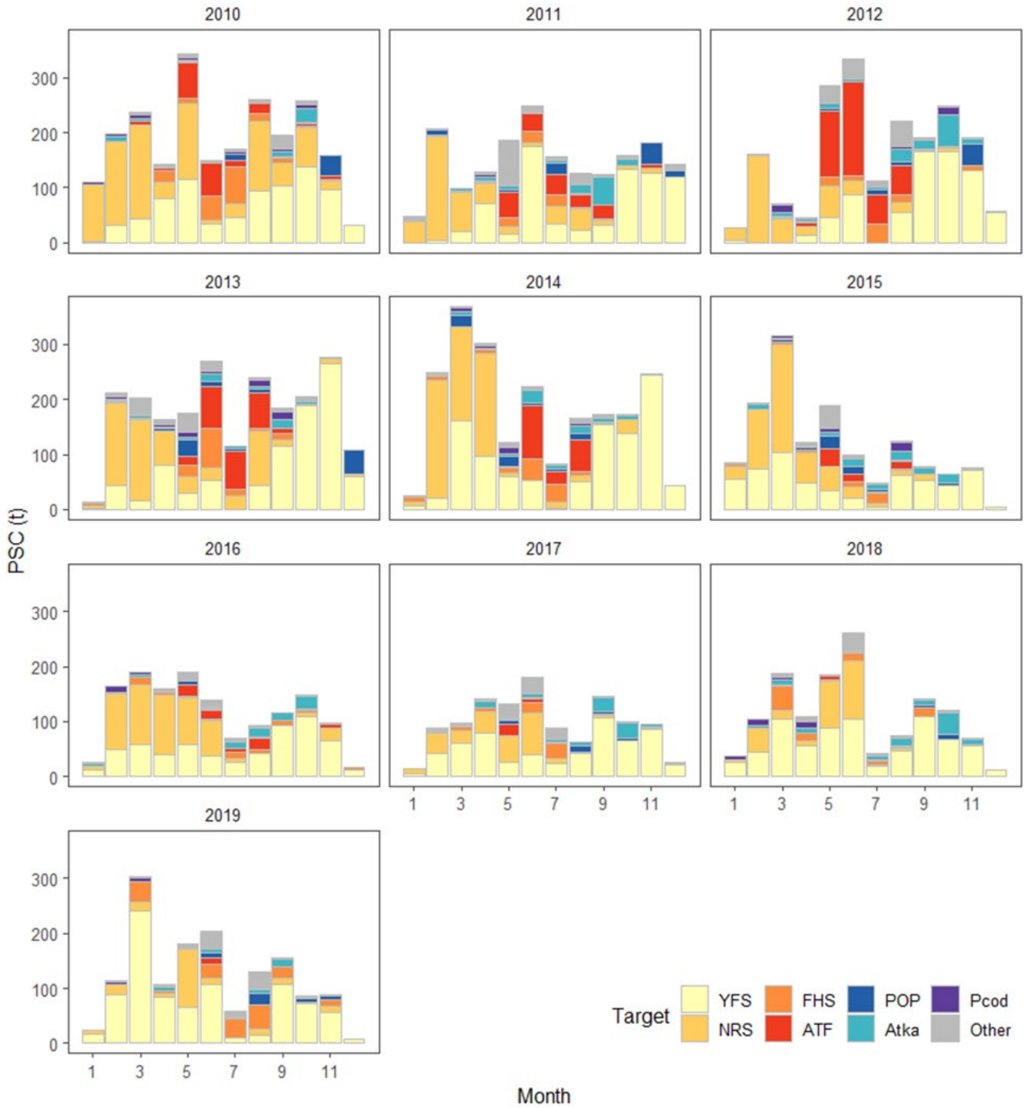

Figure 3-30 A80 Pacific halibut PSC mortality (mt) by month and target fishery, with panels corresponding to years 2010 through 2019.

3.4.2 Pacific halibut mortality as related to groundfish revenue

The relationship between halibut PSC mortality and A80 groundfish revenue is a key indicator of the sector-level and distributional impacts of potential changes to halibut PSC limits. The revenue/PSC relationship encompasses the full array of possible determinants: groundfish harvest levels (TAC; effort; CPUE), bycatch mortality (encounter rates; DMRs and effective mortality), and other external factors (wholesale markets; environmental/ecosystem conditions that affect the co-occurrence of halibut and groundfish species). Figure 3-31 plots the relationship between mt of halibut mortality (PSC use) and groundfish wholesale revenue for 2010 through 2019 (2018$). It is important to note that the figure is plotting gross revenues that do not account for operational costs. It is possible that lower PSC mortality was achieved at a higher cost in some years (e.g., search costs, fewer or less efficient tows). The figure reflects that yellowfin sole is the highest volume target in the A80 sector, and with a relatively high PSC rate it typically incurs the greatest amount of halibut mortality. Northern rock sole performs similarly but at a lower volume. As evident from the unit values and PSC rates shown in Table 3-15 and Table 3-20, respectively, Atka mackerel and Pacific ocean perch generate greater revenue per ton of PSC. The other species shown are clustered because they are less often designated as A80 trip targets in CAS data. Aside from visible outliers like arrowtooth flounder in 2012, the other species' revenue/PSC relationship is driven mainly by harvest intensity.

At the sector level (not shown), lower PSC rates can result in similar levels of groundfish harvest volume with different PSC totals. For example, PSC use in 2014 and 2016 were quite different – 2,667 mt versus 1,965 mt – but gross wholesale revenues were similar ($317 million in 2014 versus $306 million in 2016, 2018$). The difference has many causative factors; lower effective mortality is likely a key factor, but species composition of catch and market conditions should not be discounted.

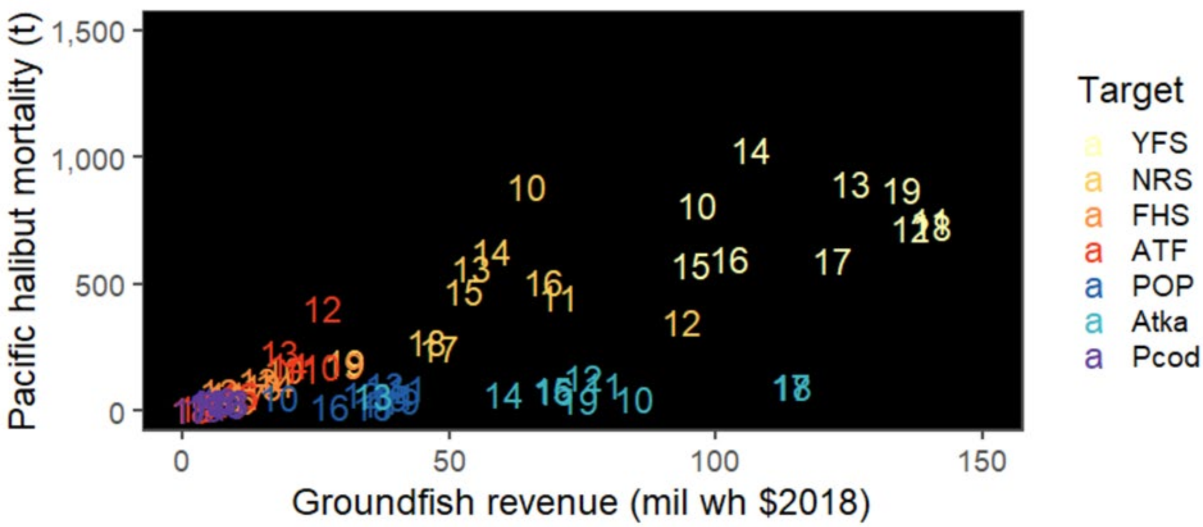

Figure 3-31 A80 Pacific halibut PSC mortality (mt) versus groundfish revenue (2018$ millions in wholesale) by target and year, 2010 through 2019.

Another metric to evaluate the productive value that halibut PSC contributes to the A80 sector is the wholesale revenue generated per mt of estimated halibut mortality. The more wholesale revenue that can be generated per ton of halibut PSC, the more valuable that unit of halibut PSC becomes. In general, wholesale revenue per halibut PSC can be increased three ways: (1) increased wholesale revenues (holding halibut PSC constant); (2) decreased halibut PSC (holding wholesale revenues constant); or (3) a combination of both. If wholesale revenue increases or halibut PSC decreases by the same relative amount, wholesale revenue per halibut PSC remains the same. Figure 3-32 shows the annual value of a mt of halibut PSC from 2010 through 2019. Noting that the values in the table are adjusted for inflation, the sector-level increase since 2014 is likely attributed to lower PSC rates. The lower panel in Figure 3-32 shows gross revenue per ton of PSC by target species, aggregating across all years.[50] This panel underlines the fact that a metric defined as a ratio can be strongly determined by one factor. The low PSC rate for Atka mackerel and POP target trips separates that target group from other A80 species. If the A80 sector were able to restructure its total activity around the harvest of low-PSC groundfish species it could achieve high gross revenues at a low PSC rate, but that is not possible given that roundfish species have defined catch limits and A80 companies cannot alter the flatfish/roundfish quota share mix that they are allocated under the program. In effect, the only levers that the sector can use to increase its revenue per mt of PSC is to reduce usage in flatfish targets or to generate higher value from flatfish, which may be occurring but is inevitably limited by market and operational factors.

[50] Previous versions of this analysis included revenue per mt of halibut PSC by month but no discernable pattern with a plausible explanation to link available seasonal catch, its value, and the observed PSC rate was apparent.

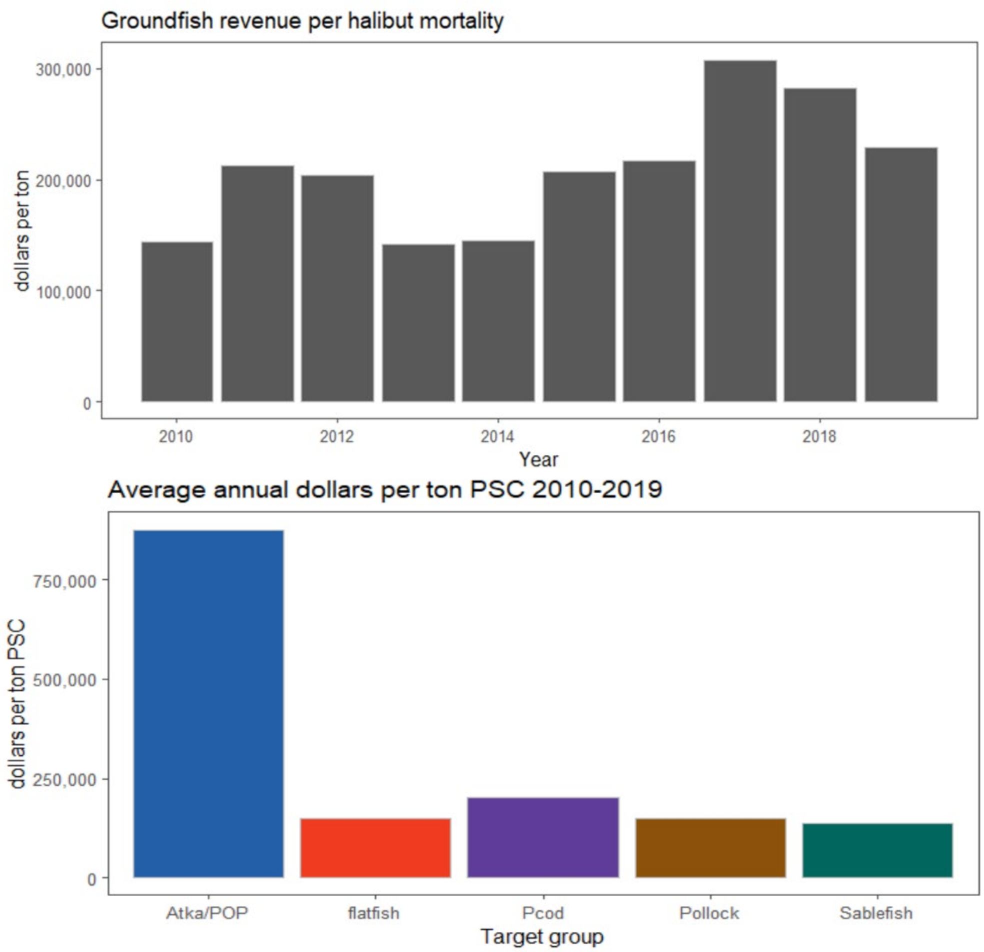

Figure 3-32 A80 wholesale groundfish revenue (2018$) per mt of halibut PSC, 2010 through 2019. Top panel: Sector-level revenue per mt by year; Bottom panel: revenue per mt by targets species aggregated over years.

Figure 3-33 further illustrates the consistent difference in target categories' revenue per ton of halibut PSC. Atka mackerel and POP ratios stand out from flatfish and Pacific cod. Pacific cod ratios should not be overly interpreted because the A80 sector often records "trips" that are assigned a cod target designation as a byproduct of other operational factors; the analysts are led to understand that it is rare for an A80 vessel to truly target Pacific cod over the course of a week's fishing. The difference in revenue per ton of PSC by flatfish/roundfish species group is an integral part of understanding the distributional impacts of a constraining halibut bycatch limit within the A80 sector. Figure 3-15 shows that the A80 companies are heterogeneous in terms of their flatfish/roundfish quota mix. While intra-sector transfers are possible, they likely come at a cost that is not observable by public analysis, and transfers on the margin would not change the essential disposition of an A80 company as one that is "flatfish-dependent" versus one that is less so. To the analysts' knowledge, intra-sector transfers may occur within a company's fleet of vessels but are not being made between companies, even within the single cooperative.

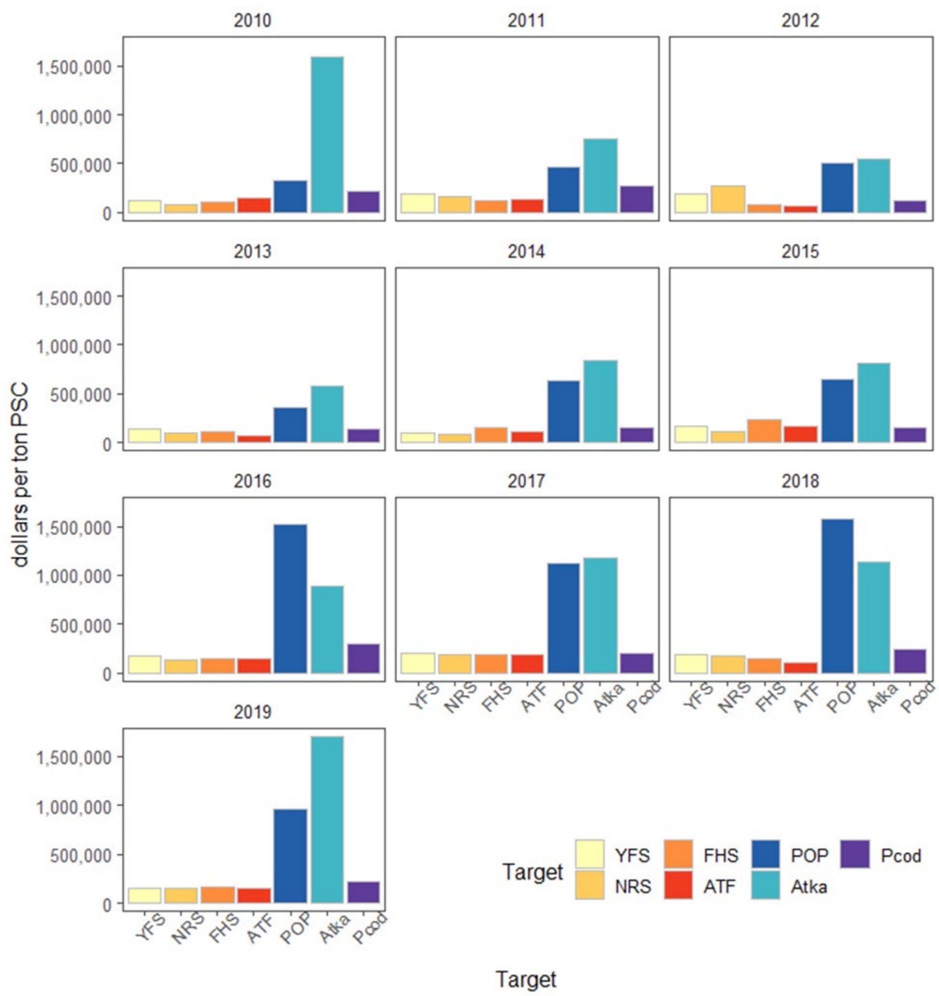

Figure 3-33 A80 wholesale groundfish revenue (2018$) per mt of halibut PSC by selected target species, 2010 through 2019.

3.4.3 Spatial data on A80 fishery and EBS trawl survey

This section presents visual comparisons of the A80 sector's spatial range and halibut PSC to that of the EBS trawl survey. Data are pulled from the three most recent years that were used in the development of the ABM operating model reviewed in October 2020 – i.e., 2017 through 2019. The EBS trawl survey is typically conducted in June and July so, in some figures, data are selected to provide a direct comparison. The purpose of this section is not to affirm or question the approach of linking PSC limits to abundance estimates derived from the trawl survey – as seasonal surveys are utilized in many instances to condition management of year-round fisheries in Alaska. These spatial data are simply provided to give the reader the best publicly available understanding of where the fishery occurred, where halibut PSC typically occurs, and where the EBS trawl survey encountered halibut. The selected years represent the groundfish stock and environmental conditions as they occurred in the background of this fishery and survey data. Note that all mapped data are drawn from Observer Program information and are presented by ADF&G statistical area.

Figure 3-34 shows where the A80 sector operated from 2017 through 2019 based on the number of hauls recorded in Observer Program data. The figure also pares back to the activity that occurred in June and July to mirror the EBS survey season. Figure 3-35 depicts where halibut PSC occurred within the main A80 target species. Halibut PSC is not a direct representation of all fishing activity, but all of the targets represented in the figure incurred halibut PSC at a known rate (Table 3-20) so the figure provides an adequate depiction of the fact that flatfish species tend to be targeted in the eastern Bering Sea while roundfish (Atka mackerel and POP) are generally targeted along the Aleutian Island chain. Targets that predominately show up along the shelf break (i.e., flathead sole and arrowtooth flounder) are species that sometimes end up as "targets" in the CAS when a vessel was primarily working on other species up to their retainable amounts, like POP or Pacific cod.

Figure 3-36 shows where halibut PSC occurred from 2017 through 2019, with a breakout for the EBS survey months of June and July. When compared with Figure 3-35, it is apparent that PSC tracks with the areas fished for flatfish (YFS, NRS) plus a cluster around Unalaska and Unimak Pass where roundfish, Pacific cod, and arrowtooth flounder are predominant.

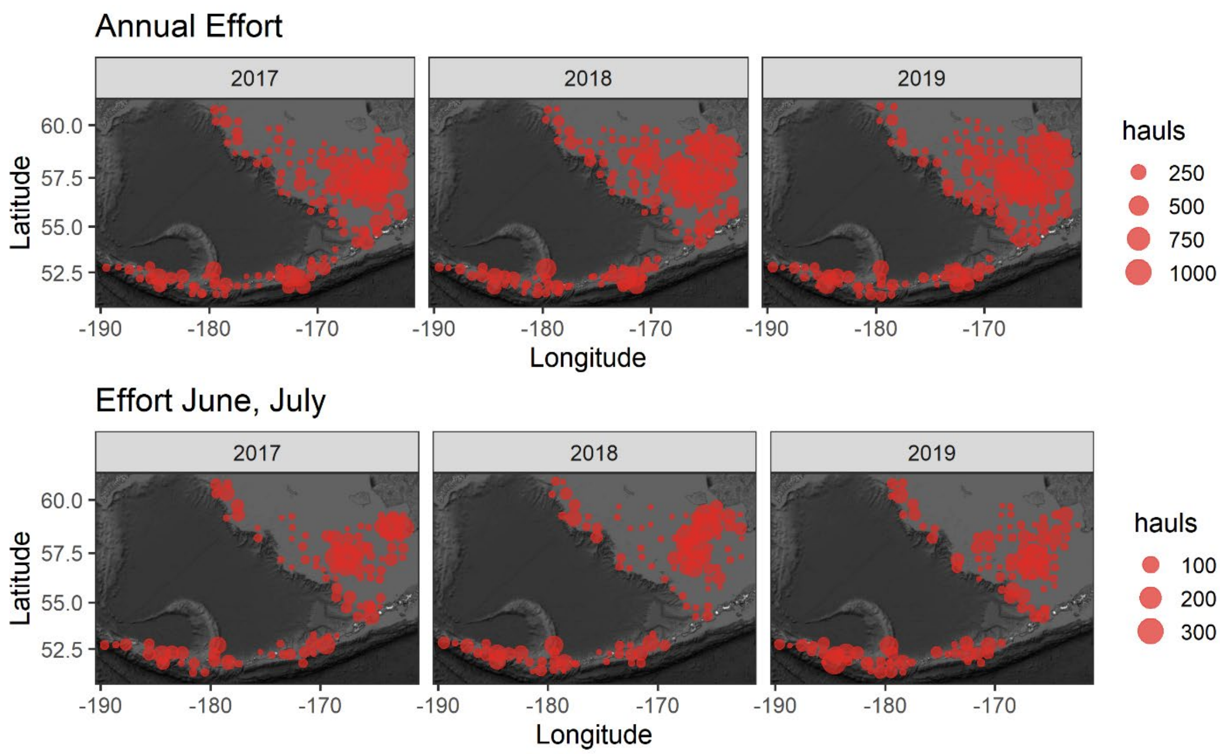

Figure 3-34 A80 sector effort by ADF&G statistical area, 2017 through 2019. Lower panel shows fishery data for months when the EBS survey is conducted. Size of plotted circles is proportional to number of hauls.

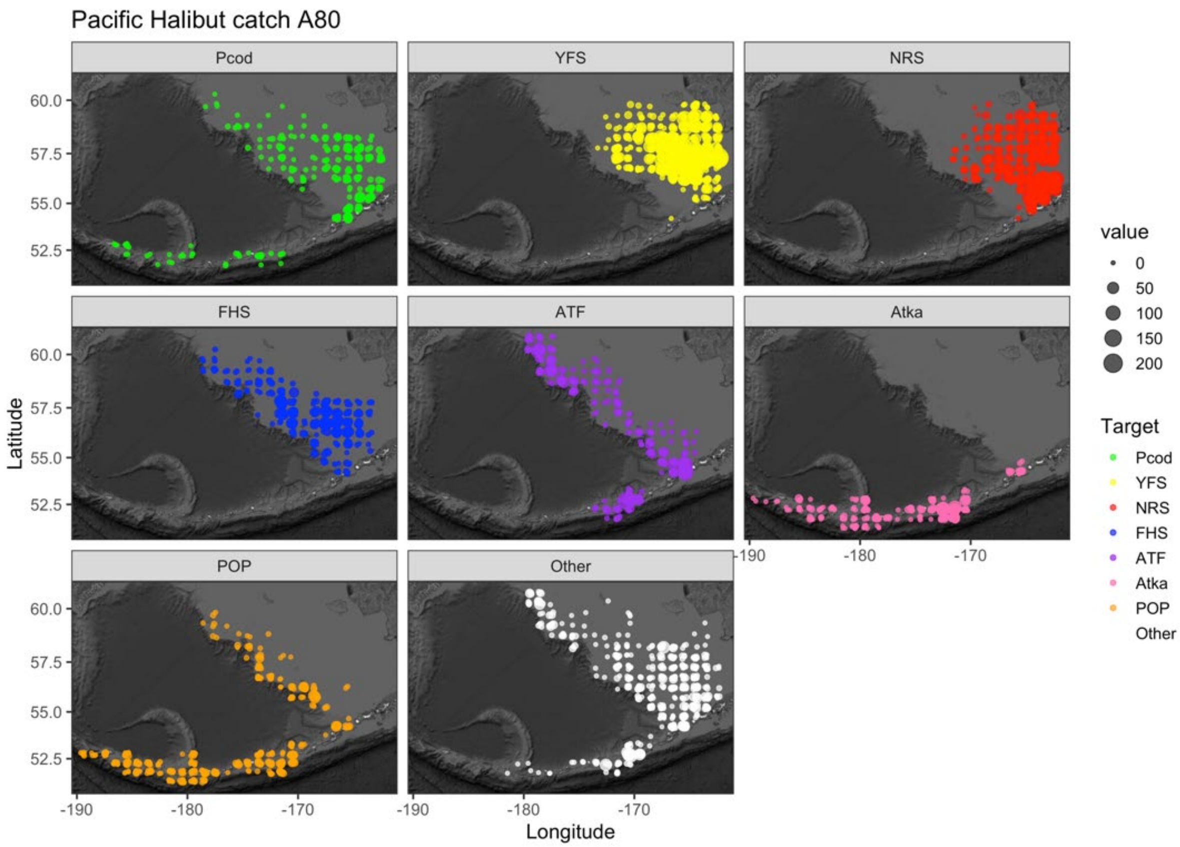

Figure 3-35 A80 sector catch (pre-mortality) of Pacific halibut by ADF&G statistical area and target groundfish species, aggregated over 2010 through 2018. Size of plotted circles proportional to volume ("value" in legend equals mt).

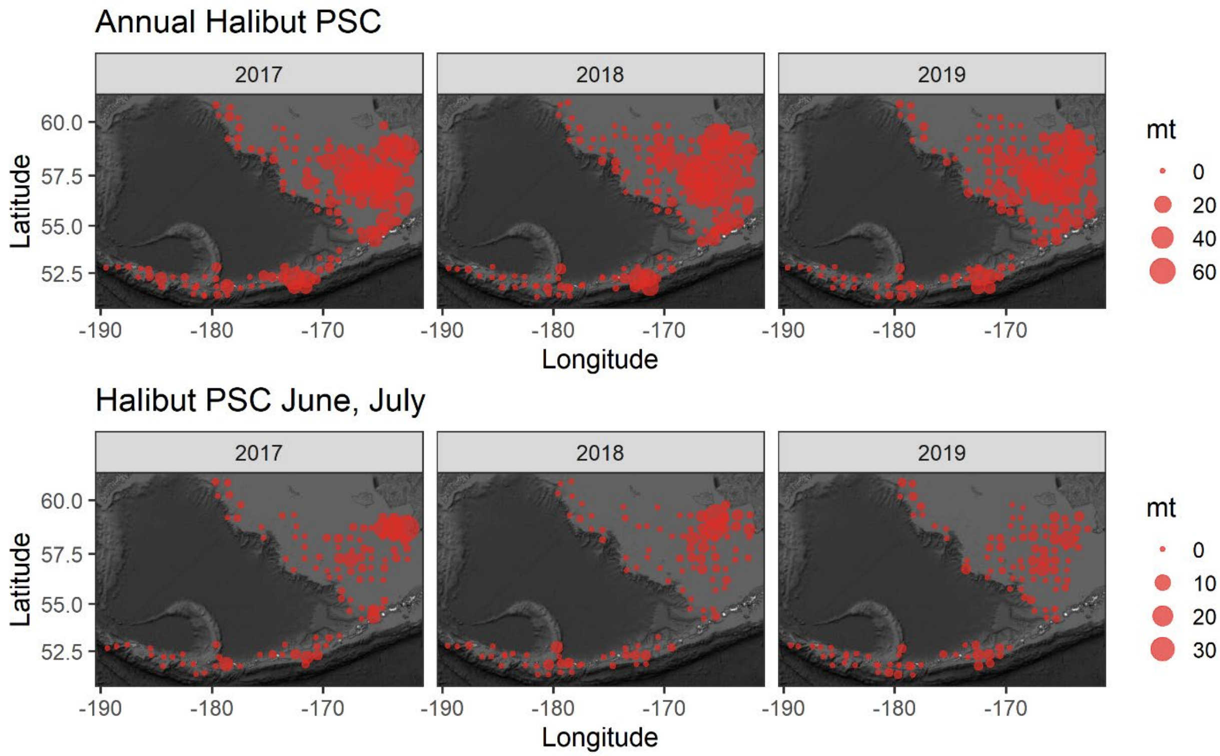

Figure 3-36 A80 sector Pacific halibut PSC (mt of mortality) by ADF&G statistical area, 2017 through 2019

Figure 3-37 compares the ADF&G statistical areas where fishing occurred during the EBS survey season (June/July) with areas where the survey encountered halibut. Figure 3-38 overlays ADF&G statistical areas where halibut occurred in the fishery throughout the year and during the survey season on the surveyed areas that encountered halibut.

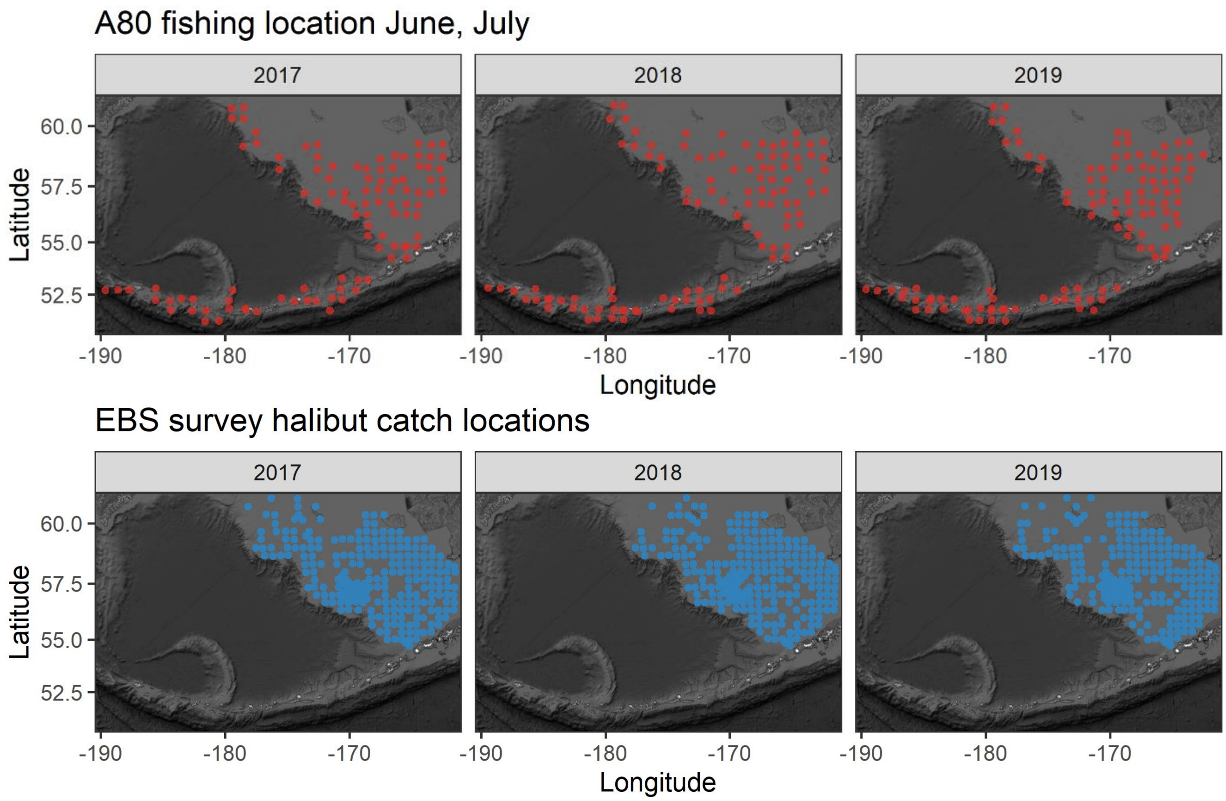

Figure 3-37 ADF&G statistical areas where the A80 sector fished during the months when the EBS trawl survey (EBS) typically occurs and ADF&G statistical areas where the EBS survey encountered halibut, 2017 through 2019

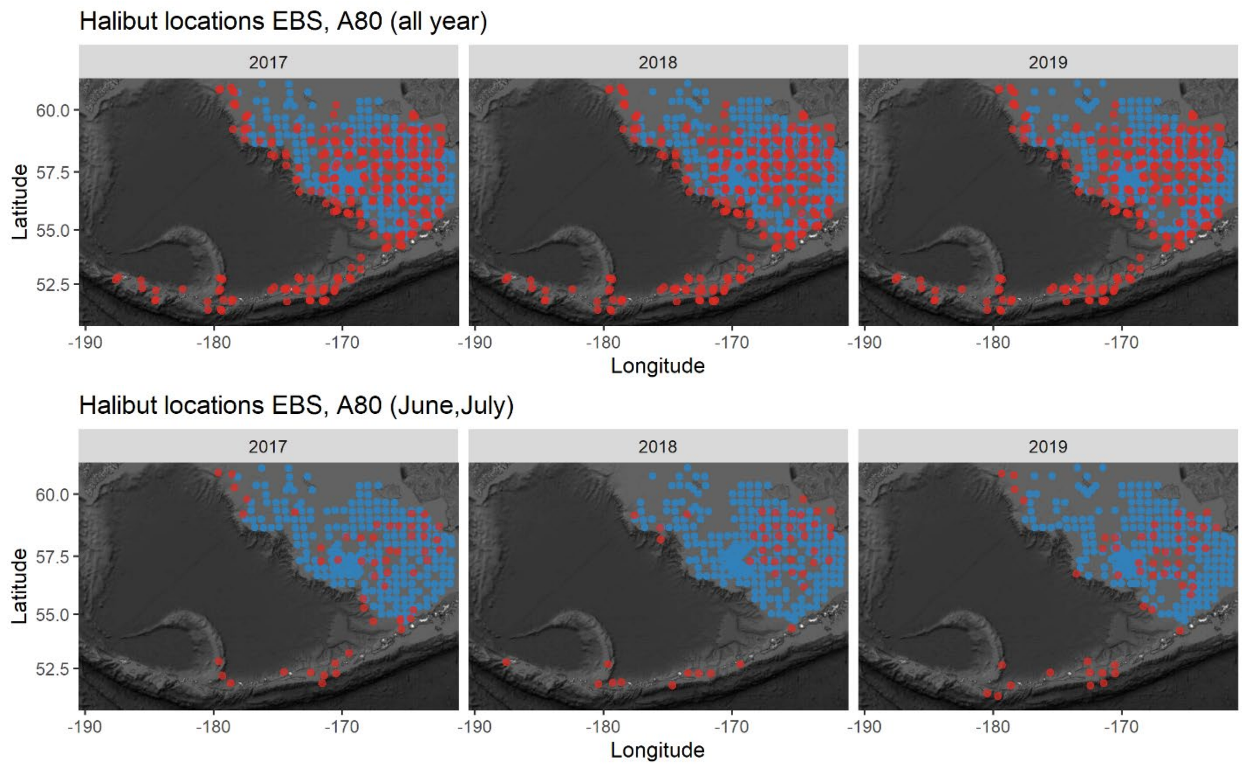

Figure 3-38 ADF&G statistical areas where halibut PSC occurred in the A80 fishery overlaid on areas where the EBS trawl survey (EBS) encountered halibut, 2017 through 2019. Top panel shows areas with A80 halibut catch throughout the year; bottom panel show areas with A80 halibut catch for the months during which the EBS trawl survey typically occurs.

3.4.4 Comparison of A80 PSC and survey trends

This section reports survey trends as they relate to A80 halibut mortality at the sector-level and by A80 groundfish target species.

Figure 3-39 shows A80 halibut catch and mortality in the top panels and shows the EBS trawl and setline survey index values in the bottom panels (Table 2-5 shows these metrics numerically). The vertical axis represents mt for all panels (note that the vertical scale is different in each panel). Both surveys display downward abundance trends. Halibut catch and mortality (PSC) follow similar trajectories from 2010 through 2015, but since then halibut catch has increased at a greater rate than mortality due to changes in catch accounting and fish handling procedures described in the following section (3.4.5).

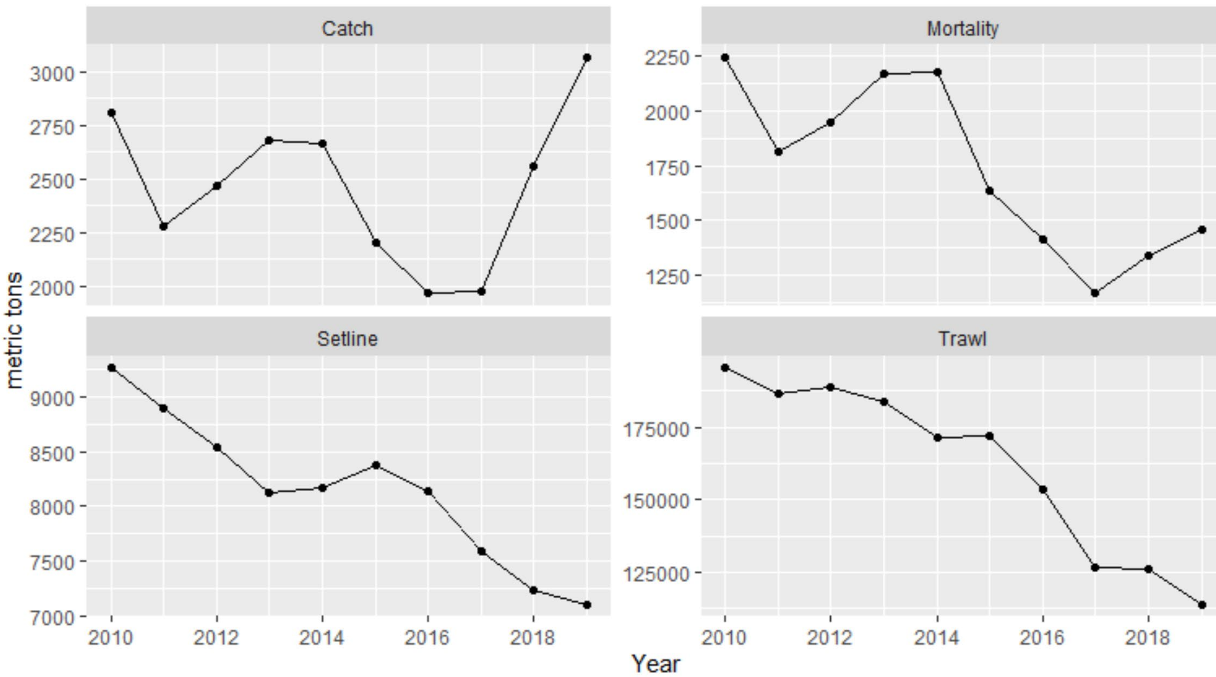

Figure 3-39 A80 halibut catch and mortality (top panels) and setline and trawl survey indices (bottom panels), 2010 through 2019

Figure 3-40 plots A80 halibut PSC catch (encounter) and mortality in relation to the two survey indices. Survey indices have consistently declined while catch reached a high in 2019; mortality has increased since 2017 but at a slower rate than catch. The relationship between halibut catch and the survey value is not well correlated. Factors other than halibut population size that may lead to increased encounter rates include mixing with target species, variable groundfish aggregation behavior across years, and targeting of different species by the various fleets/companies within the sector. Halibut mortality shows a slightly better correlation with both abundance indices. Halibut population size and distribution certainly plays some role in the abundance:mortality relationship but total PSC mortality is likely also driven by fleet behavior in response to management. For example, deck sorting, test tows, shorter tows, and excluder use have become more widely adopted since 2015, resulting in lower effective mortality (ratio of halibut mortality to catch) even though halibut catch has increased (see Figure 3-26, Section 3.4.5). Looking at the bottom panel of Figure 3-40, there would likely be no trend without the inclusion of 2015 through 2019 – the period during which active mortality mitigation measures became widely adopted throughout the A80 fleet. Based on the data available, one might conclude that halibut catch rates are somewhat stochastic but may have increased in recent years as the A80 fleet has found ways to mitigate the negative consequences of halibut encounter, thus allowing the fleet to prioritize finding the right mix of groundfish slightly ahead of minimizing the number of halibut in a haul. That said, the analysts do not solely attribute the recent upward trend in halibut encounter to fleet choices; it is possible that higher encounter rates are at least partially attributable to environmental conditions (e.g., comingling of species in an ocean environment with less temperature variation that could help separate species and guide time/area targeting). One could also conclude that halibut mortality rates are correlated to abundance through the mechanism of management pressure to reduce mortality levels in times of low abundance by any available means.

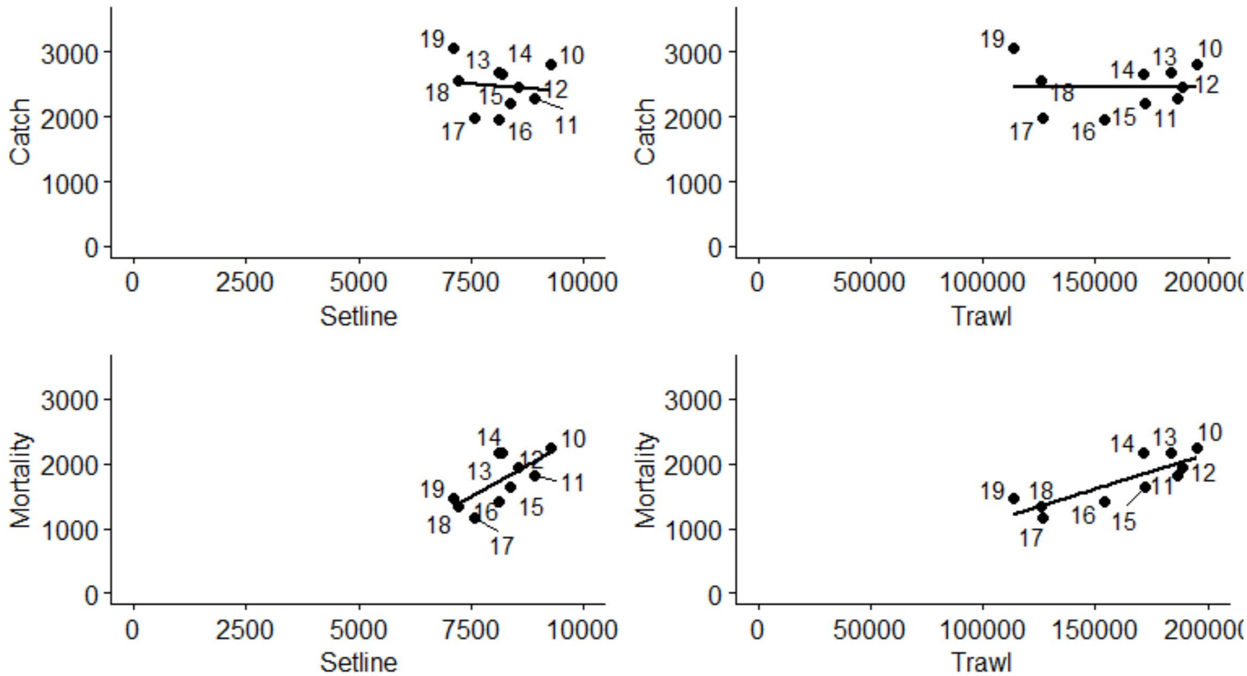

Figure 3-40 Plot of annual halibut catch and mortality against setline and trawl survey indices 2010-2019.

A80 halibut encounter rate by target species for 2010 through 2019 are shown in Section 3.4.1 (Figure 3-28). Yellowfin sole target fishing clearly accounts for the highest groundfish catch volume and the highest halibut encounter rate, followed by northern rock sole. After those two, halibut encounter drops off due to either lower effort (other flatfish) or lower PSC rates (Atka mackerel and POP). Table 3-21 provides the survey values and look up table "states" as well as total A80 mortality by year and the mortality by target for the species shown in Figure 3-28). There may be some utility in examining the general association between trends in mortality by year (overall and by target) and trends in survey indices (Table 3-21). For most targets and for overall A80 PSC mortality, higher values of both surveys (2010-2014) trended with higher overall A80 PSC mortality as well as higher halibut PSC for most targets. Both surveys have been at lower abundance levels in the more recent years. Total PSC has been lower relative to the 2010-2014 period, though the analysts attribute at least some of that trend to active mitigation measures implemented by the A80 sector. PSC mortality by target has varied considerably, trending upward in 2018 and 2019 for both yellowfin sole and flathead sole targets. The two, clear target-level conclusions that can be made are: yellowfin sole and northern rock sole account for the greatest proportion of halibut PSC mortality because they are the highest volume flatfish targets; and Atka mackerel/POP generally account for less PSC per ton of groundfish catch when compared to flatfish targets (Table 3-20).

Table 3-21 Survey index values (WPUE and metric tons (mt)) and "State" from Table 2-5 with associated tons of A80 sector halibut mortality in total and by selected targets, 2010 through 2019. Shading corresponds to higher (darker) and lower (lighter) values within individual columns. [51]

Year	Setline Survey 4ABCDE		EBS Trawl Survey		Mortality (mt)	Target					
	Index (WPUE)	State	Index (mt)	State	Total A80	YFS	NRS	FHS	ATF	POP	Atka
2010	9,271	Medium	195,535	High	**2,254**	833	913	302	190	57	55
2011	8,896	Medium	186,666	High	**1,810**	790	467	119	172	92	111
2012	8,539	Medium	189,000	High	**1,944**	761	378	104	415	75	144
2013	8,133	Medium	183,989	High	**2,166**	955	583	159	238	107	62
2014	8,173	Medium	171,427	High	**2,178**	1,102	645	112	188	63	77
2015	8,385	Medium	172,237	High	**1,638**	598	480	46	62	60	86
2016	8,134	Medium	153,704	High	**1,412**	631	521	63	71	18	80
2017	7,583	Low	126,684	Low	**1,167**	608	256	63	35	34	105
2018	7,228	Low	125,957	Low	**1,343**	752	278	105	12	24	110
2019	7,104	Low	113,855	Low	**1,461**	890	207	183	17	44	51

Comparison of spatial coverage of the EBS trawl survey and A80 fishery (Section 3.4.3) indicate that the survey stations capture the area where the A80 sector is fishing during the survey season in the Bering Sea and along the shelf. The EBS survey, by its nature, does not provide data on catch and halibut encounter in the Aleutian Islands. The analysts note that the predominant A80 species caught in the Aleutian Islands are Atka mackerel and Pacific ocean perch, which are typically associated with lower halibut bycatch (see Figure 3-38 Table 3-21). The lower panel of Figure 3-38 illustrates the year-to-year variability in where the A80 sector operates at a given point in the season. That variation can be ascribed to any of several reasons: groundfish CPUE, halibut encounter rates, or mix of species including constraining Pacific cod, to name a few.

There are many reasons why it would not be expected for A80 halibut PSC encounter to be consistently, positively correlated with halibut survey abundance indices, including, but not limited to different temporal and spatial coverage, selectivity, and targeting behavior. Surveys are designed to collect standardized data and therefore operate differently than fishing operations that are actively targeting specific species based on any number of changing variables such as catch limits, allocations, and economic incentives. This is one reason fishery catch limits are not set using solely fishery dependent data. Similarly, the premise of abundance-based management correlated to halibut PSC is that the PSC limit would be set based on the surveyed abundance of halibut, not based on the halibut encounter by A80. A lack of correlation between surveyed abundance and A80 encounter does not discount the underlying assumption of abundance-based management of halibut PSC limits; however, it may affect the potential impacts. This is particularly likely in years in which the surveyed abundance is low, the resulting

[51] YFS = yellowfin sole; NRS = northern rock sole; FHS = flathead sole; ATF = arrowtooth flounder; POP = Pacific ocean perch; Atka = Atka mackerel; Pcod = Pacific cod. Note that Pacific cod is not shown in Table 2-4 because, in most cases, cod is not the explicit target of an A80 "trip." Rather, Pacific cod is taken as a valuable and necessary secondary species when fishing for other A80 species but might be targeted in circumstances where a vessel is already processing cod delivered at-sea by CVs. In many cases, NMFS Catch Accounting System identifies Pacific cod as a trip target when catch by volume exceeds a certain proportion as a matter of circumstance.

PSC limits are low, and A80 encounter is high. Further survey biomass estimates comprise an integral component underpinning the assessment of BSAI flatfish stocks. The relationship between the abundance of YFS stock and the catch of YFS by the A80 sector are also not well correlated but does not discount the utility in the use of the survey for the assessment of the YFS stock for purposes of setting catch limits. Market considerations, the 2 million mt cap and other factors are considered in TAC-setting which impact the relatively flat interannual variability in the YFS TAC and ultimately catch. However, this does not negate the use of abundance-based approaches in assessing stocks in the BSAI.

3.4.5 Bycatch mortality reduction strategies

This section describes existing efforts and projects in development within the A80 cooperative to minimize halibut PSC catch and mortality. Note that Section 3.5.1 of the preliminary DEIS (NPFMC 2019a) and Section 1.4.4 of the October 2017 ABM Discussion Paper (NPFMC 2017) provided earlier iterations of this information as well as contrasting and overlapping avoidance strategies in the BSAI TLAS and HAL CP sectors. Those other sectors are no longer directly regulated by the alternatives under consideration and thus have been excised from this section.[52] Some of the information reported below is drawn from the most recent cooperative report submitted to the Council by the lone A80 cooperative that is currently operating, which includes all active A80 vessels as members.[53]

Vessels that currently participate in the A80 sector have been engaged in halibut avoidance to some degree since the years before A80 implementation when limited access BSAI flatfish fisheries were often closed due to halibut bycatch limits. The implementation of A80 in 2008 created a binding constraint on the qualifying vessels. Since 2011, all A80 vessels have participated in one or two voluntary A80 cooperatives (as opposed to the A80 limited access fishery), resulting in additional capabilities to take organized steps to minimize bycatch. All A80 vessels have participated under a single cooperative since 2017 (the AKSC). According to AKSC's most recent report to the Council, the sector increased its focus on voluntary halibut bycatch avoidance in 2014 as the Council was considering hard cap PSC limit reductions for A80 and other BSAI groundfish sectors. Those reductions were implemented under Amendment 111 in 2016. Upon taking action to reduce PSC limits in 2015, the Council requested a proactive plan to maintain low bycatch rates. The A80 sector responded with a HAP that was agreed to by the two cooperatives that covered all A80 vessels at the time: AKSC and the Alaska Groundfish Cooperative.

The HAP defined operational practices and accountability measures to avoid halibut and reduce halibut mortality. The Plan imposed rate-based halibut PSC standards for the calendar year and, separately, for the last quarter of the year. The latter measure is meant to prevent overuse of halibut PSC if the annual

[52] In summary, halibut avoidance in TLAS is structured around existing affiliations by most – but not all – TLAS CVs with A80 and AFA companies and/or cooperatives. Unaffiliated TLAS vessels receive information from cooperatives regarding halibut avoidance and encouragement to voluntarily adopt best practices and information sharing. Specific measures include the A80 tools described in this subsection as well as Better Practices Protocols established for AFA CVs when trawling for BSAI Pacific cod. Those protocols include halibut excluders that meet certain specifications, no night fishing, minimum mesh size for escapement of small fish, voluntary full observer coverage, and real-time catch/location information sharing through their cooperative managers. AFA CVs also subject to internal cooperative bycatch allocations. AFA cooperatives may impose internal accountability measures through vessel rankings of PSC rates and monetary sanctions for vessels that do not comply with the Protocols. AFA cooperatives manage such that the PSC limit is not exceeded and allows the managers of cooperatives that do not need their full suballocated PSC to harvest the cooperative's non-pollock sideboard catch to redistribute PSC to other AFA cooperatives at no cost. The HAL CP sector (Freezer Longline Coalition Cooperative, or FLC) approaches halibut avoidance and PSC minimization through real-time communication facilitated by a third-party data manager. That information includes location data on catch rates and observed discard mortality, which incentivizes careful release practices to increase halibut discard viability. Vessel-specific internal reports on PSC rates promote social incentives to avoid activity that could result in lost fishing opportunities for the voluntary cooperative as a whole. All vessels in the HAL CP sector operate with flow scales and 100% observer coverage or greater.

[53] Alaska Seafood Cooperative Report to the NPFMC for the 2019 Fishery (April 8, 2020). Accessible at: https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/CoopRpts2019/AKSC.pdf.

rate does not appear to be a constraint in that year. Acceptable rates are established based on target species due to the different intrinsic halibut bycatch rates among the A80 species groups (see Table 3-7). Intra-cooperative accountability measures for failure to meet the standards include monetary fines, increased monitoring, and possible reduction in vessel-level halibut PSC allocations within the cooperative for the following year. The AKSC report to the Council on the 2019 fishery notes that all vessels complied with the Plan's standards in that year.

The three principal halibut avoidance measures used by the sector are choice of fishing time and location, use of halibut excluders, and deck sorting of halibut. Active communication among vessel captains on the fishing grounds, facilitated through the cooperative and a third-party data manager, is central to the effectiveness of halibut bycatch minimization under changing fishery conditions. Captains are informed of avoidance measures and operational decisions that are yielding good results at that particular time. Performance reports are shared internally, characterizing the areas being fished by cooperative members in terms of halibut mortality rates, target species, excluder effectiveness, deck sorting, halibut movement, fishing depths, and bottom temperatures. The fleet does not presume seasonal halibut movement to be constant from one year to the next, underlining the importance of continuous data collection and real-time communication. An A80 skipper's primary decision-drivers are the catch and bycatch rates in the particular area where they are fishing. Participants also noted that actively looking for clean fishing can be more productive and less risky than leaving the grounds and returning to make their next decisions based on older information.

The most recent AKSC Cooperative Report states that operators incur direct costs to avoid bycatch and/or reduce mortality rates. For example, participants cite that halibut excluders not only reduce target catch per effort but also increase fuel consumption. Fuel costs and efficiency loss is also incurred when vessels transit to move away from time/area combinations that are resulting in high encounter rates. Transit time also increases total fishing time and reduces productivity for the vessel and its crew, who are compensated based on harvest. Another category of cost is shorter tows that yield fewer groundfish. Shorter tows include test tows to ascertain halibut rates in that area and reduced tow time to increase the viability of the halibut that are caught when a vessel is practicing deck sorting. Costs related to deck sorting and the amount of deck sorting occurring are described below.

The total annual number of hauls made by A80 vessels had been increasing in recent years until a relative drop in the unusual 2020 year. The fleet-wide number of hauls peaked in 2019 at 16,574 (Table 3-22). From 2010 through 2014 the number of annual hauls ranged between roughly 11,000 and 12,500. Since 2015, total hauls were between roughly 12,500 and 16,500. Haul-level data on groundfish catch (mt), wholesale value (2018$), and PSC (catch and mortality) are shown in Figure 3-41.[54]

The total number of hauls may be influenced by a variety of factors including TACs, CPUE, and business plans, but is likely driven at least in part by efforts to minimize halibut mortality. While 2015 is somewhat of an arbitrary demarcation for this particular metric, that year does correspond to the implementation of active measures by the fleet to mitigate PSC. In the impacts section of this analysis (Section 5.3.2), 2015/2016 is used to broadly distinguish a shift in how the A80 sector approaches halibut mortality mitigation. Table 3-13 shows that the most recent years have yielded lower PSC use with total gross wholesale value and harvested groundfish weight remaining in a range comparable to the preceding period. PSC mitigation efforts could result in making more hauls of shorter duration for several reasons.[55] First, test tows with lower intended catch volume are used to assess the time/area fishing conditions and the risk of a high bycatch rate on subsequent longer tows. Second, marginally reducing the duration and volume of a normal tow allows captains to manage the risk of a high magnitude bycatch encounter and

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[54] The data in this figure are drawn from the same observer dataset that was used for the revenue analysis in Section 5.5. Data from 2015 are included here – in contrast to their exclusion in the impacts analysis – because confidence in annual aggregate haul-level data is high whereas specific haul data in 2015 were complicated by the early implementation of a deck sorting EFP.
[55] Alaska Seafood Cooperative, via personal communication. August 2020.

provides more frequent opportunities to move out of an area if necessary. Finally, shorter tows increase the expected viability of halibut that are brought onboard due to less time spent in the codend. The A80 fleet has placed an emphasis in recent years on reducing discard mortality, as evidenced by the broad adoption of deck sorting (Table 3-23).

Table 3-22 Total A80 sector hauls by year, 2010 through 2020

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
A80 Hauls	12,507	11,163	10,892	11,338	11,702	12,443	14,167	13,821	15,908	16,574	14,430

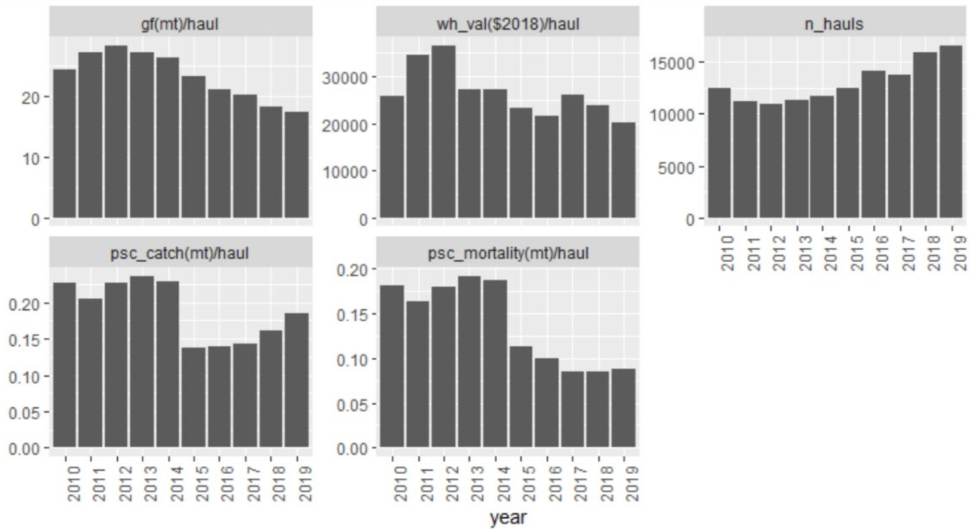

Figure 3-41 Haul-level data on A80 groundfish catch (mt), first wholesale revenue (2018$), and halibut PSC encounter/mortality (mt)

The 2019 AKSC report states that A80 vessels continue to experiment with halibut excluder designs to improve effectiveness and reduce target loss. The cooperative stated that excluder effectiveness varies across fisheries and vessels with conditions, vessel and net characteristics, and operating practices. Metrics for effectiveness are not well measured. For example, fishery participants and managers can only speculate about whether excluders might be less effective when encountering a higher proportion of small size halibut. In February 2021, the A80 cooperative brought an EFP proposal to the Council, seeking to better study the efficacy and efficiency of the most up-to-date excluder designs. The Council recommended that the EFP application be approved by NMFS.[56]

Previous iterations of the ABM analysis and associated discussion papers had noted a possible trade-off in the efficacy of excluder use and deck sorting – in other words, they were not viewed as purely complementary because it was thought that excluders increased mud or siltation on fish in the net, reducing release viability. Continuing gear experimentation may have reduced this effect by bringing the excluder section of the net higher in the water, reducing mud and increasing the proportion of tows when excluder use could be advantageous (AKSC, personal communication, July 2020). Innovations that work well with deck sorting are increasingly important now that all A80 vessels are deck sorting at least some of the time (Table 3-23). In 2019, nine of the 10 A80 vessels that fished in the GOA utilized deck sorting at least some of the time that they were fishing in that area.

[56] The EFP application can be seen at: https://meetings.npfmc.org/CommentReview/DownloadFile?p=924c31f1-0bdf-4625-a44d-c7f643b16024.pdf&fileName=D2%20Halibut%20Excluder%20EFP%20Application.pdf.

Table 3-23 A80 vessel participation in deck sorting EFP, 2015 through 2019

Year	A80 Vessels in EFP	Deck Sorted BSAI	Deck Sorted GOA
2015	9	9	-
2016	10	10	-
2017	15	15	-
2018	19	19	8
2019	20	20	9

The A80 sector has invested substantial time and labor in the development of deck sorting as an EFP, and in 2020 deck sorting was implemented as a regulation and is fully incorporated as an option within the observer program. Note that – as a byproduct of deck sorting implementation – observer data no longer include a separate 'purpose code' that identifies a deck-sorted haul so 2020 data cannot be characterized in this manner. In addition to direct costs, deck sorting may reduce a vessel's daily productivity if it is able to complete fewer tows and if tows are shortened to increase viability. These costs could be compensated if lower DMRs reduce the likelihood that the sector or a company within the sector loses fishing opportunities or has to diverge from its optimal operating plan due to PSC levels that approach internal limits, standards set within the sector's HAP, or the overall sector limit. These benefits would be of marginally greater value in years that can be described as a high-PSC environment, which the sector has avoided in recent years (partly as a result of deck sorting – see Figure 3-25 through Figure 3-27).

Figure 3-42 shows a strong correlation between the percentage of A80 PSC catch that receives a deck sorting DMR and the effective halibut mortality rate (the ratio of halibut PSC mortality to total halibut catch). Figure 3-43 shows that the sector has expanded deck sorting from a practice used in only the highest-PSC-rate target. The sector apparently now sees a net benefit from deck sorting even when the target tends to have a lower PSC rate, such as Atka mackerel or Pacific ocean perch. Figure 3-44 illustrates the marked change in the number of halibut assessed by viability category on A80 vessels beginning in 2015 with the ramped-up deck sorting EFP. The investments made by the A80 sector and NMFS to improve fish handling and to collect viability information has resulted in better information about the release mortality of halibut bycatch, which has translated into lower DMRs for the sector (Table 3-7).

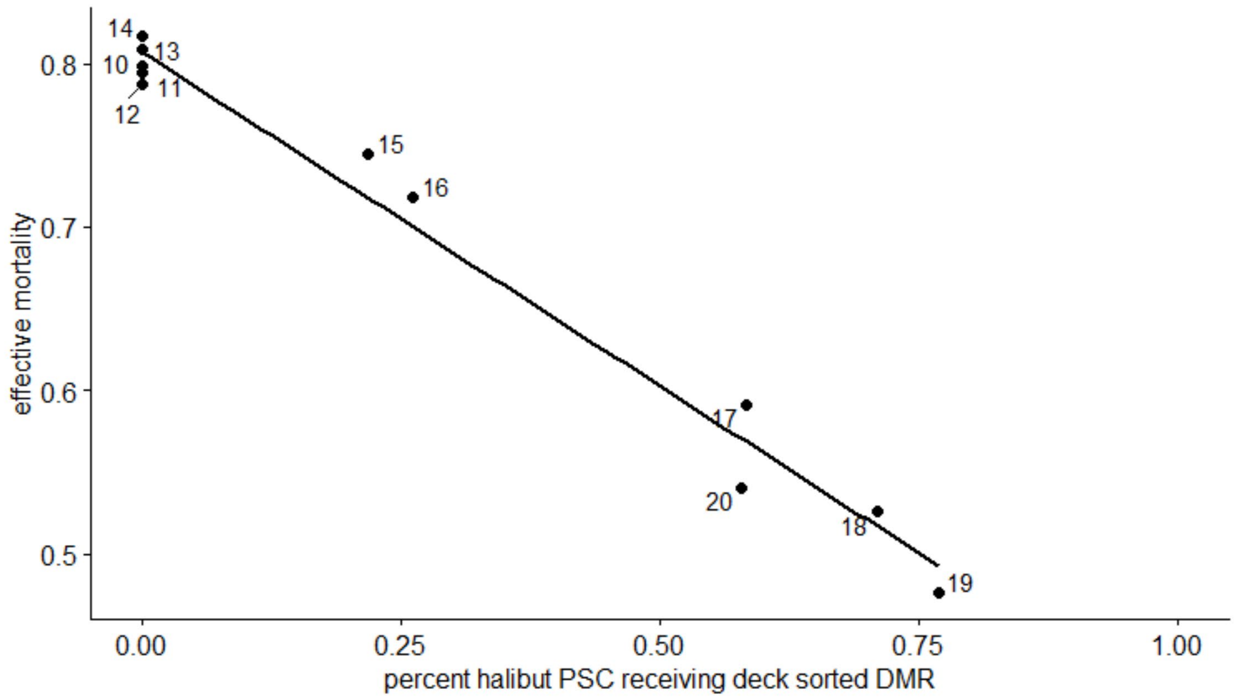

Figure 3-42 Relationship between effective mortality rate (halibut mortality/catch) and percent of A80 PSC catch receiving deck sorted DMR.

Figure 3-43 Proportion of A80 catch deck sorted, by targets species (2014 through 2019)

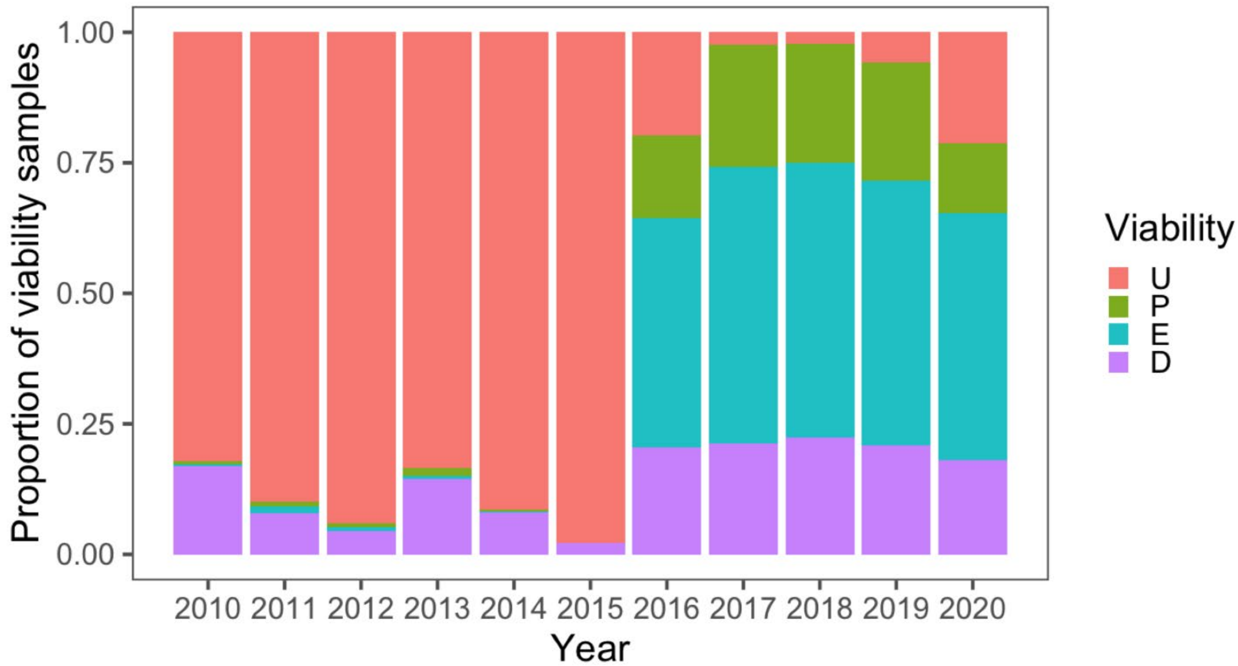

Figure 3-44 Observer estimates of Pacific halibut viabilities taken on A80 vessels, 2010 through August 2020. Viability codes (which affect DMR estimates) are: D=Dead, E=Excellent, P=Poor, U=Unknown.

3.4.6 Count of SBA small entities

The Regulatory Flexibility Act (RFA), first enacted in 1980 and amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (5 U.S.C. 601-612), is designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. Major goals of the RFA are 1) to increase agency awareness and understanding of the impact of their regulations on small business, 2) to require that agencies communicate and explain their findings to the public, and 3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting significant adverse economic impacts on small entities as a group distinct from other entities, and on the consideration of alternatives that may minimize adverse economic impacts, while still achieving the stated objective of the action. When an agency publishes a proposed rule, it must either 'certify' that the action will not have a significant adverse economic impact on a substantial number of small entities and support that certification with the 'factual basis' upon which the decision is based, or it must prepare and make available for public review an Initial Regulatory Flexibility Analysis (IRFA). Under Section 603 of the RFA, an IRFA "shall describe the impact of the proposed rule on small entities." Required elements of an IRFA are specified at 5 U.S.C., Section 603(b).

One of the required elements in an IRFA is a description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate). This section identifies the number of small entities that would be directly regulated by an ABM action. As currently specified, the alternatives under consideration would only directly regulate the A80 sector, which is described in Section 3.3. Entities that fish for halibut either commercially under the IFQ Program or for subsistence and sport uses are important in the consideration of the ABM action and, as such, are described in this DEIS and the attached SIA but they are not directly regulated. Therefore, any documentation prepared under the RFA would not include directed halibut fishery participants. As the action alternatives are presently defined, the number and categories of small entities that could be directly regulated does not differ between alternatives.

Note that the preparation of a complete IRFA is not necessary for the Council to take action on this issue. NMFS Alaska Region prepares the IRFA for a proposed action in the Classification section of the proposed rule. Section 5.3.2 of this document identifies the general nature of the potential economic impacts on directly regulated entities, whether the impacts may be adverse or beneficial, and how impacts might be distributed among directly regulated entities.

The RFA recognizes and defines three kinds of small entities: 1) small businesses, 2) small non-profit organizations, and 3) small government jurisdictions. The analysts have preliminarily concluded that the considered action would only directly regulate the first type of small entity (small businesses – i.e., fish harvesting businesses). As noted above, the only BSAI groundfish sector that is regulated by a PSC limit is A80. Some A80 vessels harvest groundfish that were allocated to CDQ groups (0). Vessels harvesting CDQ allocations are distinct from the non-profit CDQ groups, themselves. Vessels that are owned by, or fishing on behalf of, CDQ groups are evaluated according to the same affiliation and income thresholds as for all other vessels. NMFS typically considers CDQ groups to be small entities due to their non-profit status. The CDQ groups that partner with A80 vessels or partially own vessels are not considered to be directly regulated but, nevertheless, are identified elsewhere in Section 3.3.4 of this document and in the attached SIA.

The following paragraphs provide the parts of the SBA definition of small businesses that are relevant to the directly regulated entities and for which the analysts possess the data necessary to make a small/non-small determination:

Section 601(3) of the RFA defines a 'small business' as having the same meaning as 'small business concern,' which is defined under Section 3 of the Small Business Act (SBA). 'Small business' or 'small business concern' includes any firm that is independently owned and operated and not dominant in its field of operation. The SBA has further defined a "small business concern" as one:

> *"organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor… A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture."*

The thresholds applied to determine if an entity or group of entities is a small business under the RFA depend on the industry classification for the entity or entities. Businesses classified as primarily engaged in commercial fishing are considered small entities if they have combined annual gross receipts not in excess of $11.0 million for all affiliated operations worldwide (81 FR 4469; January 26, 2016). Businesses classified as primarily engaged in fish processing are considered small entities if they employ 750 or fewer persons on a full-time, part-time, temporary, or other basis, at all affiliated operations worldwide. Since at least 1993, NMFS has considered CPs – such as A80 vessels – to be predominantly engaged in fish harvesting rather than fish processing. Under this classification, the threshold of $11.0 million in annual gross receipts is appropriate. Because this action directly regulates only fish harvesting businesses, the employment threshold does not need to be considered in determining SBA classifications.

The SBA has established "principles of affiliation" to determine whether a business concern is "independently owned and operated." In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or when a third-party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question.

NMFS considers members of fishing cooperatives to be affiliated for purposes of applying thresholds for identifying small entities. In making this determination, NMFS considered SBA's "principles of affiliation" at 13 CFR 121.103. Specifically, in § 121.103(f), SBA refers to "[A]ffiliation based on identity of interest," which states

> *"[A]ffiliation may arise among two or more persons with an identity of interest. Individuals or firms that have identical or substantially identical business or economic interests (such as family members, individuals or firms with common investments, or firms that are economically dependent through contractual or other relationships) may be treated as one party with such interests aggregated."*

If business entities are affiliated, then the threshold for identifying small entities is applied to the group of affiliated entities rather than on an individual entity basis. The AKSC – the lone A80 cooperative that operated during the year for which revenue data were examined by the analysts for this section (2019) – falls under this definition.

All directly regulated harvesting entities (i.e., A80 vessels) have participated in voluntary cooperatives since 2011. As a result of cooperative affiliation and aggregate gross revenues, no directly regulated entities are considered to be small entities under SBA guidelines. Data on A80 gross revenues are provided in Section 3.3.2.

4 Pacific Halibut

4.1 Life history, and distribution

Pacific halibut (*Hippoglossus stenolepsis*) is one of the largest species of flatfish in the world, with individuals growing up to eight feet in length and over 500 lb. The range of Pacific halibut that the IPHC manages covers the continental shelf from northern California to the Aleutian Islands and throughout the Bering Sea. Pacific halibut are also found along the western north Pacific continental shelf of Russia, Japan, and Korea.

The depth range for halibut is up to 250 fathoms (457 m) for most of the year and up to 500 fathoms (914 m) during the winter spawning months. During the winter (November through March), the eggs are released, move up in the water column, and are caught by ocean currents. Female halibut release a few thousand eggs to several million eggs, depending on the size of the fish. Eggs are fertilized externally by the males. Prevailing currents carry the eggs north and west. By the age of 6 months, young halibut settle to the bottom in shallow nearshore areas such as bays and inlets. Research has shown that the halibut then begin what can be called a journey back. This movement runs counter to the currents that carried them away from the spawning grounds and has been documented at over 1,000 miles for some fish. Most male halibut are sexually mature by about 8 years of age, while half of the females are mature by about age 11.6 (Stewart 2015). At this age, they are generally large enough to meet the minimum size limit for the commercial fishery of 32 inches.

Halibut feed on plankton during their first year of life. Young halibut (1 to 3 years old) feed on euphausiids (small shrimp-like crustaceans) and small fish. As halibut grow, fish make up a larger part of their diet. Larger halibut eat other fish, such as herring, sand lance, capelin, smelt, pollock, sablefish, cod, and rockfish. They also consume octopus, crabs, and clams.

Halibut also move seasonally between shallow waters and deep waters. Mature fish move to deeper offshore areas in the fall to spawn and return to nearshore feeding areas in early summer. It is not yet clear if fish return to the same areas to spawn or feed, year after year.

4.2 Stock assessment and management

As the Pacific halibut directed and non-directed fisheries have evolved, the methods to assess the stock and manage the fishery have also evolved over many decades. The stock assessment began with simple catch-per-unit-effort models, moved to yield-per-recruit models in the 1970s, surplus production models in the early 1980s, catch-at-age models in the 1980s and 1990s, and more recently integrated age-structured models (see Clark 2003 for a brief history of IPHC's first 80 years). Currently, the stock assessment for Pacific halibut uses four integrated age-structured models in an ensemble to account for parameter and structural uncertainty (Stewart & Martell 2015). The advice from the stock assessment ensemble is presented to the Commission as a risk-based decision table with different catch levels as columns and various performance metrics as rows (Stewart et al. 2021).

As with all stock assessment models, the IPHC stock assessment ensemble is a simplification of reality that attempts to capture the trends in the stock, supply useful management advice, and characterize an appropriate level of uncertainty. The ensemble is composed of coastwide models, which means that the annual estimated biomass is a single value for the entire coast (U.S. and Canada) and migration between areas is not modeled. Natural mortality is estimated in some models and fixed for one sex in others. Each of the models use annual empirical weight-at-age observations to convert numbers-at-age to biomass. This allows the model to account for the observed large changes in historical weight-at-age. Steepness (a stock-recruit relationship parameter that relates to productivity/resilience of the stock) was fixed at 0.75 for all models. However, a dominant source of recruitment variability comes from treating the average recruitment as a function of environmental conditions where a regime (cool or warm) is determined from the Pacific Decadal Oscillation (PDO) (Clark & Hare 2002).

Ensemble modeling provides a more robust assessment approach that acknowledges structural uncertainty and that, along with other recent improvements, has effectively stabilized management decision tables relative to catch recommendations and potential impacts on spawning biomass (in probabilistic terms). Prior to 2012 assessments for Pacific halibut had consistently overestimated spawning biomass causing a retrospective pattern of overly optimistic short-term forecasts (Stewart & Martell 2014). Figure 4-1 shows the estimates of fishing intensity (a measure of the harvesting rate over all sizes and sources) on the coastwide stock compared to the current interim Spawning Potential Ratio (SPR)-based harvest policy of $F_{SPR=43\%}$ (reproduced from Stewart and Hicks 2021). The fishing intensity is estimated to have been more than 1.2 times the current interim harvest policy fishing intensity in some years with considerable uncertainty. Over this period, the current stock assessment retrospectively estimates stock status to have mostly been above 30% (i.e., higher than the threshold precautionary management action) and always above 20% (i.e., higher than the threshold for biological concern Figure 4-2). Weight-at-age was declining since the 1980s (even without fishing, a decline in spawning biomass and recommended catch levels are predicted over this period) but has since stabilized (Stewart and Webster 2021) and recent recruitment is estimated to have been mostly below average since 2006 (Stewart and Hicks 2021). Large changes in the spawning biomass of Pacific halibut, which do not seem explicitly linked to fishing, have been observed over the more than 100 years of commercial fishing.

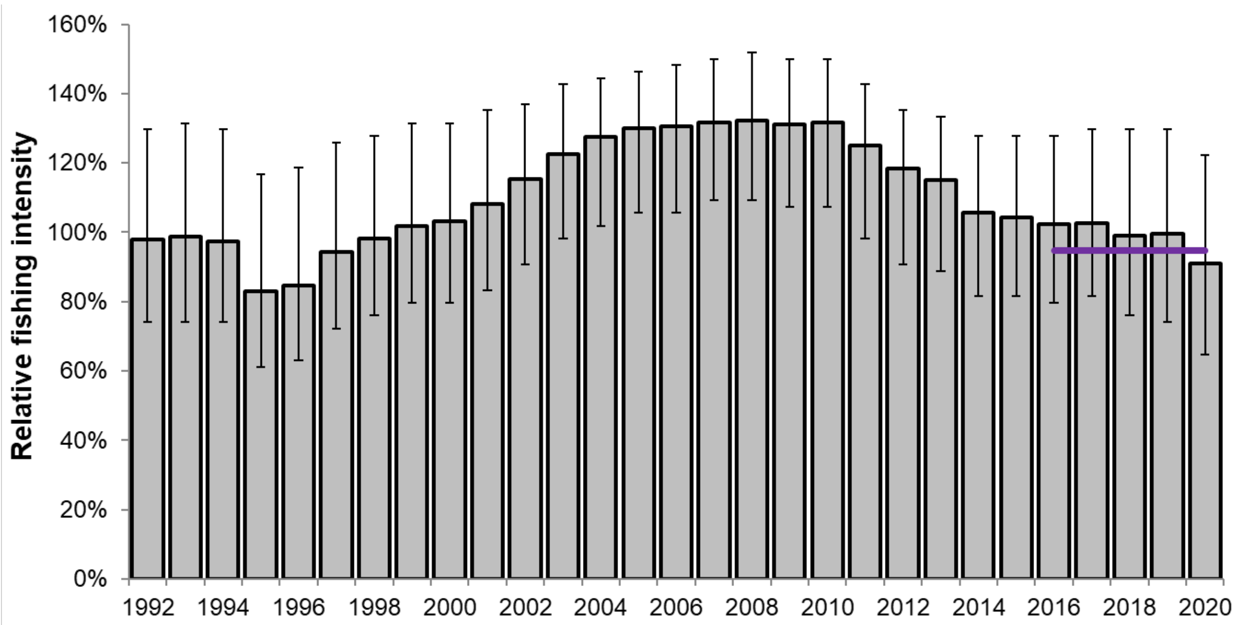

Figure 4-1. Time-series of coastwide fishing intensity (1992-2020; based on the Spawning Potential Ratio) relative to the IPHC current interim harvest policy SPR = 43%, as estimated retrospectively in the 2020 pacific halibut stock assessment. The previous IPHC interim SPR = 46% reference level is shown as the purple horizontal line. Vertical lines indicate approximate 95% credible intervals from the stock assessment ensemble. Reproduced from Stewart and Hicks (2021).

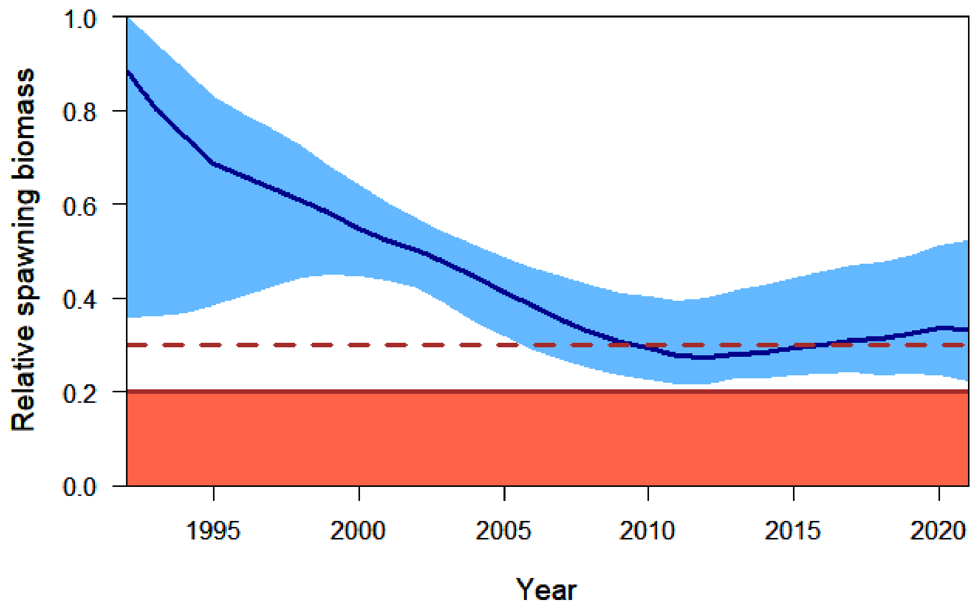

Figure 4-2 Estimated time-series of relative spawning biomass (compared to the unfished condition in each year) based on the median (dark blue line) and approximate 95% credibility interval (blue shaded area). IPHC management procedure reference points ($SB_{30\%}$ and $SB_{20\%}$) are shown as dashed and solid lines respectively, with the region of biological concern (<$SB_{20\%}$) shaded in red. Reproduced from Stewart and Hicks (2021).

Based on the most recent stock assessment for Pacific halibut (Stewart & Hicks 2021) the estimated spawning stock biomass has been stable since 2010 following a considerable decline since the late 1990s (Figure 4-3) which was partly a result of declining average weight-at-age. In recent years, the spawning biomass has been predicted to slightly decrease, even at low fishing levels, due to recent below average recruitment.

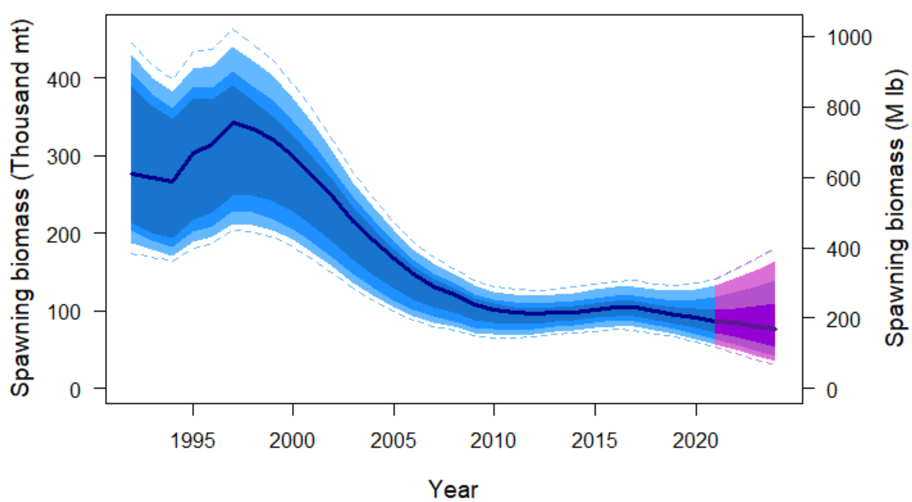

Figure 4-3. Estimated coastwide spawning biomass from the 2020 stock assessment ensemble (from Stewart & Hicks 2021) with a three-year projection (purple) based on a fishing intensity of $F_{SPR=43\%}$ (TCEY=39.0 million pounds, ~17,690 mt).

4.3 Closed loop simulation modeling

A closed loop simulation model was employed in previous iterations of this analysis (See Table 1-2). This had been reviewed multiple times by the SSC with resulting modifications made subsequent to each review. In April 2021, the SSC reviewed the full model and results and determined that while useful for context in understanding the sensitivities of various parameters to output results as well as to indicate unknowns in halibut population modeling, that it should not be employed to estimate the impacts of the alternatives. Therefore, it is included here for context and for indications of areas recommended for further research.

4.3.1 Closed loop model description

A description of the closed loop model employed in previous iterations of this analysis and incorporated here for context is summarized briefly, followed by a review of issues and conclusions from this model. The steps of a closed loop simulation are as follows: (i) simulating the true biology of the natural system (referred to as the operating model, OM), (ii) sampling from the true population, (iii) calculating the measures of stock status (assessment), (iv) calculating recommended fishing restrictions using management alternatives, and (v) applying updated restrictions to the fishery, which allows the dynamics of the true population to be updated. Here, we provide a short overview of the closed loop simulation model. Additional details of the model are then described in the subsections that follow.

The OM consisted of a two-area, age- and sex-structured model of Pacific halibut population dynamics with the BSAI modeled as one area and the remaining components of the range of the halibut stock comprising the "other" area (this includes the GOA, British Columbia, and US West Coast). Recruitment is assumed to occur at the coastwide level and the proportion of new recruits that settle in the BSAI is time-varying and temporally autocorrelated. The OM allows adult movement between the two areas, based on a model validation exercise (described below) and values estimated in Webster et al. (2013). Weight-at-age was set equal to values used in the most recent (2020) IPHC assessment models. The model included five fishing fleets: the directed halibut fishery in the BSAI, the directed halibut fishery outside of the BSAI, the BSAI trawl PSC fishery, the BSAI hook-and-line (HAL) PSC fishery, and the bycatch fishery in the other area. Though BSAI trawl PSC is modeled as a single fleet when applying population dynamics, PSC limits and mortality are separated for the A80 and non-A80 components of trawl PSC when applying the Alternatives and for reporting purposes. Many values for halibut population dynamics were fixed based on results from the most recent IPHC coastwide long assessment model.

The EBS trawl survey and the IPHC's Setline Survey were modeled as a function of halibut total biomass, survey selectivity, and observation error. These two survey indices served as the basis for calculating PSC limits according to each PSC management alternative.

The IPHC's process for setting coastwide catch limits for the directed fishery (called Total Constant Exploitation Yield, or TCEY) was simulated by using the true spawning biomass from the population dynamics model and applying assessment error. In a sensitivity analysis, a lag on assessment error was incorporated to recognize that the current year's assessment results may be correlated with those of the previous year. More recently the IPHC has used an SPR-based harvest strategy which may contribute to the uncertainty of using spawning biomass as a proxy for the TCEY.

The coastwide catch limits were then calculated in two ways such that there are two base case runs of the model comprising bookends of the IPHC's decision-making process:

(1) a linear relationship between historical IPHC estimates of spawning biomass and total mortality of halibut in the following historical year. This approach assumes that the process of decision-making at the IPHC in the future will resemble that of the past. In contrast to the model configuration presented in 2019, the most recent model iteration used the current year's linear relationship between historical IPHC spawning biomass and the total mortality in the following historical year used fewer years of earlier observations (2011 onward instead of 2007 onward).

This led to a shallower slope, or less drastic changes in predicted total mortality in the following year, as was recommended by the SSC. Removing all but the most recent period, as also suggested, led to a completely unresponsive relationship between spawning biomass and total mortality in the following year, which is likely not true. Additionally, there has been little change in the coastwide spawning biomass in recent years, thus there is not a lot of contrast to measure how well spawning biomass may correlate with the TCEY.

(2) The linear relationship described in (1) was used when coastwide relative spawning biomass was greater than 30% of unfished biomass, and a 30:20 harvest control rule was implemented without variability when coastwide relative spawning biomass (with assessment error) was below 30% of unfished biomass.

The model allocated a proportion of the coastwide catch limit (TCEY) to the BSAI in each year, according to the proportion of all-sizes setline survey biomass in the BSAI in the previous year. However, distribution of the TCEY determined in the current interim IPHC harvest strategy further reduces the TCEY in IPHC Regulatory Areas 3B, 4A, 4B, and 4CDE to account for a strategy to harvest at a rate in the western areas that is three-quarters the rate in eastern areas. The previous year's O26 PSC mortality was used as a proxy for expected O26 PSC in coming year in the BSAI and in the other area and was subtracted from the area-specific TCEY to determine directed fishery catch limits in the following year in both areas. As is the case in the current management system, the PSC in the BSAI may exceed the TCEY allocated to the BSAI in any given year. Bycatch limits in the other area are fixed to their 2019 value throughout the simulation.

The relationship between PSC use and limit was modeled stochastically according to the historical distribution of this relationship for each sector. A sensitivity analysis was conducted that assumed that as the PSC limit decreased, the proportion of the limit comprising the use would become higher.

The simulations were conducted for 100 future years and 500 simulations, each with a unique set of random deviations defining the process and observation errors modeled.

The model was first run for 26 historical years to verify that population dynamics, survey indices, distribution of survey biomass by area, and catches by fleet were able to mimic our historical data and assessment-based perceptions of stock dynamics. This process is detailed in Appendix 3 of the April 2020 analysis[57], entitled "Model Validation," and prompted the inclusion of several key features of the OM before conducting forward simulations. In summary, time-varying recruitment allocation among areas, an influence of the PDO on unfished recruitment, the ability of the model to simulate fluctuating weight-at-age over time, and the chosen mean recruitment allocation and adult movement parameters were included or adjusted to best match both the coastwide stock dynamics estimated by the most recent Pacific halibut stock assessment and to match BSAI dynamics from a BSAI-only assessment submodel, as well as the proportion of setline survey biomass that has been observed in the BSAI over the past 25 years.

The simulation model used two areas to model the population and fishery dynamics. The BSAI area incorporates three IPHC Regulatory Areas for which the IPHC sets TCEYs (4A, 4B, and 4CDE), and each of those areas has unique trade-offs between directed halibut mortality limits and PSC usage. Therefore, drawing model inferences on the area-specific directed fishery effects are limited. Also, summing over the three IPHC Regulatory Areas may dampen the effects on directed fisheries in certain areas, such as 4CDE.

There are not meaningful differences in spawning stock biomass (SSB) trajectories for the range of alternative PSC mortality examined and expected population dynamics were minor; the alternatives impacted allocation across sectors, but the analysis showed that SSB and stock status differed across alternatives only in a few extreme circumstances.

[57] April 2020 initial review Halibut ABM PSC Limits DEIS

4.3.2 Summary of findings and issues from the closed loop simulation model

The model results showed that the differences in Pacific halibut spawning biomass trajectories between alternative PSC mortalities and expected population dynamics were minor. The alternatives impacted allocation across sectors, but the analysis showed that stock status was similar across alternatives. Changes from the status quo alternative were larger for PSC limits than for directed halibut fishery limits. However, the amount of uncertainty about impacts to the directed halibut fishery was large. Several reasons for this uncertainty on relative impacts to the directed Pacific halibut fishery includes:

- The IPHC decision-making process is uncertain occurs annually and may deviate from a defined procedure (deciding coastwide catches and how much is allocated to BSAI- socioeconomic factors are considered on a year-to-year basis)
- The two management agencies (IPHC and NMFS) have different spatial area boundaries and the model used simplifications of these boundaries.
- The variability in weight-at-age for Pacific halibut varies substantially and adds to future uncertainty. The processes leading to the large variability observed in the historical weight-at-age of Pacific halibut is poorly understood.
- The relationship between PSC limits and realized PSC (usage) under future conditions is highly uncertain, especially when PSC limits are projected outside of the historical range.
- The dynamics of halibut movement into and out of the BSAI are variable and uncertain; results from analyses using the IPHC tagging data are inconsistent with BSAI survey abundance data.

Additional sources of uncertainty include variability in the PSC selectivity from trawl gear in the BSAI which creates differences in age-specific mortality and causes variability in downstream impacts to the directed fishery. Results from the model also indicate little effect of the IPHC's 30:20 harvest control rule except under extreme situations of recruitment failure. Recruitment variability is high and linked to the Pacific decadal oscillation (PDO) based on the IPHC's analysis. The closed loop simulation model included this impact but for simplicity, included a fixed set of future changes in the PDO. In fact, the timing of PDO changes are uncertain and including this variability would add future uncertainty in the results (but the contrast among alternatives would be similar).

4.4 Management of Pacific Halibut

4.4.1 IPHC and process for setting catch limits

In 2017, the previous IPHC harvest policy paradigm was replaced with an interim SPR-based harvest strategy policy (Figure 4-4) while a management strategy evaluation (MSE) process is underway. This new paradigm sets a coastwide mortality limit (scale) and then distributes the mortality limits (distribution) across IPHC Regulatory Areas (Figure 1-4, Hicks & Stewart 2017). Previously, the IPHC Regulatory Area mortality limits were determined by multiplying the apportioned biomass (based on estimated biomass from survey catches and assumed selectivity) in each IPHC Regulatory Area by a harvest rate specific to each IPHC Regulatory Area. This new SPR-based harvest strategy policy now considers mortality from all sources and sizes when setting a coastwide mortality limit but still uses estimates of stock distribution from the IPHC fishery independent setline survey (FISS) along with relative harvest rates to distribute the mortality limits across IPHC Regulatory Areas. Currently, there are interim agreements through 2022 for IPHC Regulatory Areas 2A and 2B that define how the mortality limits are specifically determined in each of those areas (paragraph 97 in the Report of the 96th Session of the IPHC Annual Meeting IPHC 2020a).

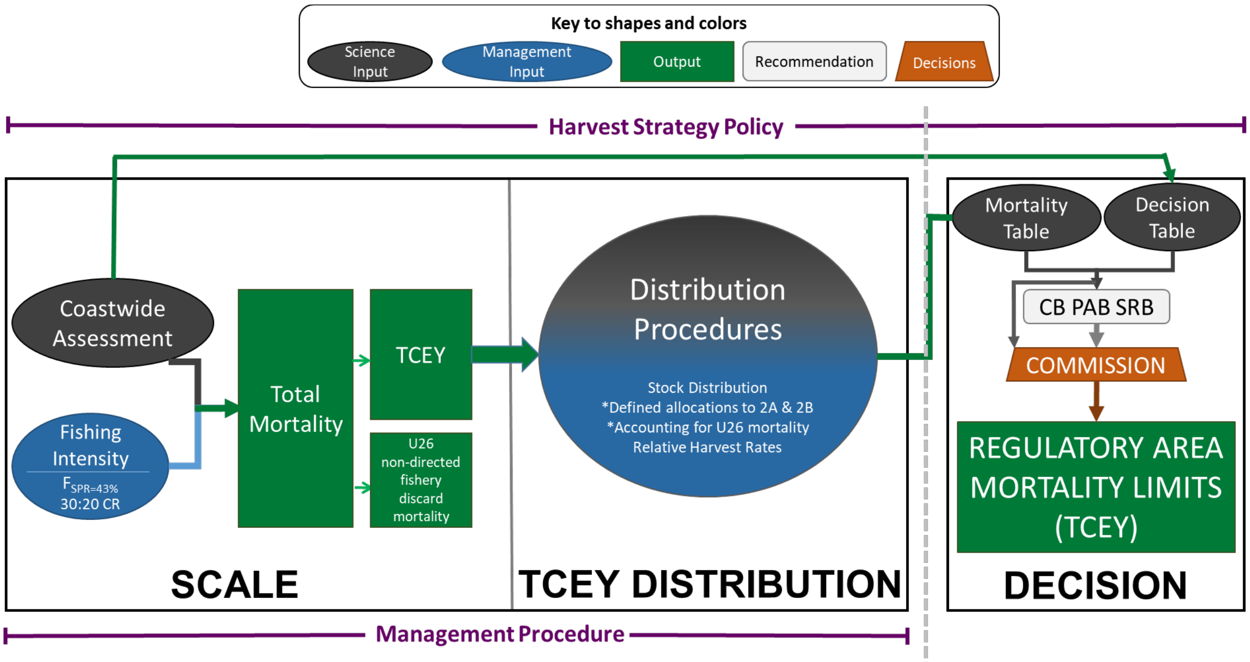

Figure 4-4. Illustration of the Commission interim IPHC harvest strategy policy (reflecting paragraph ID002 in IPHC CIRCULAR 2020-007) showing the coastwide scale and TCEY distribution components that comprise the management procedure. Items with an asterisk are three-year interim agreements though 2022. The decision component is the Commission decision-making procedure, which considers inputs from many sources.

An SPR-based harvest policy defines a default or reference level of fishing intensity ($F_{xx\%}$, the level of fishing that would reduce the lifetime spawning output per recruit to xx% of the unfished level given current biology, fishery characteristics and demographics where lower values indicate higher fishing intensity) to determine mortality limits. This fishing intensity adopted in 2016 for the IPHC interim harvest policy was $F_{SPR=46\%}$. In response to MSE simulations investigating the coastwide scale portion of the harvest strategy policy the reference fishing intensity was adjusted to $F_{SPR=43\%}$ after the 2020 Annual Meeting (AM096). The MSE simulations found that an $F_{SPR=43\%}$ in conjunction with a control rule where the fishing intensity is reduced when the stock status is estimated to be below 30% and set to zero when stock status is estimated to be below 20% would successfully meet the coastwide conservation and fishery objective (paragraph ID002 in IPHC CIRCULAR 2020-007). A reduction in fishing intensity invoked by this control rule is expected to mainly affect the directed fisheries, although other agencies may consider action when the stock status of Pacific halibut is estimated to be at low levels.

The Total Mortality determined from F_{SPR} is split into two components: U26 non-directed commercial fishing (i.e., U26 bycatch) mortality and all other mortality which is called the TCEY and consists of mostly O26 halibut. The IPHC delineates U26 and O26 differently because directed commercial fisheries encounter mainly O26 halibut, U26 Pacific halibut are highly mobile and much less likely to occur in the same IPHC Regulatory Area in the upcoming year in which mortality limits would apply, the setline survey captures almost exclusively O26 Pacific halibut, there is currently no reliable tool for describing the annual distribution of U26 across the entire IPHC convention area, and the mortality of U26 Pacific halibut has a differing effect on the Spawning Potential Ratio than O26 fish (they are not entirely exchangeable although the SPR-based harvest policy accounts for the mortality of all sizes) (IPHC 2020b).

The TCEY is distributed among IPHC Regulatory Areas based on estimates of biomass from the setline survey and defined relative harvest rates, where western areas (Area 3B and all of Area 4) are harvested at a lower level (a factor of 0.75). The lower harvest rate in western areas is due to concerns about historical uncertainty, past observed declines in those regions, and likely different life-history characteristics and population dynamics. The westward areas also differ from the central and eastern regions in the levels of bycatch of juveniles (which can affect the overall productivity of the stock) and evidence that there is net emigration of exploitable halibut from these areas (Hare & Clark 2008, Hare 2011). All of these factors suggest that target harvest rates should be lower in the western IPHC Regulatory Areas.

Annually, a stock assessment is done using all of the available data for that year and a decision table (e.g., risk analysis) is presented at the IPHC Annual Meeting in January. Various advisory bodies as well as the public provide recommendations to the Commissioners. Unlike the MSA, the Halibut Act does not include specific provisions that require Commissioners to allocate quotas within, for example, an overfishing threshold; their broad mandate is the conservation of the halibut stock. Decisions for Area-specific TCEY's are made considering all the input received; they may differ from the harvest policy output.

The IPHC formula for determining TCEY and allocating catch limits among regulatory areas has shifted over the past two years and is expected to shift again, as Commissioners evaluate the results of the IPHC's management strategy evaluation (described below). The management strategy evaluation evaluated 11 potential management strategies for allocating catch limits among areas and were presented to the Commission at the January 2021 Annual Meeting (Hicks et al. 2021). These results will inform the Commission as they make decisions in the coming years to update the harvest policy in terms of both the scale of the coastwide TCEY and the methods for distributing TCEY among areas.

The specific formula used by the IPHC Commissioners to distribute catch limits among Regulatory Areas has been different for each of the past three years. In 2019, the US and Canadian Commissioners departed from the interim harvest policy at that time, written as follows in the Annual Meeting report from 2019, with further adjustments then made to the distribution of TCEY among Alaskan Regulatory Areas (IPHC AM095 Report 2019):

> *"69. The Commission ADOPTED: a) a coastwide target SPR of 47% for 2019; b) a share-based allocation for IPHC Regulatory Area 2B. The share will be defined based on a weighted average that assigns 30% weight to the current interim management procedure's target TCEY distribution and 70% on 2B's recent historical average share of 20%. This formula for defining IPHC Regulatory Areas 2B's annual allocation is intended to apply for a period of 2019 to 2022. For 2019, this equates to a share of 17.7%; and c) a fixed TCEY for IPHC Regulatory Area 2A of 1.65 mlbs is intended to apply for a period from 2019-2022, subject to any substantive conservation concerns."*

In 2020, the formula used by Commissioners to set TCEY by Regulatory Area was again slightly different than the interim harvest policy at that time, as follows, with further adjustments then made to the distribution of TCEY among Alaskan Regulatory Areas (IPHC AM096 Report 2020):

> *"97. The Commission ADOPTED: a) a coastwide mortality limit (TCEY) of 36.6 million pounds; and b) a fixed TCEY for IPHC Regulatory Area 2A of 1.65 million pounds is intended to apply for a period from 2019-2022, subject to any substantive conservation concerns; and IPHC–2020–AM096–R c) a share-based allocation for IPHC Regulatory Area 2B. The share will be defined based on a weighted average that assigns 30% weight to the current interim management procedure's target TCEY distribution and 70% on 2B's recent historical average share of 20%. This formula for defining IPHC Regulatory Areas 2B's annual allocation is intended to apply for a period of 2019 to 2022. For 2020, this equates to a share of 18.2% before accounting for U26; and d) an accounting for some impacts of U26 non-directed discard mortality from US IPHC Regulatory Areas on available harvest in IPHC Regulatory Area 2B. The accounting increases the 2B TCEY by 50% of the estimated yield lost due to U26 non-directed discard mortality in Alaskan waters and is intended to apply for the period 2020-2022. For 2020 this calculation equates to 0.21 million pounds and reduces all Alaskan IPHC Regulatory Area TCEYs to*

maintain a coastwide TCEY of 36.6 million pounds; and e) the use of a rolling three-year average for projecting non-directed fishery discard mortality by IPHC Regulatory Area; this is also intended to apply for a period of 2020 to 2022."

In 2021, the Commission set the coastwide mortality limit (TCEY) at 39.0 Mlbs, which followed the current interim harvest policy coastwide fishing intensity level ($F_{SPR=43\%}$). The distribution of that TCEY among IPHC Regulatory Areas includes the current estimate of stock distribution, relative harvest rates by IPHC Regulatory Area, specific adjustments to the TCEY in IPHC Regulatory Areas 2A and 2B, as well as an increase in the TCEY in IPHC Regulatory Area 2B accounting for the U26 non-directed discard mortality in Alaska (IPHC-2021-AM097-INF02).

Due to a combination of changing harvest policies and Commission decisions that depart from harvest policy recommendations, as described above, the IPHC has adopted coastwide catch limits of varying fishing intensities in recent years. The Commission has adopted TCEYs above those recommended by the harvest policy in three of the last five years (Table 4-1). Estimates of fishing intensity are highly uncertain and change in subsequent years based on actual mortality and updated stock assessments.

Table 4-1 Comparison of reference TCEY and SPR based on the Interim harvest policy and those adopted by the IPHC commissioners

	Interim Harvest Policy (reference)		Adopted	
Year	TCEY	SPR	TCEY	SPR*
2021	39.00	43	39.00	43
2020	31.90	46	36.60	42
2019	40.00	46	38.61	47
2018	31.00	46	37.21	41
2017	39.10	46	40.74	45

*As estimated at the time of adoption (in the decision table presented at the IPHC annual meeting)

Currently, a management strategy evaluation (MSE) framework is being done at IPHC to determine a level of fishing intensity and distribution procedure that meets the short- and long-term objectives of the directed fishery and managers. These include biological sustainability, optimizing yield, and stability in yield, with biological sustainability objectives as the top priority for evaluation. Recent MSE analyses have informed the change to a fishing intensity using SPR=43% and are being used to evaluate trade-offs in distributing the mortality limits between IPHC Regulatory Areas.

Bycatch mortality in IPHC MSE closed loop simulations is simulated from an assumed relationship with simulated total biomass tuned to recent coastwide bycatch levels (one unit increase in total biomass results in 0.4% increase in bycatch mortality). This integrates the MSE results over a wide range of possible bycatch scenarios to determine a management procedure that is robust to various levels of bycatch. In the future, allocation between directed and non-directed fisheries may be specifically investigated with involvement from other agencies and fishing sectors.

Another factor of interest in the management of Pacific halibut is the size limit for the directed commercial fishery (currently 32 inches; see Stewart et al 2020 for a recent investigation). A change in the size limit could increase efficiency of the commercial fleet but would result in a change in selectivity. A change in selectivity could result in a change to the target SPR that meets the defined goals and objectives, although in the likely range of potential selectivity, this change in SPR would be slight.

Changes to the IPHC harvest strategy policy to meet objectives as defined in the IPHC MSE process will benefit the management of the coastwide stock of Pacific halibut, distribute the TCEY using an agreed upon procedure, and provide opportunity to measure impacts from different fisheries. However, it does not solve the difficult issues of allocation between fisheries within IPHC Regulatory Areas. One can understand the components of the harvest policy and measure impacts of each fleet, but ultimately choosing a management strategy involves to understanding and balancing the trade-offs between the goals and objectives of each fishery, which may be achieved in an MSE context if that is the goal of the evaluation. The IPHC MSE uses the currently defined catch-sharing plans to distribute the mortality limits among fisheries within IPHC Regulatory Areas, which does not include ABM alternatives in the Bering Sea and Aleutian Islands. Given the generalized IPHC MSE framework, it is possible to use this framework to simulate and evaluate alternative procedures for allocating mortality between fisheries within IPHC Regulatory Areas.

The Fishery Constant Exploitation Yield or FCEY is the Regulatory Area specific amount of yield for most directed Pacific halibut fisheries dependent upon allocation agreements for each IPHC Regulatory Area. The FCEY forms the basis of the directed fishery catch limits, although may not include all components of the directed fishery mortality for some Regulatory Areas. The FCEY includes commercial fishery landing limits in all areas, and other sectors in any area subject to Catch Sharing Plans for allocation of the halibut harvest. The Catch Sharing Plans are developed by the responsible fishery management organizations in each IPHC Regulatory Area. Non-FCEY removals include catches which either have no explicit limits on the amount of harvest (unguided sport harvest in Alaska, subsistence/personal use harvest in Canada and Alaska, and wastage from the commercial halibut fishery, except where this is explicitly included in catch-sharing plans) or catches which the IPHC has no authority to manage (bycatch mortality, such as halibut PSC in Alaska). The FCEY is determined by subtracting all other removals of O26 halibut from the TCEY.

The IPHC detailed sector mortality information (Table 4-2) shows the relationship between the different types of mortality and the TCEY and FCEY. The two rows in this table that include mortality from non-directed discards is where mortality from A80 PSC use is incorporated:[58] the second row from the bottom titled "U26 Non-directed discards" and the second row from the top titled "O26 non-directed discards."

U26 non-directed discards (including U26 A80 PSC) are accounted for in the stock assessment with respect to total mortality on the halibut stock but are not part of the TCEY although it is accounted for in the calculation of the coastwide TCEY by subtracting it from the coastwide total mortality limit. O26 non-directed discards are subtracted from the TCEY within each IPHC area when calculating the FCEY. According to the IPHC's Interim Management Procedure (specified during AM096 para. 97), the default projection for non-directed discards is to use the three-year average of recent non-directed discard mortality to avoid some of the interannual variability of annual discard estimates.

[58] More information on trends of A80 PSC use by IPHC regulatory and potential impacts on directed catch limits is in Section 5.4.1

Table 4-2 IPHC Detailed sector mortality information as presented at 2021 Annual Meeting (IPHC-2021-AM097-INF02)

Detailed sector mortality information

	2A	2B	2C	3A	3B	4A	4B	4CDE	Total
Commercial discards	0.03	0.17	NA	NA	0.11	0.15	0.05	0.08	0.59
O26 Non-directed discards	0.10	0.23	0.09	1.14	0.42	0.24	0.12	2.20	4.54
Recreational	NA	0.04	1.16	1.70	0.01	0.02	0.00	0.00	2.93
Subsistence	NA	0.41	0.37	0.19	0.02	0.01	0.00	0.03	1.02
Total non-FCEY	0.14	0.84	1.61	3.03	0.56	0.42	0.17	2.31	9.09
Commercial discards	NA	NA	0.06	0.24	NA	NA	NA	NA	0.30
Recreational	0.61	0.92	0.65	1.94	NA	NA	NA	NA	4.12
Subsistence	0.03	NA	NA	NA	NA	NA	NA	NA	0.03
Commercial landings	0.87	5.23	2.84	8.91	2.56	2.09	1.29	1.67	25.46
Total FCEY	1.51	6.15	3.55	11.09	2.56	2.09	1.29	1.67	29.91
							4C FCEY	*0.74*	
							4D FCEY	*0.74*	
							4E FCEY	*0.19*	
TCEY	1.65	7.00	5.16	14.12	3.12	2.51	1.47	3.98	39.00
U26 Non-directed discards	0.00	0.03	0.00	0.29	0.06	0.08	0.01	0.78	1.25
Total	1.65	7.03	5.16	14.41	3.18	2.59	1.48	4.75	40.25

Similar to the coastwide catch limit, the TCEY and FCEY limits in each IPHC Regulatory Area adopted by the Commissioners often differ from those recommended by the IPHC harvest policy (Table 4-3). Additionally, in 2018 the Commission did not reach agreement on new Pacific halibut catch limits for the 2018 fishing period. Thus, by default, the catch limits set for the 2017 fishing period remained in place, unless more restrictive regulations are put in place by the Contracting Parties, in accordance with The Convention between Canada and the United States of America for the preservation of the [Pacific]halibut fishery of the Northern Pacific ocean and Bering sea(Article I, paragraph 2). Both Canada via Fisheries and Oceans Canada (DFO), and the United States of America, via NOAA-Fisheries, adopted and implemented 2018 catch limits for the commercial Pacific halibut fisheries (https://iphc.int/uploads/pdf/nr/2018/iphc-2018-nr005.pdf), which differed from the harvest policy but were very close to the suggested catch limits from the Commission (para. 131 in the Report of the 94th Session of the IPHC Annual Meeting).

Table 4-3 TCEY and FCEY by IPHC Regulatory Area as recommended by IPHC harvest policy and adopted by commissioners

		TCEY				FCEY			
Year	Area	Harvest Policy	Adopted	Difference (adopted-policy)	% Difference	Harvest Policy	Adopted	Difference (adopted-policy)	% Difference
2021	2A	1.65	1.65	0.00	0%	1.51	1.51	0.00	0%
	2B	7.00	7.00	0.00	0%	6.15	6.15	0.00	0%
	2C	5.16	5.80	0.64	12%	3.55	4.41	0.86	24%
	3A	14.12	14.00	-0.12	-1%	11.09	11.14	0.05	0%
	3B	3.12	3.12	0.00	0%	2.56	2.56	0.00	0%
	4A	2.51	2.05	-0.46	-18%	2.09	1.66	-0.43	-21%
	4B	1.47	1.40	-0.07	-5%	1.29	1.23	-0.06	-5%
	4CDE	3.98	3.98	0.00	0%	1.67	1.67	0.00	0%
	Total	39.00	39.00	0.00	0%	29.91	30.34	0.43	1%
2020	2A	1.65	1.65	0.00	0%	1.50	1.50	0.00	0%
	2B	5.80	6.83	1.03	18%	5.44	6.00	0.56	10%
	2C1	4.97	5.85	0.88	18%	3.28	4.26	0.98	30%
	3A	9.80	12.20	2.40	24%	6.41	9.06	2.65	41%
	3B	2.94	3.12	0.18	6%	2.30	2.41	0.11	5%
	4A	2.26	1.75	-0.51	-23%	1.87	1.41	-0.46	-25%
	4B	1.27	1.31	0.04	3%	1.06	1.10	0.04	4%
	4CDE	3.22	3.90	0.68	21%	0.69	1.73	1.04	151%
	Total	31.90	36.60	4.70	15%	22.54	27.48	4.94	22%
2019	2A	0.78	1.65	0.87	112%	0.64	1.50	0.86	134%
	2B	4.91	6.83	1.92	39%	4.09	5.95	1.86	45%
	2C1	6.26	6.34	0.08	1%	4.42	4.49	0.07	2%
	3A	16.35	13.50	-2.85	-17%	13.12	10.26	-2.86	-22%
	3B	2.97	2.90	-0.07	-2%	2.41	2.33	-0.08	-3%
	4A	2.21	1.94	-0.27	-12%	1.92	1.65	-0.27	-14%
	4B	1.95	1.45	-0.50	-26%	1.70	1.21	-0.49	-29%
	4CDE	4.59	4.00	-0.59	-13%	2.62	2.04	-0.58	-22%
	Total	40.00	38.61	-1.39	-3%	30.90	29.43	-1.47	-5%
2018	2A	0.59	1.32	0.73	124%	0.47	1.19	0.72	153%
	2B	3.84	7.10	3.26	85%	3.14	6.32	3.18	101%
	2C1	5.65	6.34	0.69	12%	3.76	4.45	0.69	18%
	3A	12.07	12.54	0.47	4%	8.98	9.45	0.47	5%
	3B	2.56	3.27	0.71	28%	1.95	2.62	0.67	34%
	4A	1.69	1.74	0.05	3%	1.32	1.37	0.05	4%
	4B	1.21	1.28	0.07	6%	0.99	1.05	0.06	6%
	4CDE	3.39	3.62	0.23	7%	1.36	1.58	0.22	16%
	Total	31.00	37.21	6.21	20%	21.96	28.04	6.08	28%
2017	2A	0.96	1.47	0.51	53%	0.84	1.33	0.49	58%
	2B	6.08	8.32	2.24	37%	5.28	7.45	2.17	41%
	2C1	6.47	7.04	0.57	9%	4.69	5.25	0.56	12%
	3A	13.84	12.96	-0.88	-6%	10.88	10.00	-0.88	-8%
	3B	4.39	3.98	-0.41	-9%	3.53	3.14	-0.39	-11%
	4A	1.84	1.80	-0.04	-2%	1.43	1.39	-0.04	-3%
	4B	1.46	1.34	-0.12	-8%	1.25	1.14	-0.11	-9%
	4CDE	4.06	3.84	-0.22	-5%	1.92	1.70	-0.22	-11%
	Total	39.10	40.74	1.64	4%	29.81	31.40	1.59	5%

Source: https://www.iphc.int/data/time-series-datasets

Figure 4-5 illustrates the distribution of TCEY to the Area 4 subareas and the Area 4 Catch Sharing Plan (CSP) that is described in the following subsection. Areas 4C, 4D, and 4E are considered as a unit by IPHC when harvest policy analyses are conducted. Note that the figure is incorporating a provision that is in place when the catch limit for that combined area is above a certain threshold. If that threshold is not met, the FCEY for those combined areas is distributed by the percentages shown with no adjustment applied.

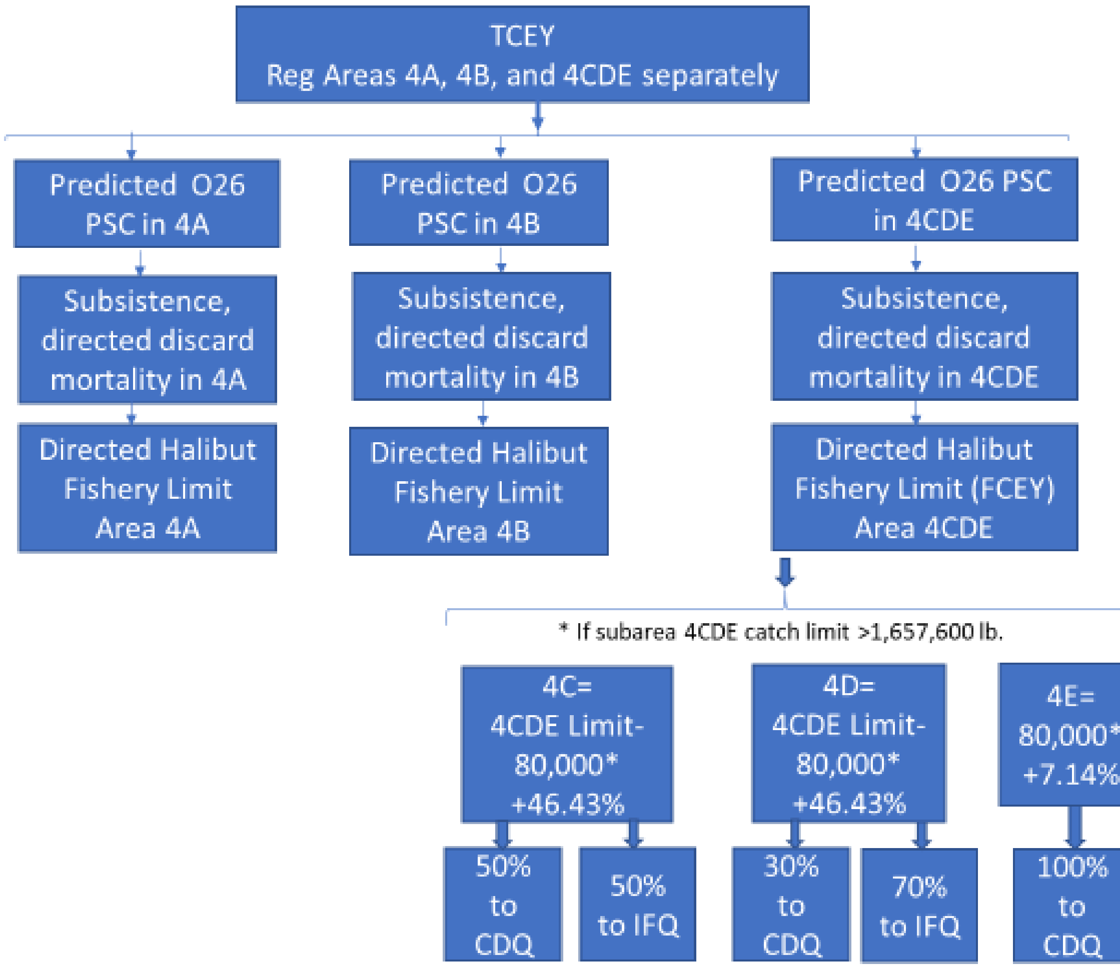

Figure 4-5. Distribution of TCEY to directed fishery users in IPHC Area 4 when the 4CDE catch limit is greater than 1,657,600 lbs.

Figure Notes: CSP: Area 4 Catch Sharing Plan; TCEY: Total Constant Exploitation Yield = Total mortality minus U26 bycatch mortality; FCEY in Area 4CDE = commercial catch limit (TCEY minus subsistence and O26 non-directed commercial discard mortality ("bycatch) and directed commercial discard mortality)

4.4.2 NPFMC Area 4 Catch Sharing Plan

The BSAI management area equates approximately to the IPHC's Area 4 regulatory areas, excepting a portion of Area 4A that overlaps the GOA management area. Area 4CDE and the Closed Area are considered to be a single unit in all IPHC apportionment and harvest policy analyses. Within each of the Area 4 regulatory areas (4A, 4B, and 4CDE), allocation of the IPHC catch limit to different sectors is under the jurisdiction of the Council and NMFS, not the IPHC.

The 4C, 4D, and 4E subareas were created to serve the needs of the Council's Area 4CDE catch sharing plan (CSP). Each year, the IPHC adopts the Council's CSP to determine the specific catch limits for these subareas. The percentage shares for these areas, as determined by the Council, are: Areas 4C and 4D each receive 46.43% of the IPHC's adopted catch limit for Area 4CDE and Area 4E receives the remaining 7.14%. If the total catch limit for Area 4CDE exceeds 1,657,600 lbs., Area 4E receives 80,000 pounds off the top of the total 4CDE catch limit *before* the percentages are applied.

Within Area 4CDE, the annual catch limit is further allocated among CDQ and IFQ fishing within subareas. The amounts allocated to CDQ by area are: Area 4C 50%, Area 4D 30% and Area 4E 100%. The CDQ component of the commercial halibut fishery is described in Section 4.5.1.1. There are also provisions within the CSP allowing Area 4C CDQ and IFQ to be harvested in Area 4D, and for allowing Area 4D CDQ fish to be harvested in Area 4E. The CDQ allocations are apportioned among the six CDQ groups that represent CDQ communities.

4.4.3 IPHC Closed Area

The IPHC has identified part of the Bering Sea shelf as a Closed Area, in which commercial fishing for halibut is prohibited. The IPHC considers the halibut resource in this area to be part of the Area 4CDE halibut stock unit.

The Closed Area was created by the IPHC in 1967 to protect a nursery area for juvenile halibut, in response to severe declines in halibut abundance. The current Closed Area is slightly smaller than the original definition due to reductions that occurred when Areas 4C and 4E were created. The Closed Area had historically accounted for a relatively small percentage (<10%) of the commercial halibut landings in the Bering Sea but was a source of significant halibut mortality from foreign vessel bottom trawling. The IPHC recommended the closure to both commercial halibut fishing, which was under IPHC jurisdiction, and to bottom trawling, which was not under Commission jurisdiction. However, through negotiations within the International North Pacific Fisheries Commission and bilateral agreements with foreign governments, the Closed Area was also closed to foreign bottom trawling. Throughout the late 1960s until the early 1970s, the Closed Area provided significant protection for juvenile halibut, with bycatch mortality dropping to an estimated low of 4.21 million lbs. in 1985. Coincidentally, halibut abundance improved dramatically, fueled in part by strong year classes of the mid-1970s.

With the Americanization of the Bering Sea trawl fisheries in the early 1980s, following promulgation of the U.S. Extended Economic Zone, the protection to juvenile halibut afforded by the Closed Area diminished. Bycatch mortality on halibut again increased substantially in the 1985 through 1991 period, reaching a peak of approximately 10.7 Mlbs. in 1992. Bottom trawling within the Closed Area accounts for a significant proportion of the halibut mortality in the Bering Sea. The Closed Area remains open to all fishing except commercial halibut fishing.

The IPHC requested a review of the Closed Area in 1998 (Trumble 1999). That review examined the purpose of the Closed Area and its value to halibut management. The summary of that review is reproduced below:

The closed area does not reduce halibut PSC mortality. Bycatch is managed by bycatch mortality limits through the NPFMC, with quota reductions and harvest rate reductions by the IPHC.

Ecosystem effects from the IPHC closed area have little benefit. The fishing by other gear types throughout the Bering Sea- Aleutian Island area, especially on the Bering Sea shelf, preclude an undisturbed ecosystem. A small no-trawl zone occurs on the eastern edge of the IPHC closed area. Evaluation of ecosystem stability in the Bering Sea must include the other fisheries, both in and out of the IPHC closed area and the no-trawl zone.

The IPHC requested another review of the Closed Area in 2012. The 2012 report noted that the area remained closed after 1989 as a hedge against uncertainty concerning assessment and management of halibut in the Bering Sea. Since 1998, the Commission has accumulated sufficient data and has been able to generate stock assessments for the Bering Sea with considerably greater confidence than was possible in 1998. Therefore, in 2012 the IPHC staff no longer saw a purpose for the Closed Area as a guard against uncertainty.

It also stated that halibut PSC was managed through PSC limits for various groundfish fisheries, with particular time and area specificity, and the IPHC Closed Area played no role in the management of bycatch. IPHC staff concluded that from a halibut assessment and management perspective, there was no continued purpose in maintaining the current Closed Area to the commercial halibut fishery in the eastern Bering Sea. In 2012, the IPHC took no action to open the Closed Area to the commercial halibut fishery. If the Closed Area was to open to the commercial halibut fishery, allocations within the new area would have to be incorporated in the Council's Area 4CDE halibut CSP because the IPHC treats Area 4CDE, including the Closed Area, as a single management unit..

The IPHC again reviewed the Closed Area in 2018 (IPHC-2018-AM094-PropA1) with the following outcome (IPHC-2018-AM094-R, paragraph 47).

> *The Commission DEFERRED regulatory proposal IPHC-2018-AM094-PropA1, which considered the intent, purpose and effectiveness of the IPHC Closed Area, as defined in IPHC Fishery Regulations (2017) Section 10, NOTING that the NPFMC is currently undertaking an Abundance-Based Management process aimed at limiting bycatch. The ABM process should be closely monitored and if considered necessary, the IPHC closed area proposal should be reconsidered at subsequent meetings of the Commission, but no later than in 2020.*

4.5 Directed halibut IFQ fishery description

Note to the reader: CFEC/ADF&G Fish Ticket information and COAR data are not yet available for 2020 at the time of preparation. As a result, tables and figures that report revenue or catch tables based on Fish Ticket information terminate in 2019.

This section provides a broad overview of commercial halibut IFQ fishery management, but the focus of the section is the fishery that occurs in Area 4 (IFQ and CDQ) and putting that area in the context of the halibut fishery on the Alaska statewide scale. Greater detail on the regulations that govern the fishery are most recently provided in the Council's IFQ Program 20-Year Review (NPFMC 2016[59]) and through resources accessible on the NMFS Alaska Region website.[60] Section 4.5.4 provides a brief synopsis of information on subsistence and recreational uses of halibut in Alaska, and directs the reader to a more detailed description in the SIA Appendix to this DEIS (Appendix 1, Sections 5.9, 5.10, and the subsections of Section 6 that are titled "Engagement in the Subsistence BSAI Halibut Fishery").

In December 1991, the Council chose an IFQ Program as the preferred management alternative for both halibut and sablefish fixed gear fisheries. The IFQ Program was approved as a regulatory amendment by the Secretary of Commerce in 1993 and implemented by NMFS in 1995 (58 FR 215). The IFQ Program was developed to address issues associated with the race-for-fish that had resulted from the open-access and effort control management of the halibut and sablefish fisheries. Specifically, the Council identified several problems that emerged in these fisheries due to the previous management regime, including increased harvesting capacity, decreased product quality, increased conflicts among fishermen, adverse effects on halibut and sablefish stocks, and unintended distributions of benefits and costs from the fisheries.

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59 https://www.npfmc.org/wp-content/PDFdocuments/halibut/IFQProgramReview_417.pdf

60 https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/pacific-halibut-and-sablefish-individual-fishing-quota-ifq-program

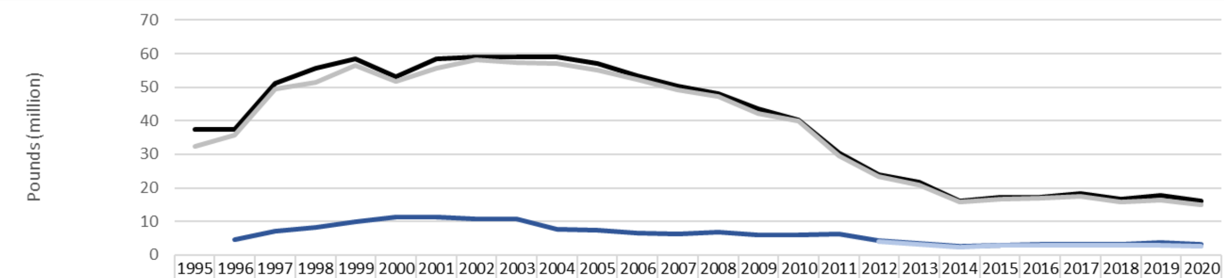
In the original Supplemental Environmental Impact Statement for the IFQ Program, the Council identified 10 policy objectives that it intended to address through elements of the IFQ Program. In selecting the elements of the IFQ Program the Council attempted to do the following:

1) Address the problems that occurred with the open-access management regime.
    - The Council identified 10 specific problems: Allocation conflicts, gear conflicts, deadloss from lost gear, bycatch loss, discard mortality, excess harvesting capacity, product wholesomeness, safety, economic stability in the fisheries and communities, and rural coastal community development of a small boat fleet.
2) Link the initial quota share (QS) allocations to recent dependence on the halibut and sablefish fixed gear fisheries.
3) Broadly distribute QS to prevent excessively large QS from being given to some persons.
4) Maintain the diversity in the fleet with respect to vessel categories.
5) Maintain the existing business relationships among vessel owners, crews, and processors.
6) Assure that those directly involved in the fishery benefit from the IFQ Program by assuring that these two fisheries are dominated by owner/operator operations.
7) Limit the concentration of quota share ownership and IFQ usage that will occur over time.
8) Limit the adjustment cost to current participants including Alaskan coastal communities.
9) Increase the ability of rural coastal communities adjacent to the Bering Sea and Aleutian Islands to share in the wealth generated by the IFQ Program.
10) Achieve previously stated Council goals and objectives and meet MSA requirements.

A primary impact of implementing the IFQ Program was the elimination of the derby-style fishery that existed previously and the transition to longer seasons. The prolongation of the fishing season was made possible by the allocation of exclusive harvesting privileges through QS. Longer fishing seasons have allowed for better handling of fish, a shift in product form from frozen toward fresh halibut, the removal of unused fishing gear from grounds, and likely fewer gear conflicts. This document is focused on Area 4. Fresh markets have not developed equally in all parts of Alaska. The markets that purchase halibut caught in Area 4 predominantly rely on frozen product due to their remote location relative to consumers, yielding a lower ex-vessel value relative to the statewide average. Ex-vessel values may also be affected by the cost of operating processors and bringing products to market, which can be higher for halibut caught in Area 4 (noting that not all halibut caught in Area 4 are processed in communities adjacent to the BSAI). Information on ex-vessel values by area is provided in Section 4.5.1 (see Figure 4-8 through Figure 4-10) and information on the processing component of the halibut IFQ fishery is provided in Section 4.5.2.

In terms of how participants have fared under the IFQ program, the 20-Year Review found that many significant impacts were the result of the changing commercial halibut TAC levels in the time since implementation. Figure 4-6 shows total IFQ (non-CDQ) TAC and landings dating back to 1995 for all IPHC management areas in Alaska and for Area 4 in particular. Statewide, halibut TAC has generally declined since 2004. The Area 4 TAC and landings encompass Areas 4ABCD; Area 4E is not included because 100% of the available harvest in that area is allocated to the CDQ reserve. CDQ TAC and harvest data are provided in Section 4.5.1.2. Decreasing TACs may change how QS holders and hired masters participate in the IFQ fisheries. For example, since decreasing TAC results in QS holders having fewer IFQ pounds to harvest they may choose to consolidate QS onto fewer vessels by coordinating with other QS holders to fish on one vessel, they might sell their QS, they might lease IFQ or act as a hired master for eligible shareholders, or they might purchase additional QS to increase their annual harvest potential. Hired masters with fewer IFQ pounds on their vessel might choose to lease IFQ or bring onboard more IFQ via individual QS holders who do not operate a vessel. The aggregation of QS holders onto fewer vessels eliminates some crew positions and other indirect economic activity that is associated with the operation of an active vessel. The number of unique vessels that have operated in Area 4/BSAI through 2019, based on Fish Tickets, is shown in Table 4-7.

The 20-Year Review notes that biologists have not found direct linkages between overall stock abundance and the IFQ Program (NPFMC 2016, Section 2.9), and that changes in the TACs are understood to be external to the IFQ Program itself. Section 4.2 of this document similarly notes that large changes in the spawning biomass of Pacific halibut, which do not seem explicitly linked to fishing, have been observed over the more than 100 years of commercial fishing.



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TAC	37.4	37.4	51.1	55.7	58.4	53.1	58.5	59.0	59.0	58.9	57.0	53.3	50.2	48.0	43.5	40.3	30.4	24.0	21.8	16.0	17.1	17.1	18.3	16.6	17.7	16.1
Catch	32.3	35.6	49.4	51.4	56.4	51.8	55.8	58.1	57.4	57.2	55.2	52.2	49.3	47.3	42.3	39.9	29.6	23.3	20.8	15.8	16.7	16.8	17.6	15.9	16.5	15.0
Area 4 TAC		4.7	7.1	8.2	9.9	11.3	11.3	10.8	10.8	7.8	7.4	6.6	6.3	6.7	5.9	6.0	6.2	4.4	3.5	2.5	3.0	3.2	3.2	3.1	3.7	3.2
Area 4 Catch																		4.1	3.1	2.4	2.9	3.0	3.0	2.8	3.0	2.7

Figure 4-6 Commercial IFQ (non-CDQ) halibut TAC and catch (millions of pounds), statewide and Area 4ABCD.

Sources: 1995 through 2012 are taken from the annual NMFS IFQ Report to the Fleet, which do not include harvest amounts at the subarea level (https://www.fisheries.noaa.gov/resource/document/pacific-halibut-sablefish-ifq-report-report-fleet); 2013 through 2020 are taken from NMFS Annual IFQ Catch and Landings Reports (https://www.fisheries.noaa.gov/alaska/commercial-fishing/fisheries-catch-and-landings-reports).

All halibut QS has regulatory area designations that specify the area in which the IFQ derived from those shares may be harvested. Catch and value data by regulatory area and subareas within Area 4 are provided in Section 4.5.1.

There are four vessel classes in the halibut IFQ fishery (A through D). Class A shares are harvested on catcher/processors and there is no vessel length restriction. Class B, C, and D are designated by harvesting vessel length, where B class vessels are greater than 60' LOA, C class vessels are greater than 35' and less than 60', and D class vessels are 35' or less. Vessel class designations were intended to maintain the diversity of the IFQ fleets, and the Council intended for the Class D QS to be the most likely entry-level opportunity. In most cases, quota can be "fished down" on smaller-class vessels. In regards to Area 4, class D QS may be harvested on any vessel that is less than or equal to 60' LOA in Areas 4B and 4C. Table 4-4 shows the percentages by which QS is distributed among vessel classes. The table shows that in Area 4 the plurality of QS units in each subarea are designated as class B. Class A shares (catcher/processors) account for a small percentage of potential harvest in each area, and no QS is allocated to class A in Area 4C. Area 4C has the highest proportion of QS that is designated class D but, as noted above, class D QS can be fished up on class C vessels in that area.

Table 4-4 Halibut quota share distribution by vessel category

Vessel Category	2C	3A	3B	4A	4B	4C	4D	4E	4ABCD Subtotal	Grand Total
A	2%	3%	3%	4%	6%	0%	8%	All CDQ	5%	3%
B	4%	37%	55%	59%	77%	40%	83%		65%	37%
C	79%	53%	39%	30%	15%	22%	9%		21%	52%
D	15%	7%	3%	7%	3%	38%	0%		9%	8%

The overall management context of the IFQ Program for the 20-plus years since its implementation has largely been one of decreasing restrictions over time. For example, within the first year of the IFQ

Program, the Council added the "fish down" provision allowing IFQ designated for larger vessel classes to be fished on smaller vessels and increased the allowable "sweep up" limit to allow larger amounts of IFQ to be swept up into QS blocks. Over the course of the IFQ Program, the Council has also allowed for some inter-area harvest of QS, increased the number of QS blocks that a shareholder may hold, and allowed for "fishing up" in some areas (e.g., the allowance to fish category D QS on C class vessels in 4B, 4C – mentioned above – and in 3B).

The main exception the general trend of decreasing restrictions has been with respect to the owner-operator characteristic of the fleet. The Council has repeatedly re-asserted its position on limiting hired master use for the harvest of catcher vessel IFQ and the acquisition of catcher vessel QS by non-individual entities in an effort to continue progress toward an owner-operator catcher vessel fleet. At the same time, however, the Council elected to authorize certain communities to be able to form community quota entities (CQEs) that can purchase halibut and sablefish QS and lease the resultant IFQ to their residents.

4.5.1 Catch, value, and harvest participation

IPHC Area 4 is comprised of five subareas (ABCDE) and generally covers the BSAI groundfish FMP area. A portion of Area 4A overlaps the GOA FMP area. This section is based on catch and processing data for all halibut IFQ and CDQ harvest that occurred in Area 4 ABCDE. IPHC management areas are depicted in Figure 1-4. To compare Area 4 to Alaska statewide commercial halibut catch, Table 4-5 shows IFQ landings in mt (round weight, or "CFEC whole pounds") for each area from 2010 through 2020. Values are shown in round weight tons to better put commercial harvest in the context of PSC limits for the groundfish fisheries and the units output from the Operating Model are referenced in the impact analysis. During that period, Area 4 accounted for 21% of statewide catch on average, ranging from 18% in 2010 to 24% in 2011. Area 4 accounted for 23% of catch in both 2019 and 2020.

The summary data below are based on ADF&G/CFEC Fish Ticket information, and values are reported at the ex-vessel level. Section 4.5.1.1, below, describes why the analysts have elected to present ex-vessel values for commercial halibut, but also provides what information is available to help a reader consider the relative scale of the fishery's value at the primary processing level (gross first wholesale value). The best available information on gross first wholesale value is applied alongside ex-vessel values in the impact analysis results tables that are presented in Section 5.4.

Table 4-6 shows total ex-vessel value by area in inflation-adjusted 2018 dollars (millions). Overall, Area 4 accounted for 18% of state-wide ex-vessel value from commercial halibut catch. On an annual basis, Area 4 accounted for 16% (2010, 2013, 2014) to 23% (2011) of total value. Area 4 accounted for 19% of total ex-vessel value in 2019. Figure 4-7 plots the gross ex-vessel value (2018$) of commercial halibut catch in Area 4 by subarea.

Table 4-5 Alaska commercial IFQ and CDQ halibut catch (mt) by IPHC area, 2010 through 2020

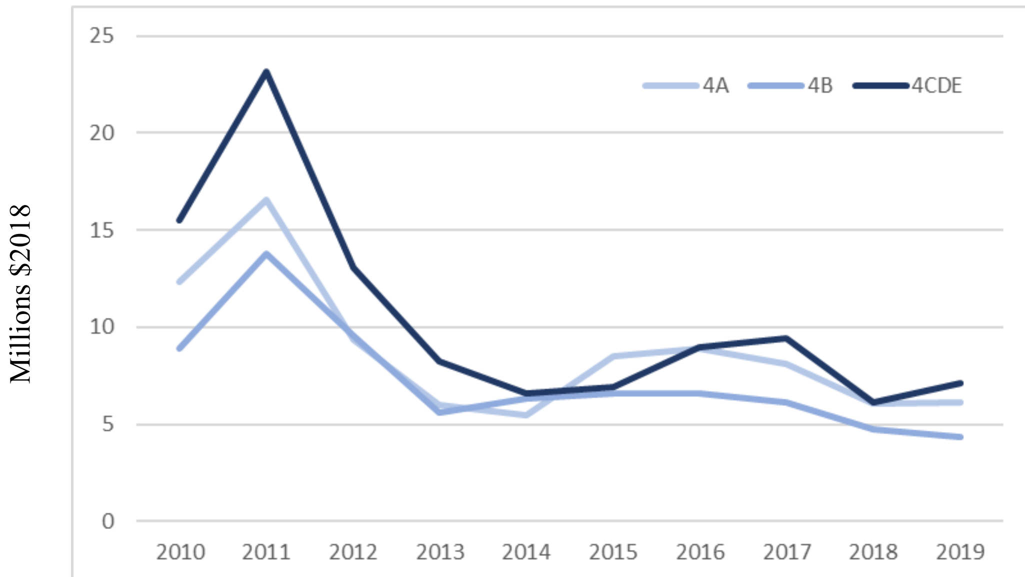
IPHC Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
2C	2,627	1,416	1,565	1,766	1,991	2,202	2,345	2,412	2,049	2,027	1,936
3	18,432	13,277	10,310	9,152	6,385	6,435	6,216	6,406	5,789	6,056	5,483
4	4,534	4,710	3,409	2,567	1,982	2,205	2,398	2,379	2,214	2,409	2,207
Total (t)	25,593	19,403	15,284	13,485	10,358	10,842	10,959	11,197	10,052	10,492	9,625
Total (M lbs.)	56.4	42.8	33.7	29.7	22.8	23.9	24.2	24.7	22.2	23.1	21.2

Source: CFEC Fish Ticket data provided by AKFIN Note: Conversion to mil of lbs. (M lbs.) provided for comparison to Figure 4-6.

Table 4-6 **Alaska commercial IFQ and CDQ halibut ex-vessel value (million 2018$), 2010 through 2019**

IPHC Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
2C	24.8	17.8	18.4	17.4	23.5	25.6	28.8	26.6	18.3	18.5
3	173.7	163.3	111.6	86.5	73.3	73.6	73.7	69.0	52.6	55.2
4	37.6	54.6	32.6	20.3	19.1	22.5	24.9	23.7	16.9	17.6
Total	236.1	235.6	162.6	124.2	115.9	121.8	127.4	119.3	87.8	91.3

Source: CFEC Fish Ticket data provided by AKFIN

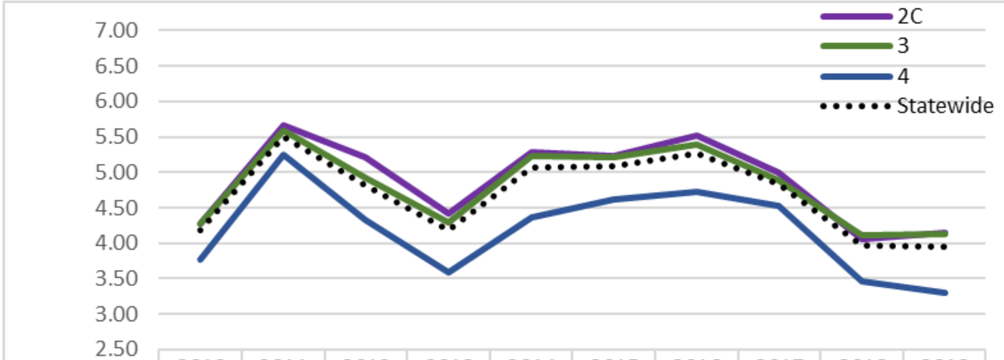


Source: CFEC Fish Ticket data provided by AKFIN

Figure 4-7 Alaska commercial IFQ and CDQ halibut ex-vessel value (million 2018$) within Area 4, 2010 through 2019

Figure 4-8 plots average annual halibut value per pound calculated based on the round weight totals shown in Table 4-5 and Table 4-6, adjusted to 2018 dollars to account for general inflation. Calculating value per pound based on round weights results in lower estimates that the reader is likely accustomed to seeing, as IPHC and RAM typically report on the halibut fishery in terms of IFQ pounds, i.e., head-and-gut net weight. Those values are reported in Figure 4-9 and Figure 4-10.

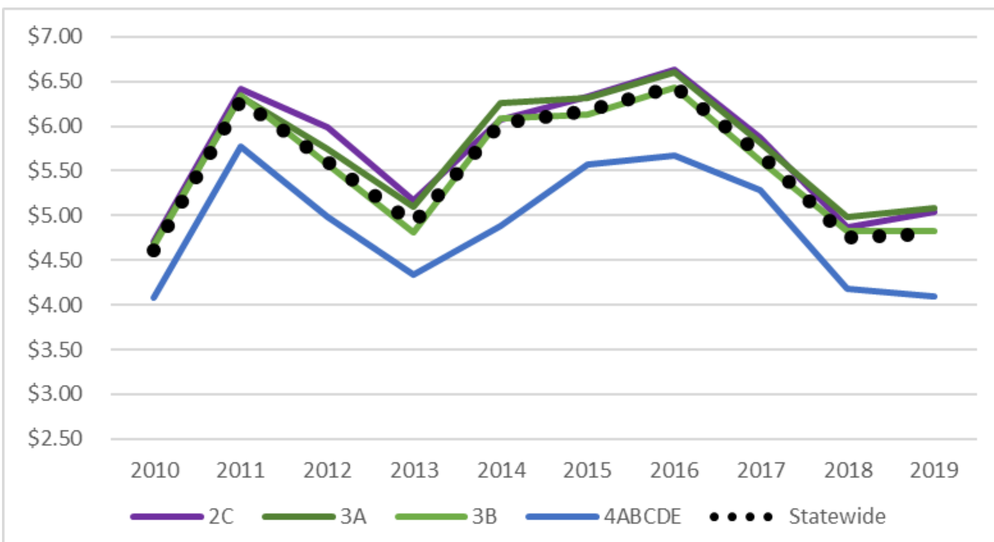
The purpose of Figure 4-8 is to show that, in real dollar terms, the unit value of the resource has been flat to decreasing over the analyzed period, and that unit value in Area 4 displays the same time trend as the rest of the state but at a lower level. This document does not fully analyze the reason that Area 4 catch produces lower value per pound relative to other areas. However, several factors that might be at play include higher plant operating costs at some of the smaller, remote plants in western Alaska that purchase halibut, as well as a general focus by processors in the BSAI region on the higher volume groundfish species for which processing facilities are specifically set up. Related to this point, the IFQ Program 20-Year Review includes an exploration of whether and to what extent the issuance of quota exclusively to the harvest sector reduced profit margins on halibut for the processing sector (see Section 2.4.2 in NPFMC 2016). Accepting the conclusion that the IFQ program tilted economic rents toward the harvest sector, it is reasonable to conclude that processors in western Alaska, which are either focused on high-volume groundfish species or have high operating costs, would have less demand for halibut and thus might offer a lower price than what is observed in areas such as 2C and 3A. In those areas, halibut is a primary focus and processors have both incentive and ability to market the product in ways that can generate a greater unit return.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
2C	4.28	5.67	5.21	4.42	5.29	5.22	5.52	5.00	4.06	4.14
3	4.27	5.59	4.92	4.29	5.23	5.21	5.39	4.88	4.12	4.14
4	3.76	5.24	4.34	3.59	4.37	4.62	4.72	4.52	3.46	3.31
Statewide	4.18	5.51	4.82	4.18	5.08	5.09	5.27	4.83	3.96	3.95

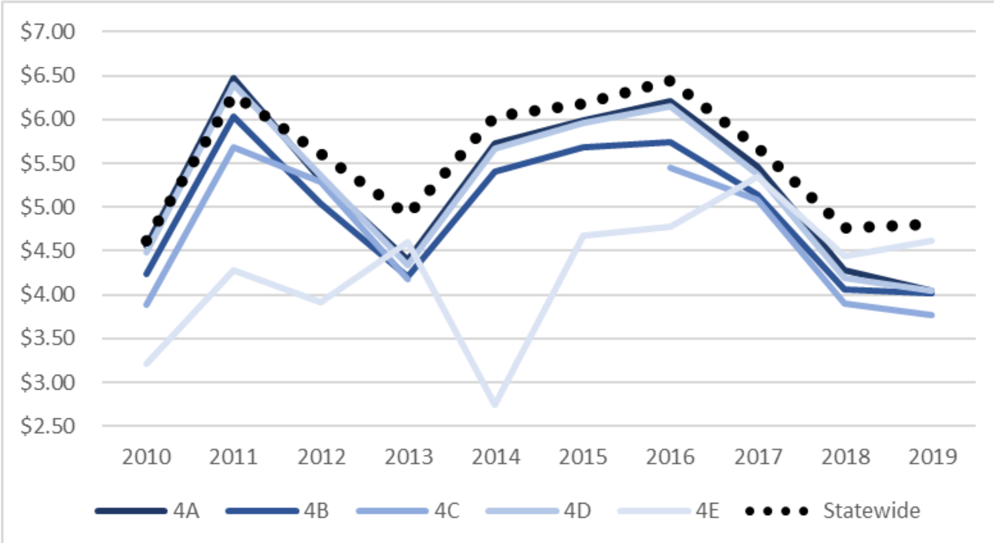
Figure 4-8 Average annual ex-vessel value per pound (2018$) by IPHC areas within Alaska, calculated from round weight catch. (Source: CFEC Fish Tickets provided by AKFIN)

Figure 4-9 and Figure 4-10 plot ex-vessel by area in nominal dollars (not inflation-adjusted) in terms of head-and-gut net weight. These values are taken from NMFS Alaska Region website and are the annual estimates with which the reader will be most familiar. Like the data shown above, these values are based on CFEC Fish Tickets for all commercial catch delivered by catcher vessels to inshore processors. The statewide estimate is a weighted average based on the volume and value of harvest taken across all Alaska IFQ areas. Figure 4-10 breaks out the subareas within Area 4, comparing them to the statewide average and to each other. Data for Area 4C is redacted in 2014 and 2015 due to confidentiality. Figure 4-10 highlights that average values are lower in Area 4.



Source: NMFS – See "Annual ex-vessel and volume prices – Halibut" at https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports. Note: Area 4ABCDE estimates for 2014 and 2015 omit Area 4C due to confidential data.

Figure 4-9 Commercial halibut ex-vessel value/lb. (nominal dollars) by IPHC area, 2010 through 2019



Source: NMFS – see "Annual ex-vessel and volume prices – Halibut" at https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports Note: Area 4C data in 2014 and 2015 is redacted as confidential.

Figure 4-10 Area 4 subarea commercial halibut ex-vessel value compared to statewide value (nominal dollars), 2010 through 2019

Annual ex-vessel value estimates for 2020 at the state-wide level and in each area are not currently available. The analysts can state, however, that 2020 did not likely to reflect an upward movement in the ex-vessel value of Alaska halibut. In-season dock prices at the beginning of the season, reported voluntarily by quota brokers and in online trade-press, were around $3.25/lb. to $4.40/lb. depending on size and varying across locations (all reporting locations were in Areas 3A and 2C)[61]; it is appropriate to presume that prices are similar or lower in more westward areas). Summer prices represented a slight improvement but did not exceed the 2019 nominal ex-vessel values shown in Figure 4-9 (e.g., Homer dock price reported at $4.25 to $4.75/lb. on August 5, 2020[62]).

The 2020 market for U.S. halibut faced several headwinds; the extent to which these factors remain in effect into 2021 is not yet known but a price holding steady at recent historical levels would likely be viewed as a positive outcome. Though not vetted through the AKFIN process for ex-vessel price reporting, early 2021 prices in the 3A/2C region appear higher, between $5.25 and $5.75/lb. in March 2021 (Sitka, Petersburg, Whittier, and Homer).[63] It is likely that ex-vessel prices in Area 4 are slightly lower, but that information is not publicly available at the time of writing. Alaska halibut markets are currently facing at least three headwinds. First, domestic demand has been depressed by the ongoing global health crisis, especially in high-end fresh markets to supply the restaurant industry. Second, air services were stalled in the early months of 2020, impeding high-value fresh markets and adding to a backlog in frozen inventories. Third, Alaska halibut is facing increased competition from foreign imports that have penetrated U.S. retail markets in all regions at lower prices. The U.S. increased its purchase of farmed halibut from Norway in 2019 and 2020. Atlantic halibut from eastern Canada is increasingly entering U.S. markets and is being supplied fresh year-round. The U.S. is also importing an increasing volume of halibut caught in Russia and China. A news article published in May 2020 – citing industry analysts – notes that U.S. imports of Russian halibut were 140,000 lbs. in 2018 and up to approximately 2 million lbs. in 2019. Russian imports in just the first two months of 2020 were triple the annual total for 2018. Halibut caught in Russia and China are entering U.S. frozen markets via importation through Canada to circumvent tariffs on trade with those two countries and are marketed in the U.S. at lower prices than Alaska halibut. The relatively weak Russian currency is making that nation's product

[61] Alaska Fish Factor, published in Anchorage Daily News, March 24, 2020.
[62] Alaska Boats & Permits, Inc. www.alaskaboat.com
[63] Ibid., accessed March 2021.

attractive to U.S. buyers and buyers in China whose reprocessed product may be destined for U.S. end-markets. In terms of U.S. halibut exports, Russia has not purchased U.S. seafood since 2014 and China imposes a reciprocal tariff of 25% that suppresses demand for many U.S. seafood products.

From 2010 through 2019, the number of CVs participating in Area 4 averaged 200 per year, ranging from 337 CVs in 2011 to 117 CVs in 2017 (Table 4-7). As noted in Table 4-4, the bulk of the harvest opportunity is in the class B category. The total number of vessels decreased substantially in 2015, with the largest drop-off occurring among class B vessels. In the average across years, 86.3% of active CVs were owned by individuals who listed their residence as Alaska average (equating to an average 180 CVs owned by Alaska residents). There were 568 unique CVs participating in the Area 4 halibut fishery; 523 of those were owned by Alaska residents, 41 were owned by Washington residents, 4 were owned by Oregon residents, and 8 were owned by residents of other states. Table 4-7 also shows the number of CPs and catcher-sellers (listed as "CASO" in the data) that fished A class quota during the period. The average number of vessels that processed their own halibut catch in Area 4 was six. Note that all annual vessel counts shown in Table 4-7 include the unique number of vessels participating in IFQ, CDQ, or both; a vessel that fished both IFQ and CDQ halibut in a given year would not be double-counted.

Table 4-7 Number of vessels in the Area 4 halibut fishery by vessel class, 2010 through 2019

	Catcher Vessels				CP/CASO
	B	C	D	Total	A
2010	216	60	33	309	10
2011	243	62	32	337	4
2012	214	60	28	302	2
2013	227	52	25	304	3
2014	81	48	21	150	1
2015	44	53	22	119	3
2016	48	50	21	119	4
2017	48	50	19	117	8
2018	47	56	20	123	9
2019	49	53	20	122	12
Average	**122**	**54**	**24**	**200**	**6**
Median	**65**	**53**	**21.5**	**136.5**	**4**

Section 5.2 of the SIA Appendix provides information on engagement and reliance on the BSAI halibut fishery by community of vessel ownership address. For the Area 4 fishery, commercial halibut vessel ownership among states is heavily concentrated in Alaska. Within Alaska, ownership is distributed across numerous communities. The SIA identifies 25 Alaska communities with two or more vessels participating in the fishery annual (on average), another four communities with 1 or 2 vessels participating, and 21 communities with one or fewer vessels participating (on average). The SIA notes a recent downward trend in CV participation in recent years that spans multiple BSAI communities and regions but is most notable in the communities associated within the Coastal Villages Region Fund (CVRF) CDQ group region.

Table 4-8 shows total catch (CFEC whole lbs.) of Area 4 halibut IFQ and CDQ by subarea from 2010 through 2019. On average, the Area 4 fishery generated 6.34 million whole lbs. per year. The greatest proportion of catch occurs in Areas 4A, 4B, and 4D. The annual catch trend peaked in 2011 but currently appears to be at a stable level around 5 million whole lbs. This trend conforms to the decline in statewide TACs that is shown in Figure 4-6.

Table 4-6 reported gross halibut ex-vessel revenue from the Area 4 fishery for 2010 through 2019 (2018$). Table 4-9 reports inflation-adjusted ex-vessel revenues (2018$) by Area 4 subarea. The annual average value was around $27 million across all areas and years. Ex-vessel value by subarea clearly tracks the relative amount of catch by subarea. By residence of vessel ownership, Alaska-owned vessels accounted for an average of 66% of gross revenue; Washington-owned vessels accounted for roughly 30%. For all CVs that participated in the fishery during the analyzed period, the Area 4 halibut fishery accounted for approximately 28% of total inflation-adjusted gross ex-vessel revenues from all fisheries, including other areas, species, and gear types that those vessels prosecuted.

Table 4-10 and Table 4-11 report shoreside halibut catch and gross ex-vessel revenues (2018$) by area and by vessel size category from 2010 through 2019. Section 5.2 of the SIA Appendix identifies the communities of vessel ownership with combined average annual revenues greater than $1 million. The higher-grossing communities located in the BSAI region were St. Paul and Unalaska. The other communities of residence with high ex-vessel gross revenues were Anchorage/Wasilla, Homer, Juneau/Sitka, Kodiak, and the Seattle MSA.

Table 4-8 Total halibut catch (IFQ + CDQ) in Area 4 (CFEC whole lbs.), 2010 through 2019

	4A	4B	4C	4D	4E	4ABCDE Total
2010	3,204,111	2,483,204	1,013,835	2,748,241	546,103	**9,995,494**
2011	3,070,785	2,749,754	1,055,179	2,923,669	609,221	**10,408,608**
2012	2,101,072	2,308,241	750,826	1,906,104	443,665	**7,509,908**
2013	1,615,029	1,661,653	678,671	1,315,880	372,694	**5,643,927**
2014	1,193,289	1,486,806	525,847	930,241	202,313	**4,338,496**
2015	1,778,525	1,455,041	539,997	948,399	118,177	**4,840,139**
2016	1,822,804	1,487,477	552,943	1,257,131	159,559	**5,279,914**
2017	1,742,815	1,397,215	678,302	1,207,444	218,307	**5,244,083**
2018	1,621,429	1,382,072	660,910	1,094,895	126,693	**4,885,999**
2019	1,800,135	1,296,887	646,908	1,377,635	158,403	**5,279,968**
Average	**1,994,999**	**1,770,835**	**710,342**	**1,570,964**	**295,514**	**6,342,654**

Source: CFEC Fish Tickets provided by AKFIN

Table 4-9 Ex-vessel value (2018$) of all halibut catch (IFQ+CDQ), 2010 through 2019

	4A	4B	4C	4D	4E	4ABCDE Total
2010	12,618,162	9,060,223	3,695,186	10,675,677	1,577,994	**37,627,241**
2011	16,843,193	14,018,154	5,455,909	15,818,404	2,418,054	**54,553,713**
2012	9,276,352	9,616,738	3,597,548	8,490,769	1,576,836	**32,638,219**
2013	5,834,081	5,694,057	2,540,492	4,666,917	1,520,714	**20,319,188**
2014	5,483,180	6,401,491	2,333,494	4,233,100	476,385	**19,094,363**
2015	8,467,071	6,530,732	2,458,248	4,468,937	438,439	**22,363,428**
2016	8,905,273	6,714,714	2,603,693	6,059,222	626,207	**24,909,108**
2017	8,119,576	6,122,683	2,938,104	5,522,621	995,331	**23,698,315**
2018	5,775,440	4,681,520	2,150,498	3,839,246	469,578	**16,916,281**
2019	5,996,834	4,276,457	2,009,123	4,580,441	601,322	**17,464,178**
Average	**8,731,916**	**7,311,677**	**2,978,230**	**6,835,533**	**1,070,086**	**26,958,403**

Source: CFEC Fish Tickets provided by AKFIN

Table 4-10 Halibut catch (IFQ+CDQ) delivered to shore in Area 4 subareas by vessel class (CFEC whole pounds), 2010 through 2019

Area	Vessel Class	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total	Average
4A	B	250,874	267,875	157,398	143,409	94,398	117,743	210,650	161,540	143,483	120,216	1,667,586	166,759
	C	1,890,376	1,947,014	1,388,485	1,024,378	774,632	1,191,948	1,163,793	1,232,961	1,139,628	1,286,393	13,039,608	1,303,961
	D	991,508	816,417	525,231	429,786	269,619	435,450	383,757	327,217	320,561	376,556	4,876,102	487,610
4A Total		**3,132,758**	**3,031,306**	**2,071,114**	**1,597,573**	**1,138,649**	**1,745,141**	**1,758,200**	**1,721,718**	**1,603,672**	**1,783,165**	**19,583,296**	**1,958,330**
4B	B	23,246	17,731	42,175	60,179	40,258	52,989	48,826	9,235	0	0	294,639	29,464
	C	1,339,774	1,404,528	1,478,062	965,649	965,348	947,941	1,024,715	962,853	952,369	884,186	10,925,425	1,092,543
	D	1,013,114	1,252,522	788,004	635,509	481,200	454,111	413,936	425,127	429,703	412,701	6,305,927	630,593
4B Total		**2,376,134**	**2,674,781**	**2,308,241**	**1,661,337**	**1,486,806**	**1,455,041**	**1,487,477**	**1,397,215**	**1,382,072**	**1,296,887**	**17,525,991**	**1,752,599**
4C	B	752,767	697,594	558,021	536,571	419,798	380,408	423,541	483,156	443,531	438,462	5,133,849	513,385
	C	252,519	324,621	184,102	126,228	96,440	135,529	110,009	181,973	203,317	196,134	1,810,872	181,087
	D	C	C	C	C	C	24,060	15,954	C	C	C	107,671	10,767
4C Total		*	*	*	*	*	**539,997**	**549,504**	*	*	*	**7,052,392**	**713,702**
4D	B	73,801	40,769	70,696	48,263	50,635	14,009	32,866	35,707	48,182	95,852	510,780	51,078
	C	1,590,306	1,501,540	1,029,335	698,816	468,913	566,988	659,847	639,464	585,446	744,037	8,484,692	848,469
	D	932,821	1,268,083	707,466	513,306	379,017	333,369	529,413	493,641	425,619	493,324	6,076,059	607,606
4D Total		**2,596,928**	**2,810,392**	**1,807,497**	**1,260,385**	**898,565**	**914,366**	**1,222,126**	**1,168,812**	**1,059,247**	**1,333,213**	**15,071,531**	**1,507,153**
4E	B	499,916	553,919	411,157	344,075	181,869	67,920	85,320	94,464	58,533	75,046	2,372,219	237,222
	C	43,914	55,302	31,130	C	C	38,862	46,442	100,583	42,684	62,265	*	*
	D	C						C				C	C
4E Total		*	**609,221**	**442,287**	*	*	**106,782**	*	**195,047**	**101,217**	**137,311**	**2,839,751**	**283,975**

C = confidential; * denotes data not shown to maintain confidentiality.

Source: CFEC Fish Tickets provided by AKFIN

Table 4-11 Ex-vessel value (2018$) of all halibut catch (IFQ+CDQ) delivered to shore in Area 4 subareas by vessel class, 2010 through 2019

Area	Vessel Class	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total	Average
4A	B	977,995	1,462,095	703,824	502,842	429,191	544,599	1,013,410	723,415	492,140	387,489	7,237,000	723,700
	C	7,418,891	10,664,680	6,091,410	3,640,776	3,538,623	5,671,619	5,668,659	5,761,092	3,993,178	4,248,983	56,697,912	5,669,791
	D	3,948,269	4,503,281	2,346,520	1,629,423	1,269,422	2,096,474	1,919,226	1,542,938	1,228,945	1,303,316	21,787,812	2,178,781
4A Total		**12,345,155**	**16,630,056**	**9,141,754**	**5,773,040**	**5,237,235**	**8,312,692**	**8,601,295**	**8,027,445**	**5,714,263**	**5,939,788**	**85,722,724**	**8,572,272**
4B	B	65,045	66,038	146,502	189,463	156,273	224,107	196,252	34,854	0	0	1,078,534	107,853
	C	4,655,280	6,883,715	6,024,333	3,217,308	4,040,695	4,174,988	4,520,287	4,162,187	3,225,129	2,919,329	43,823,250	4,382,325
	D	3,965,258	6,664,069	3,445,904	2,286,252	2,204,523	2,131,637	1,998,175	1,925,643	1,456,391	1,357,127	27,434,978	2,743,498
4B Total		**8,685,583**	**13,613,822**	**9,616,738**	**5,693,023**	**6,401,491**	**6,530,732**	**6,714,714**	**6,122,683**	**4,681,520**	**4,276,457**	**72,336,762**	**7,233,676**
4C	B	2,715,937	3,552,121	2,694,102	2,013,546	1,862,668	1,726,300	1,987,156	2,078,499	1,439,490	1,355,307	21,425,126	2,142,513
	C	946,477	1,722,552	865,285	471,598	428,656	619,211	524,725	796,341	664,943	615,101	7,654,887	765,489
	D	C	C	C	C	C	112,738	75,801	C	C	C	486,916	48,692
4C Total		*	*	*	*	*	**2,458,248**	**2,587,681**	*	*	*	**29,566,929**	**2,956,693**
4D	B	227,333	169,138	345,149	151,471	211,242	53,061	143,467	159,995	204,152	384,586	2,049,594	204,959
	C	6,200,154	8,118,717	4,573,303	2,491,887	2,144,409	2,696,690	3,191,274	2,915,013	2,029,891	2,412,287	36,773,625	3,677,362
	D	3,663,785	6,920,055	3,130,537	1,823,789	1,732,701	1,560,441	2,556,233	2,278,595	1,482,009	1,633,290	26,781,435	2,678,144
4D Total		**10,091,272**	**15,207,909**	**8,048,989**	**4,467,148**	**4,088,352**	**4,310,192**	**5,890,974**	**5,353,603**	**3,716,052**	**4,430,162**	**65,604,654**	**6,560,465**
4E	B	1,424,443	2,158,818	1,417,203	1,430,315	395,465	230,132	300,941	440,787	181,037	260,389	8,239,529	823,953
	C	149,859	259,236	152,693	C	C	136,144	195,605	443,399	187,627	254,500	*	*
	D	C						C				C	C
4E Total		*	**2,418,054**	**1,569,896**	*	*	**366,276**	*	**884,186**	**368,664**	**514,889**	**10,174,885**	**1,017,488**

C = confidential; * denotes data not shown to maintain confidentiality.

Source: CFEC Fish Tickets provided by AKFIN

Table 4-12 reports the potential harvest for IFQ or CDQ participants in IPHC Areas 4BCDE from 2013 through 2020. Catch utilization is reported as a percentage from 2013 through 2020. The table reflects that the halibut resource has been near-fully utilized during the reported years, and that the harvest rate actually increased in 2020 relative to 2019. The concentration of CDQ harvest in Area 4D during 2020 may be the result of the unique operational challenges of 2020 resulting from the COVID-19 pandemic.

Table 4-12 Directed fishery halibut catch limits/allocations (lbs.) and utilization (%) in IPHC Areas 4CDE, 2013 through 2020

	Area	2013	2014	2015	2016	2017	2018	2019	2020
IFQ Catch Limit	**4C/4D**	1,030,800	715,920	715,920	880,320	902,400	880,200	1,092,000	919,200
		89%	*96%*	*96%*	*96%*	*96%*	*90%*	*82%*	*99%*
CDQ Allocation	**4C**	429,500	298,300	298,300	366,800	376,000	366,751	455,000	383,000
		*	*	*	*	*	*	*	*
	4D	309,240	178,980	178,980	220,080	225,600	220,050	273,000	229,800
		52%	*67%*	*65%*	*82%*	*99%*	*72%*	*97%*	*247%*
	4E	212,000	91,800	91,800	192,800	196,000	113,000	220,000	198,000
		132%	*166%*	*	*62%*	*	*	*	*
4CDE Total		1,981,540	1,285,000	1,285,000	1,660,000	1,700,000	1,580,001	2,040,000	1,730,000
%CDQ landed for 4BCDE		*86%*	*98%*	*90%*	*85%*	*94%*	*91%*	*83%*	*88%*

Notes: IFQ landings in Areas 4C and 4D are combined because 4C allocation may be fished in 4C or 4D. Harvest is debited from the account for the reported harvest area but the combined report is a better representation of activity in the two areas. CDQ allocation to 4D may be fished in 4D or 4E; harvest is debited from the account for the reported harvest area. CDQ allocation to 4C may be fished in 4C or 4D; harvest is debited from the account for the reported harvest area. Accounting for CDQ allocation that may be taken in more than one area could cause landings to appear overharvested in 4D or 4E, or underharvested in 4C or 4D.

Source: NMFS Alaska Region IFQ Catch & Landings Reports; data available from 2013.
https://www.fisheries.noaa.gov/alaska/commercial-fishing/fisheries-catch-and-landings-reports-alaska#ifq-halibut/sablefish.

4.5.1.1 Consideration of ex-vessel versus first wholesale values for Area 4 halibut fisheries

Commercial halibut catch value is reported as ex-vessel revenues taken from ADF&G/CFEC Fish Tickets. The ex-vessel value represents the amount paid to fishermen by a primary processor for harvested seafood. Ex-vessel prices are the most appropriate value to represent halibut fishery revenue given the most common halibut supply chain in Alaska, particularly in Area 4, or the BSAI processing region. Most halibut is harvested by catcher vessels that deliver to shoreside processors: “Nearly all halibut is bled and gutted onboard, iced or chilled, and delivered to a shoreside plant for a small amount of additional processing, typically limited to heading or filleting. Less than one percent of annual first wholesale halibut production typically occurs aboard catcher/processor vessels. Alaska processors sell most halibut to Lower-48 seafood distributors that supply a specific region with a variety of products” (Fissel et al. 2021).

The Alaska Fisheries Science Center has recently begun reporting estimates of first wholesale production volume, value, and value per net-weight-pound (IFQ pound) of halibut in the “Economic SAFE” report; the most recent version covers 2015 through 2019 (Fissel et al. 2021). Table 4-13 excerpts first wholesale estimates for the head-and-gut product form from Table H7 of the Economic SAFE. That information is based data from Commercial Operators Annual Reports (COAR) that are reliant on the accuracy of processors’ reporting. Due to the dearth of COAR reporting on halibut products in the BSAI region, the Economic SAFE is only able to provide estimates at the statewide scale. These estimates may not be a reliably precise indicator of value-added production at the primary processing level in the BSAI/Area 4 region, or the Area 4CDE region in particular. As shown in Figure 4-8 through and Figure 4-10, ex-vessel values in Area 4 consistently trail the statewide average. Table 4-13 omits the Economic SAFE’s estimate of first wholesale values across “All Products,” which sums H&G estimates, fillet estimates, and “other products” estimates on an annual basis then divides by total reported revenues. More highly processed halibut product forms are less prevalent in the region of interest, so using All Products estimates would impute values from product forms that are not reported and may not be being produced in the area – at least not at the relative scale they are being produced statewide. Given that a substantial portion of Area 4 halibut are sold by primary processors in a head-on form, the values in Table 4-13 will be slightly overstated when those estimates were applied on a per-pound basis to Area 4 catch.

Table 4-13 First wholesale production volume (1000s of mt), value (nominal $millions), and price (nominal $/lb. net weight) in the commercial Pacific halibut fisheries off Alaska – head-and-gut product form – 2015 through 2019.

Year	Quantity	Value	Price
2015	5.38	92.07	7.77
2016	6.29	94.99	6.85
2017	5.64	91.86	7.39
2018	5.01	75.59	6.84
2019	5.07	71.12	6.37

Source: adapted from Table H7 in the 2020 Economic SAFE (AFSC 2021); data from COAR, provided by AKFIN

Upon the analysts' request, AKFIN and AFSC investigated the possibility of estimating area-specific wholesale values in the region of interest but the effort was stymied by the small number of shoreside processors buying halibut as well as reporting issues (the latter – it is important to say – is not strictly a reflection on the reporting and recordkeeping of the processing plants themselves). AKFIN screened processors' COAR data to exclude facility-years where the ratio of the volume of fish purchased and the volume of primary-processed product sold did not match within an acceptable range. Also, for specific halibut management areas – e.g., 4CDE – the small number of processors often makes the data confidential. The other issue that makes area-specific wholesale value difficult to use is that COAR data report "bought and sold" volumes on an annual basis, meaning that holdover inventory sold in the following year obscures the value-added supply chain and can cause a plant's data to fail the AKFIN ratio "screen." Such was the case for several facilities that the analysts know to be important local buyers of Area 4 halibut.

The high value of halibut relative to other white fish is widely acknowledged and is not diminished by the decision to describe the value chain only as far as the primary processing level. Research to fully describe the value chain and the broader economic impact of Alaska halibut fisheries – commercial and non-commercial – is currently in progress; an IPHC study of this question is referenced and described in Section 5.3 of this document. The analysts propose that the Area 4 commercial fishery value chain is distinct from other regions in important ways, and that ex-vessel values – with the additional context of first wholesale estimates – is the most appropriate metric. The reader can understand that secondarily processed halibut product forms, or even direct market sales to end-retail consumers, have a higher unit value. This does not need to be shown in table-form and likely should not be given the amount of information available on the extent to which those product forms are flowing out of the region of interest. It would not be appropriate to choose an end-retail value-per-pound, apply it to catch in Area 4, and consider that number to be net revenue (after fishing costs) as that would elide costs that accrue along the supply chain. Finally, the analysts do not provide a "what if" value estimate to represent how much Area 4 catch could be worth if it were directly marketed at retail prices because there are no data to gauge how much supply that type of market would demand from Area 4 considering its unique costs and processing capacity.

4.5.1.2 CDQ

When the IFQ Program was established, a portion of commercial halibut quotas in each Area 4 subarea (the CDQ reserve) was allocated to western Alaska communities via their CDQ groups. The structure of the CDQ program was initially developed as a component of BSAI pollock allocations ("inshore/offshore") and implemented under BSAI Groundfish FMP Amendment 18 (final rule published on June 3, 1992, 57 FR 23322). During that period, the Council was developing what would become the fixed-gear halibut and sablefish IFQ Program and was evaluating options for allocates of those species to CDQ communities.

Overall, the CDQ program is allocated a CDQ reserve equal to 20% of the Area 4B halibut TAC, 50% of the Area 4C TAC, 30% of the Area 4D TAC, 100% of the Area 4E TAC, and zero percent of the Area 4A TAC. The remainder in each area constitutes the IFQ fishery. Figure 4-11 shows how the CDQ reserve is allocated among the six CDQ groups. For example, APICDA receives the full 20% of the Area 4B TAC that goes to the CDQ program (100% of the CDQ reserve for the area), while the 30% of the Area 4D TAC that goes to the CDQ program is divided among four different CDQ groups.

In 2019, the total halibut TAC for Areas 4BCDE (IFQ + CDQ) is 3,250,000 lbs. Of that amount, 1,190,000 lbs. go to the CDQ reserve, or 36.6% of the total. APICDA received 310,250 lbs. in Areas 4B and 4C; BBEDC received 136,980 lbs. in Areas 4D and 4E; CBSFA received 386,750 lbs. in Area 4C; CVRF received 219,520 lbs. in Area 4D and 4E; NSEDC received 81,900 lbs. in Area 4D; and YDFDA received 54,600 lbs. in Area 4D. The total size of the CDQ reserve is determined annually based on the 4BCDE TAC, while the distribution percentages to CDQ and among groups have remained constant. The 2019 TAC of 3.25 million lbs. was greater than in previous years. The Area 4BCDE TAC was 2.63 million lbs. in 2018, 2.84 million lbs. in 2017, 2.80 million lbs. in 2016, 2.43 million lbs. in 2015, and 2.43 million lbs. in 2014. In 2013 the TAC for these areas was 3.38 million lbs.

The total 2019 CDQ reserve equated to roughly 540 mt of halibut. For comparison, the total allocation of BSAI groundfish species to CDQ groups is 195,297 mt.[64] The total allocated of crab species to the CDQ program in 2019 was roughly 4.2 million lbs. (1,905 mt).

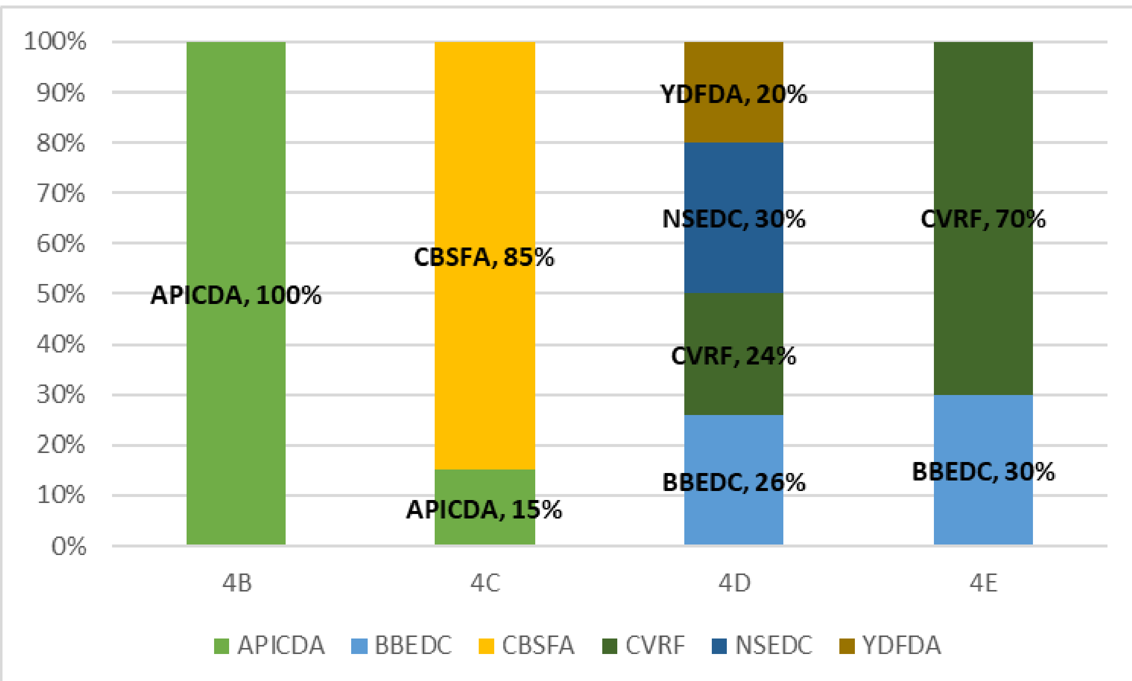


Figure 4-11 Allocation of CDQ reserve halibut by CDQ group in Areas 4BCDE

CDQ groups may use their allocation of the halibut catch limit to support nearshore small boat fisheries that provide economic opportunity and the social and cultural benefits inherent in active fishing participation to residents, or the groups can opt to lease the quota to fishing companies. CDQ groups might choose to lease the quota for a variety of reasons including, but not limited to (1) if the group's allocation is judged not large enough to support a viable or economically sustainable directed fishery, or (2) if the group judges that the social and economic benefit to their constituents would be greater by applying collected royalties to other community initiatives. Factors that influence consideration of the

64 https://www.fisheries.noaa.gov/webdam/download/90184482

economic viability/sustainability of operating an in-region fishery include the size of a CDQ group's quota allocation, increases or decreases in resource abundance, and the difficulty or, under some arrangements, cost of providing or securing a processing market that is accessible to the fleet. Factors that influence consideration among different choices in providing other socioeconomic and cultural benefits to their constituents include the nature and complexity of that constituency, as some communities and individuals may not as directly benefit as others from in-region direct fishery engagement support initiatives. The complications that CDQ groups face when making this choice and the different structures they have chosen are discussed further in the Section 6 of the SIA Appendix.

Royalty revenues support CDQ projects that encourage fishery-based economic development and social development. These projects and programs include infrastructure (fishing and non-fishing), employment, training programs, equipment maintenance and repair facilities, bulk fuel procurement, seafood branding/marketing, and financial services to support small sale fishing operations that target nearshore species using small vessels. Until 2005, NMFS received information about royalty payments to CDQ groups by species harvested. Because submission of this information is no longer required, information about royalties collected from the leasing of halibut quota is not publicly available, and not all CDQ groups have chosen to present royalty information by species in their public reports.

CDQ groups have used earnings derived from investment in vessels and subsidiary companies to gain stakes in vessels, limited access privileges, and processing capacity across most BSAI fisheries (i.e., halibut, sablefish, crab, and groundfish). Investments by individual CDQ groups include ownership interest in the at-sea processing sector and in catcher vessels and are made with the expectation of financial gain or expanding equity in the fishing fleet. According to a 2016 report, at the time approximately 20% of vessels greater than 60' LOA fishing in the BSAI or GOA were owned in full or in part by a CDQ group.[65] Those vessels included pollock (AFA), A80, and freezer longline cod (HALCP) catcher/processors, among others. Investments in subsidiaries, such as limited liability corporations, allow CDQ groups to wholly or partially own vessels directly related to fisheries. These vessels provide revenue through the direct catch and sale of target species and, in some cases, vessel ownership increases a subsidiary's holdings of quota in fisheries such as BS pollock. In addition, investments in harvesting and processing capacity provide revenue through profit sharing, contractual agreements to harvest other CDQ groups' quota, and chartering commercial fishing vessels to government agencies conducting stock assessment surveys. Revenue from such investments has exceeded direct royalty income from leasing halibut and non-halibut quota since 2004 (NMFS 2018[66]). In years when data were available, direct income from investments accounted for 55% to 84% of CDQ groups' annual revenue. Until 2011, the six CDQ groups provided a joint report through the Western Alaska Community Development Association (WACDA) on assets and investments in CDQ communities. In 2011, the six CDQ groups held approximately $938 million in assets and they invested roughly $176 million in CDQ communities and fishery activities; that value was down from the reported peak of $251 million in regional investment reported for 2010. Similar information for more recent years is not publicly available.

In addition to fishery-related investments and support programs, MSA allows CDQ groups to make up to 20% of their annual investments in non-fishery related projects within the region.[67] Groups invest in capital projects such as village infrastructure, medical clinics, and environmental programs. Groups also expend funds on programs like vocational training, post-secondary education scholarships, and assistance for elders, to name only a few examples. Since the 2011 cessation of a combined report by WACDA, CDQ groups have highlighted the work completed in their member communities via public releases that vary in format and detail.

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[65] McDowell Group. (2016). Modernization of the North Pacific Fishing Fleet: Economic Opportunity Analysis. Available at: www.edc-seaking.org

[66] https://www.fisheries.noaa.gov/resource/document/western-alaska-community-development-quota-program

[67] MSA Section 305(i)(1)(E)(iii)

Table 4-14 summarizes CDQ allocations, harvest, and the number of vessel landing events (i.e. trips) in Areas 4BCDE from 2013 through 2020.[68] A vessel landing could include harvests by more than one CDQ permit holder. Harvest is reported in IFQ pounds (head-and-gut net weight). In some cases, Areas 4CDE may appear over or underharvested because 4D CDQ may also be harvested in 4E, and 4C CDQ may also be harvested in 4D. NMFS catch reports debit harvest from the area in which the catch actually occurred. Note that much of the area-level data is redacted as confidential due to the number of processing facilities that received CDQ halibut deliveries. For that reason, the summary tables that follow focus on CDQ activity at the Area 4 level.

During the 2013 through 2020 period, the combined CDQ reserve halibut allocation was highest in 2013 (1.2 million lbs.), then dropped to roughly 800,000 lbs. during 2014 and 2015 before rebounding to between 1.0 and 1.2 million lbs. from 2016 through 2020. CDQ harvest was at its highest point in 2013 (1.1 million lbs.), representing an 86% harvest rate of available CDQ quota across the four subareas in that year. Harvest rates in the other years have ranged from 83% in 2019 to 98% in 2014. It is apparent from the annual subtotals that include all of 4BCDE that the subareas where data are confidential actually accounted for the majority of total CDQ harvest and individual landing events in most years. This trend reversed in 2020, which may again be attributed to the operational impacts of fishing during the COVID-19 pandemic. The pounds harvested could include both direct catch by vessels from CDQ communities and catch of quotas that were contracted to other vessels fishing in these areas and generated royalties for the CDQ group.

Table 4-14 CDQ halibut allocation, harvest, and landing events, 2013 through 2020 (Source: NMFS Catch & Landings Reports)

Year	Area	Vessel Landings	Allocation (lbs.)	Harvest (lbs.)	% Harvested	Year	Area	Vessel Landings	Allocation (lbs.)	Harvest (lbs.)	% Harvested
2013	4B	*	290,000	*	*	**2014**	4B	*	228,000	*	*
	4C	*	429,000	*	*		4C	*	298,300	*	*
	4D	165	309,240	160,877	52%		4D	176	178,980	120,075	67%
	4E	876	212,000	279,910	132%		4E	240	91,800	152,118	166%
	Subtotal	**1,462**	**1,240,740**	**1,066,864**	**86%**		**Subtotal**	**730**	**797,080**	**784,726**	**98%**
2015	4B	*	228,000	*	*	**2016**	4B	*	228,000	*	*
	4C	*	298,300	*	*		4C	*	366,800	*	*
	4D	98	178,980	116,847	65%		4D	122	220,080	180,790	82%
	4E	*	91,800	*	*		4E	122	192,800	119,821	62%
	Subtotal	**420**	**797,080**	**721,310**	**90%**		**Subtotal**	**558**	**1,007,680**	**851,869**	**85%**
2017	4B	*	228,000	*	*	**2018**	4B	*	210,000	*	*
	4C	*	376,000	*	*		4C	*	366,751	*	*
	4D	106	225,600	224,116	99%		4D	94	220,050	157,636	72%
	4E	*	196,000	*	*		4E	*	113,000	*	*
	Subtotal	**544**	**1,025,600**	**966,914**	**94%**		**Subtotal**	**493**	**909,801**	**828,334**	**91%**
2019	4B	*	242,000	*	*	**2020**	4B	*	220,000	*	*
	4C	*	455,000	*	*		4C	*	383,000	*	*
	4D	114	273,000	264,703	97%		4D	103	229,800	567,950	247%
	4E	*	220,000	*	*		4E	*	198,000	*	*
	Subtotal	**602**	**1,190,000**	**992,315**	**83%**		**Subtotal**	*****	**1,030,800**	*****	**88%**

* denotes confidential data

4.5.1.3 Cost recovery and other taxes and fees

MSA Section 304(d) requires the collection of cost recovery fees for LAPP programs and the CDQ program. Cost recovery fees recover the actual costs directly related to the management, data collection, and enforcement of the programs. The fee can be up to, but not exceeding, 3.0% of the annual ex-vessel value of the fish harvested under the program (MSA 304(d)(2)(B)). The cost recovery fee for halibut IFQ

[68] Data are based on NMFS Fisheries Catch and Landings Reports, which are available back to 2013 at: https://www.fisheries.noaa.gov/alaska/commercial-fishing/fisheries-catch-and-landings-reports

was at the maximum level of 3.0% in 2020 and 2019, up from 2.8% in 2018, and 2.2% in 2017. The fee percentage is based on a calculation of management and enforcement costs in relation to the calculated total value of the fishery. Had the fee percentage not been capped, the 2020 assessment based on direct program costs divided by total fishery value would have been 4.28%. The 2020 combined IFQ fishery value that NMFS used, based on its standard pricing methodology, was $103.1 million, which is down from $150.0 million in 2019, $161.4 million in 2018, and $208.0 million in 2017.

Cost recovery has been collected from IFQ fishing since 2000. The final rule implementing cost recovery for the CDQ program was published on January 5, 2016 (81 FR 150). Because CDQ groups are allocated groundfish species as well as IFQ species, the total value calculation includes non-halibut species as well. For CDQ halibut in particular, NMFS calculates an annual standard price using the same Bering Sea port group prices calculated under the Observer Fee Program, which itself is based on the annual IFQ Registered Buyer Ex-Vessel Volume and Value Report. The CDQ halibut value estimate is combined with value estimates of other CDQ species to arrive at a total value and calculate the fee percentage. For 2020, the CDQ cost recovery fee percentage was 0.84%, up from 0.70% in 2019, 0.66% in 2018, and 0.55% in 2017. The total ex-vessel value of CDQ fisheries – which, again, are comprised mostly of non-halibut species – was $66.9 million in 2020, which was a decrease from $77.7 million in 2019, $86.1 million in 2018, and $81.7 million in 2017.[69]

The state and municipal taxes that apply to commercial halibut landings include the Fisheries Business Tax ("raw fish tax") that the State of Alaska collects from shore-based and floating processors (3% and 5% of ex-vessel value, respectively). Revenues from this tax are shared between the State and the localities where the tax was first collected. Alaska also levies a Seafood Marketing Assessment of 0.5% on all seafood processed or first landed in Alaska and any unprocessed fishery products exported from the state. The state collects this tax from the processor or fisherman who exports the resource from Alaska. Processors or fishermen who produce less than $50,000 worth of seafood products during the year are exempt. Municipal fish taxes are also collected in 14 Alaska communities and four boroughs (Aleutians East, Bristol Bay, Kodiak Island, and Lake & Peninsula). Most municipal taxes are set at 2.0% but range from 1.5% to 3.5%.[70] Note that CPs (Category A halibut QS) do not pay taxes that are based on landings of raw fish. CPs would be responsible for the Alaska's Fishery Resource Landings Tax which is levied on fish processed outside the 3-mile limit but within the U.S. EEZ and is first landed in Alaska. That levy is currently set at 3% of the estimated unprocessed value of the resource and is also eligible for sharing with the municipalities or boroughs where the fishery resource was first landed.

Harvesting vessels and processors that are not part of the full observer coverage category – i.e., halibut CVs and the inshore processors who receive their landings – are also responsible for a joint payment of 1.6% of ex-vessel value that goes toward the administration of the North Pacific Observer Program's partial coverage category (including electronic monitoring).

4.5.1.4 Halibut discard mortality in the commercial halibut fishery

The commercial IFQ fishery, itself, incurs halibut bycatch mortality. The IPHC describes this as incidental mortality of halibut in the directed commercial fishery that do not become part of the landed catch. The three sources of discard mortality include (1) fish that are caught but discarded because they are below the legal size limit of 32 inches, (2) fish that are discarded for regulatory reasons (e.g., the vessel has exceeded the amount of IFQ pounds that are possessed onboard), and (3) fish that are estimated

[69] https://www.fisheries.noaa.gov/resource/document/community-development-quota-cdq-cost-recovery-reports

[70] The 2019 Alaska Taxable Report, Volume LIX (Jan. 2020) is available at https://www.commerce.alaska.gov/web/Portals/4/pub/OSA/Official%202019%20Alaska%20Taxable.pdf. There, the reader can refer to Table 1A ("Reported Tax Rates for Each Municipality") for local raw fish taxes rates and revenues in 2019. The 2019 Alaska Taxable Supplemental Report, Volume LIX (Jan. 2020) is available at https://www.commerce.alaska.gov/web/Portals/4/pub/OSA/Full%20Supplemental.pdf. The Supplement provides greater detail at the community level, including whether a community imposes a raw fish tax and how much tax revenue was generated under that tax in 2019.

to die on lost or abandoned fishing gear.[71] Information on lost gear and regulatory discards is collected through logbook interviews and fishing logs mailed to IPHC. The ratio of U32 to O32 halibut is determined from the IPHC Setline Survey in all areas off Alaska. Different mortality rates are applied to each category: mortality for released halibut is 16% and mortality for halibut estimated to be caught on lost gear is 100%.

Table 4-15 shows commercial halibut discards in all Alaska IPHC areas from 2009 through 2020. In 2019, all areas except for 3B experienced an increase in discard mortality relative to the preceding years. In 2020, commercial discards declined markedly in Areas 2C, 3A/B, and 4A, but held constant with the 2019 upticks in Areas 4B and 4CDE. On average, Area 4 accounted for 15% of the annual commercial discards that occurred from 2009 through 2020 across all Alaska areas. For comparison, total state-wide commercial IFQ halibut bycatch mortality was equal to 5.6% of the commercial catch by volume from 2009 through 2020 (16.0 million lbs. compared to 285.9 million lbs.). For those years, that relationship was highest in 2010 (6.9%) and lowest in 2020 (3.4%).

Table 4-15 Halibut discard mortality (net weight tons) in the Alaska commercial IFQ fishery and percent relative to total commercial halibut catch, by area , 2009 through 2020 (Source: IPHC)

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
2C	138	118	38	43	50	54	55	56	39	27	36	29	57
3A	533	658	422	269	235	201	236	171	157	129	160	85	271
3B	361	410	349	239	183	148	98	105	106	94	74	44	184
4A	71	63	65	43	32	16	36	24	30	31	47	38	41
4B	8	17	20	17	16	25	16	27	14	9	17	16	17
4CDE	41	43	87	34	25	24	24	29	13	12	34	36	33
Total	**1,152**	**1,308**	**980**	**645**	**542**	**468**	**464**	**414**	**360**	**302**	**368**	**248**	**604**
% Comm. Catch	**5.8%**	**6.9%**	**6.8%**	**5.7%**	**5.4%**	**6.2%**	**5.9%**	**5.2%**	**4.2%**	**4.0%**	**4.5%**	**3.4%**	**5.6%**

4.5.2 Processing component

Shore-based processors accounted for over 99% of the processing of the Area 4 halibut catch from 2010 through 2019. The average annual ex-vessel value of halibut processed shoreside was $24.8 million (2018$), though the total value was low in 2018 and 2019 compared to the period as a whole – $14.7 million and $15.5 million, respectively. The balance of the processing activity involved two catcher/processor vessels registered to Seattle-based companies that were primarily involved in the Pacific cod fishery (catch data confidential), one catcher/processor registered to Petersburg, AK (catch data confidential), one vessel that was classified by its self-reported processor code as a direct marketer catcher/processor (catch data confidential), and 19 operations defined in AKFIN data as catcher-sellers that marketed their own unprocessed catch (total 2010-2019 catch was less than 400,000 lbs. with a combined estimated ex-vessel value of roughly $1.3 million in inflation-adjusted 2018$). Almost two-thirds of the non-shore-based activity that occurred in Area 4 during the analyzed period took place in Areas 4A and 4B during 2010 and 2011.

The shore-based processors that received halibut during the analyzed period for which revenue data are available were located in 22 Alaska communities, but seven of those operations processed halibut in fewer than half of the studied years. As noted in Section 5.3 of the SIA Appendix, Area 4 halibut was processed every year in 11 Alaska communities. Within the BSAI area, those communities included Adak, Akutan, Unalaska/Dutch Harbor, St. Paul, Nome/Savoonga, and Twin Hills (Togiak area). Communities elsewhere included Anchorage, Homer, King Cove, Kodiak, Sand Point, and Seward. In 2019, Area 4 halibut was processed in 13 communities, eight of which are adjacent to the BSAI area. Six of the eight communities that processed Area 4 halibut in fewer than half of the years were located in

[71] IPHC fishery statistics (2020) published for the January 2021 IPHC Annual Meeting; available at https://iphc.int/uploads/pdf/am/am097/iphc-2021-am097-05.pdf.

communities that are affiliated with the CVRF CDQ group; those operations were active from 2010 through 2013 but not since. The other communities with inconsistent processing participation were Togiak (BBEDC CDQ region), where halibut processing has occurred in all covered years since 2016, and False Pass (APICDA CDQ region), where halibut processing occurred in 2010, 2011, 2014, and 2015.

The average number of Alaska shore-based processing facilities the received Area 4 halibut in a given year from 2010 through 2018 was 24.2, ranging from a high of 29 in 2011 to just 20 in 2016. Over the period, 37 unique facilities processed shoreside halibut deliveries from the Area 4 fishery. In the average year, just below half of the shore-based facilities that processed Area 4 halibut (average of 11.4 shore-based processors) were located in communities adjacent to GOA waters (i.e., Kodiak, Homer, King Cove, Sand Point, Seward, and Anchorage).

While facilities located adjacent to the BSAI accounted for roughly half of the Alaska processors that received Area 4 halibut, those facilities combined to account for 86% of the combined Alaska-landed ex-vessel value derived from the CV fishery during the analyzed period. By CDQ region, processors in the APICDA and CBSFA regions combined to account for 81%, NSEDC and BBEDC together accounted for 3%, CVRF accounted for 2%, while facilities in GOA communities accounted for 15%. Processed volume and value cannot be further disaggregated to the community level due to confidentiality restrictions.

The shore-based processors that received Area 4 halibut deliveries over this period processed a total average annual ex-vessel value (all species, coming from multiple areas and gear types) of around $560 million (2018$), meaning that Area 4 halibut accounted for roughly just 4.4% of the plants' total activity as measured by ex-vessel. Among this group of processors, as defined by regional location, the GOA facilities were the least dependent on Area 4 halibut (~1.5% of average annual ex-vessel value). When operating, the facilities in the CVRF region were almost entirely reliant on Area 4 halibut (>99%). Facilities in the APICDA/CBSFA regions (combined) generated roughly 16% of ex-vessel value from Area 4 halibut. Facilities in the NSEDC/BBEDC regions (combined) generated roughly 7% of ex-vessel value from Area 4 halibut. The total ex-vessel value of all processing by all plants in the communities where Area 4 halibut were processed had an average annual value of $733 million (2018$); the value of ex-vessel payments for Area 4 halibut equate to 3.4% of that total.

The 20-Year Review found that the IFQ Program fundamentally changed processing needs in the halibut IFQ fishery, shifting from a primarily frozen to a majority fresh market – though that shift was experienced mainly in geographies outside of Area 4 (NPFMC 2016). After the implementation of IFQs, most processors that were engaged in the halibut fishery increased diversification in non-IFQ species. Processors who were interviewed for the 20-Year Review noted that diversification included entering into other fisheries, increasing processing of species that they had previously been processing, focusing on value added products, and entering into custom processing arrangements. Processors adjacent to the BSAI/Area 4 that derive the majority of their revenue from high-volume groundfish fisheries and crab were less likely to modify halibut operations in a manner similar to what has been observed in some facilities that are relatively more engaged in the Areas 2C and 3A halibut fisheries.

The 20-Year Review also noted that IFQ Program implementation likely caused a shift in the relative bargaining power between harvesters and shore-based processors (Matulich and Clark, 2003; Fell and Haynie, 2011; 2013). Analysis of price margins between wholesale and ex-vessel prices indicates that halibut processor price margins have decreased over time as a result of the harvesting sector receiving 100% of the fishery's quota share (NPFMC 2016, Section 2.4.2.3). Processor representatives who were interviewed as part of the review process listed the top impacts of the IFQ program. Most of those impacts bear on bargaining power and the relative share of economic rents derived from the halibut fishery. They include: devaluation of capital investments; the creation of surplus capacity (freezing and ice-making capacity that was less needed after the elimination of the pre-IFQ derby fishery); changes in relationships between processors and fishermen; changes in landings patterns; diversification into other fisheries and different product types; and previously active processors going out of business (especially in rural communities without access to transportation services). Again, some of these generalized impacts are more reflective of the post-IFQ experience in GOA communities where processors were not already focused primarily on high-volume groundfish fisheries. Processors also noted that the total volume of IFQ landings has generally trended downwards in the years since program implementation (Figure 4-6).

Those shore-based processors that remain engaged in the Area 4 halibut fishery are, in many cases, processing halibut as a side-line, using halibut deliveries as a means to keep workers utilized during gaps in deliveries from other fisheries, engaging in custom processing for buyer-exporters, or partnering with CDQ groups to provide a market for a local small-vessel fleet. One of the IFQ Program's positive impacts that was noted by processor interviewees was steadier and longer employment for the processing workforce.

4.5.3 Halibut IFQ/CDQ crew

The IFQ Program 20-Year Review (NPFMC 2016) estimated average crew size for CVs fishing for halibut at two to four persons. The range captures the difference between vessel categories B, C, and D, which spans vessels over 60' LOA to open skiffs. While this vessel-based crew estimate is small relative to A80 groundfish CPs, it is similar to the Fish Ticket-based average annual median crew estimates for trawl and fixed gear CVs of four persons. A likely range for the number of individuals who work as crew each year in the Area 4 halibut CV fishery is between 420 to 840. This range is derived from the average crew size (2 to 4) and the average number of CVs fishing in the area annually during the 2010 through 2019 period (211; citing Table 12 within SIA Section 5.2). The true number of unique individuals who crew in the Area 4 IFQ fishery in a given year is not known due to incomplete data collection on crew size. The analysts presume that the true value is closer to the high end of the range because B and C class vessels are unlikely to operate with a crew of two persons. The true value is likely not at the extreme high end of the range because a simple multiplication of average crew size and average vessel count does not adjust for the unknown number of individuals who crew on multiple vessels in a given year. The 20-Year Review cites a 2001 study finding that typical IFQ CV crew size had decreased from a range of three to six individuals before IFQ implementation. The decrease was attributed to greater use of auto-baiters and the slower pace of the fishery (Hartley and Fina, 2001).

Specific data on crew compensation was identified as a data gap in the 20-Year Review and is also listed as a category of unavailable information in Section 4.5.4 of the SIA. As such, the analysts cannot estimate crew shares as a percentage of ex-vessel revenues or average crew earnings. The 20-Year Review relied on previous research as well as information gathered at an IFQ crew workshop held in conjunction with a Council meeting in April 2016 (Anchorage, AK). Implementation of the IFQ Program in 1995 is estimated to have decreased the total number of crew jobs by several thousand due to quota share consolidation, the exit of vessels from the fisheries, and quota shareholders consolidating IFQ permits onto fewer vessels. The 20-Year Review concluded that the decline in the number of available crew jobs and an overall shift away from vessel owners' needs for manpower reduced the bargaining strength of crewmembers relative to vessel owners. Vessel operators that lease quota or fish as a hired master for an initial quota share recipient may also deduct quota fees from gross revenues, thus reducing crew compensation. For those crew who have remained in the fishery, average seasonal earnings are likely to have increased under the IFQ Program due to the longer season and more quota available to catch on the reduced number of vessels that remained in the fishery. The Review concluded that crewmembers who remained in the fishery likely have higher paying, more stable, and safer jobs. Since the most dramatic effects of IFQ consolidation occurred in the fishery several decades ago, the annual income of crewmembers who are currently active in the fishery is mostly driven by the amount of TAC available for harvest on their vessel and the effects of lease rates when the vessel is fishing quota that is not owned by the vessel operator or active crewmembers onboard.

The 20-Year Review includes a summary of discussions at the April 2016 IFQ crew workshop (NPFMC 2016, Section 2.4.1). That summary provides anecdotal references to how crew share percentages have changed over time and as a result of quota leasing arrangements. The workshop summary noted that before the IFQ Program crewmembers were making a 9% to 15% share of gross ex-vessel revenues. In most cases, operating costs were deducted from the gross before determining boat-, captain-, and crew-shares. The implementation of IFQs led to a wider variety of compensation modes based on whether the participant is an initial quota share recipient, acquired additional quota share, or largely operates as a hired skipper/lessee. For instance, some initial recipients deduct lease fees from gross revenues for initially allocated quota while others do not. For those that do not apply a lease fee, crew shares were reported to range from 8% to 20% of gross ex-vessel revenues. Operators who do apply a lease fee for initially allocated quota were said to set those fees between 15% and 30%, meaning that operating costs and other shares were dividing 70% to 85% of fishing revenues. Operators who purchased quota typically deduct a fee from the gross revenue, and the standard lease fee has grown over the life of the program to around 50%/50% or 60%/40% (with the greater percentage going to the quota owner). The workshop summary reports that operations with a mix of initially allocated and purchased quota share paid crew shares in the range of 6% to 15% of the gross ex-vessel revenue. Operators that were strictly hired skippers or lessees paid crew shares in the range of 3% to 8% of the gross. Operating costs that are related to boat expenses that did not exist before IFQs are also being deducted from gross revenue; for example, some individuals reported that auto-baiter costs were being accounted for in the boat share. In general, the Review found that crew shares as a percentage of gross ex-vessel revenues have decreased since IFQ implementation.

4.5.4 Subsistence and Sport Halibut Use in the BSAI

Subsistence and sport uses of halibut in BSAI communities are described in detail in the SIA Appendix. Impacts relative to subsistence and sport users are discussed in Section 5.5 of this DEIS. Within the SIA Appendix, subsistence use is described in SIA Section 5.4, and in the subsections to SIA Section 6 that address each CDQ region individually (subsections titled “Engagement in the Subsistence BSAI Halibut Fishery”). Sport uses of halibut in the BSAI are described in SIA Section 5.5.

The IPHC’s 2019 annual fishery statistics report (Erikson & Tran 2021) lists estimated subsistence and recreational mortality by IPHC Areas. Table 21 in Section 5.4.3 of the SIA lists subsistence estimates from 2010 through 2019 based on the IPHC’s reports. Within Area 4, 4E tends to take the largest amount. The 4E estimate for 2018 and 2019 (estimated biennially) was 25,160 lbs., compared to 13,237 lbs. in 4A, 5,152 lbs. in 4C, and 1,684 lbs. in 4B.

Halibut is one of the primary sources of wild food throughout the western Alaska CDQ regions. Some exceptions are interior remote areas and communities on St. Lawrence Island (part of the NSEDC CDQ region) that rely primarily on marine and terrestrial mammals. Even residents in the communities that do not directly harvest halibut for subsistence use the resource as they might receive it through gift or trade, or individuals might travel to harvest halibut in an area that is different from where they reside. CDQ groups have also supplied communities with halibut in circumstances of uncommon food shortage, such as failed marine mammal harvests or natural events that spoiled caches of other stored foods.

Sport uses include both unguided and commercially guided (charter) recreational halibut fishing. ADF&G only documents unguided recreational harvest in five of their management areas that geographically overlap the BSAI. Three of those management areas are in ADF&G’s Southcentral region and two are in the Arctic-Yukon-Kuskokwim region. Aside from the Alaska Peninsula/Aleutian Islands area (Area R), recreational catch of halibut is reported in very low numbers (estimated at fewer than 50 fish per year, and often zero fish per year). Charter operations are not numerous Area 4. A 2013 ADFG estimate found that charter operations in Area 3B and Area 4, combined, represented less than 0.4 percent of Alaska’s total charter/non-charter recreational yield. AFSC’s Alaska Community Profiles, with data available through 2014, found that the only charter operations were in Unalaska/Dutch Harbor. Fieldwork conducted in

Unalaska by NPFMC staff and a contractor in July 2019 found that there are currently two part time charter operators and one ecotourism-focused business that reported having offered recreational fishing opportunities in the past.

5 Impacts of Alternatives: Amendment 80 fishery, halibut stock and Directed halibut fishery (including direct, indirect, and cumulative)

5.1 Documents incorporated by reference in this analysis

This DEIS relies heavily on the information and evaluation contained in previous environmental analyses, and these documents are incorporated by reference. The documents listed below contain information about the fishery management areas, fisheries, marine resources, ecosystem, social, and economic elements of the groundfish fisheries. They also include comprehensive analysis of the effects of the fisheries on the human environment and are referenced in the analysis of impacts throughout this chapter.

Alaska Groundfish Harvest Specifications Final Environmental Impact Statement (NMFS 2007).
This EIS provides decision makers and the public an evaluation of the environmental, social, and economic effects of alternative harvest strategies for the federally managed groundfish fisheries in the GOA and the Bering Sea and Aleutian Islands management areas and is referenced here for an understanding of the groundfish fishery. The EIS examines alternative harvest strategies that comply with Federal regulations, the Fishery Management Plan for Groundfish of the GOA, the BSAI FMP, and the MSA. These strategies are applied using the best available scientific information to derive the TAC estimates for the groundfish fisheries. The EIS evaluates the effects of different alternatives on target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, and economic aspects of the groundfish fisheries. This document is available from:

http://alaskafisheries.noaa.gov/analyses/specs/eis/default.htm.

Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the BSAI (NPFMC 2020).
Annual SAFE reports review recent research and provide estimates of the biomass of each species and other biological parameters. The SAFE report includes the acceptable biological catch (ABC) specifications used by NMFS in the annual harvest specifications. The SAFE report also summarizes available information on the ecosystems and the economic condition of the groundfish fisheries off Alaska. This document is available from:

http://www.afsc.noaa.gov/refm/stocks/assessments.htm.

Final Programmatic Supplemental Environmental Impact Statement (PSEIS) on the Alaska Groundfish Fisheries (NMFS 2004).
The PSEIS evaluates the Alaska groundfish fisheries management program as a whole and includes analysis of alternative management strategies for the GOA and BSAI groundfish fisheries. The EIS is a comprehensive evaluation of the status of the environmental components and the effects of these components on target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, and economic aspects of the groundfish fisheries. This document is available from:

http://alaskafisheries.noaa.gov/sustainablefisheries/seis/intro.htm.

5.2 Impacts on the halibut stock

Impacts to the halibut biomass under all of the alternatives are expected to be similar and result in no impact to SSB. The IPHC's SPR-based management approach is expected to conserve spawning biomass across differing patterns in fishery selectivity and/or allocation among different fisheries. As such, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives including status quo.

Closed loop model simulations are useful for context in modeling the halibut population and for exploring uncertainties. As described in Section 4.3.2, major population uncertainties for projecting halibut population estimates forward include weight-at-age, migration, environmental variability (such as the PDO) on recruitment. Closed loop simulation results from previous analyses and described in Section 4.3.2 are consistent with the conclusion that given the IPHC's SPR management policy there are no expected impacts to SSB. The SSC concurred in April 2021 and noted that the estimated model uncertainty may be underestimated due to the limited treatment of recruitment scenarios related to the Pacific Decadal Oscillation and of historical variability of body weight-at-age projected forward. The April 2021 SSC report stated 'Although a closed loop simulation is helpful to understand the effects of potential lags in information use and observation uncertainty, even without this information, the SSC supports the general conclusion that there is likely to be little difference among the average future halibut spawning biomass under different levels of PSC…"[72].

5.3 Impacts to Amendment 80 groundfish and directed halibut fisheries

5.3.1 Approach to revenue estimates

The revenue estimates for the A80 fishery and the directed halibut fishery sectors are estimated separately, using different methodologies and are meant to help compare impacts across alternatives *within* each sector and should *not* be used to compare impacts across sectors. Revenue estimates in this section are reported in gross first wholesale value for A80 and ex-vessel value for BSAI commercial halibut. Total halibut revenues are also reported in terms of estimated wholesale values, as requested in previous reviews. This is not a straightforward calculation due to limited data sources, as described in Section 4.5.1.1. The analysts do not attempt to present an analogous conversion of A80 wholesale revenue to ex-vessel value. Section 3.3.2 described the analysts' position on why ex-vessel values are not an appropriate unit to characterize revenues for a catcher/processor fishery. In short, there is no actual ex-vessel transaction price generated from the sale of raw fish by an A80 harvester to a primary processor. Also, the variety of species that make up A80 fishery catch – and their different value-added profiles and recovery rates – reduce the accuracy of any proxy ex-vessel value estimate that is based on a common conversion factor (multiplier).

The revenue estimates reported in this section do not represent the full scope of the economic impacts associated with the proposed action alternatives. This document does not incorporate generally understood but poorly quantified economic multipliers that would allow for an estimate of the total economic contributions of the A80 fishery or the directed halibut fishery in terms of output, income, employment or other economic measures. The broad, downstream economic impacts of commercial fishing can be understood and appreciated without drawing an equivalency between metrics or existing studies that have fundamentally different scopes. Previous studies have estimated economic multipliers for the A80 fishery and quantified economic contributions across multiple geographic regions.[73] More current models are being developed by both the Alaska Fisheries Science Center (Seung, et al. 2020) and the International Pacific Halibut Commission (Hutniczak 2020) to estimate economic multipliers that are specific to Alaska fisheries. These models employ a similar methodology, extending an input-output (IO)

[72] April 2021 SSC Report

[73] For example, Waters et al. (2014) estimated that the "A80 H&G sector's $281 million of first wholesale revenues produced in 2008 generated approximately $1 billion of total output and accounted for an estimated 6,800 total jobs in Alaska, the West Coast and the rest of the US (including the H&G sector's estimated 2,200 total employees)." The paper also estimated the impacts of a reduction in revenues from 2008 to 2009 of $41 million, or 14.5%, resulted in resulted in an estimated reduction of $150 million in total output, distributed as $72 million in Alaska, $26 million in the west coast and $52 million in the rest of the US. This change in total output generated estimated reductions of $82 million in total value added, $41 million in total labor income, $50 million in total household income, $12 million in total state and local government revenue, and about 1,000 total jobs in the three regions. The analysts of this document would surmise that the multipliers cited in the study, based on 2008 and 2009 data, likely underestimate the economic impact of the A80 sector in its current form as the fleet has increased its efficiency and productivity through vessel modernization and full cooperative participation since that time.

model to a multi-regional social accounting matrix (MRSAM) that links across industries to estimate the total economic impacts of an economic shock – in this case, increased or reduced harvesting revenues.

The AFSC model (Seung, et al. 2020) is a 10-region social accounting matrix that estimates impacts across six southwest Alaska boroughs and census areas (Aleutians West Census Area, Aleutians East Borough, Lake and Peninsula Borough, Bristol Bay Borough, Dillingham Census Area, and Kodiak Island Borough) as well as the rest of the State of Alaska, the West Coast (Washington, Oregon and California), the rest of the U.S., and a "region" representing at-sea catcher-processors and motherships operating in Southwest Alaska-region waters (Western Bering Sea, Aleutian Islands and Gulf of Alaska). This is an update of a previous 3-region model (Seung and Miller 2018) that will more accurately represent impacts on smaller, fishing-dependent areas such as boroughs and census areas or fishing communities. In order to characterize impacts at a community scale, researchers conducted primary data collections in the form of surveys and key informant interviews to collect specific information on employment, revenues and expenditures (intermediate inputs) by participating vessels and processors. The SSC reviewed the previous 3-region version of the MRSAM model during its February 2020 meeting and noted that the authors no longer considered the 3-region model appropriate for use in Council analyses. The SSC requested the opportunity to review the 10-region version of the model before it is used in any analyses of Council actions. Review of the 10-region model is tentatively scheduled for February 2022, thus is it not available at this time.

The IPHC adopted a similar methodology to develop a MRSAM model, the Pacific Halibut Multiregional Economic Impact Assessment (PHMEIA). The PHMEIA will describe economic interdependencies between sectors and regions with the specific purpose of assessing the economic contribution of the Pacific halibut resource to the economy of the United States and Canada (Hutniczak, 2020). The PHMEIA models impacts across six regions: Alaska, the West Coast (WA, OR and CA), British Columbia, the rest of the US, the Rest of Canada and the Rest of the world. Preliminary results were presented at the 2021 IPHC Annual Meeting.[74] However, the principal investigator notes that:

> *"…the current version of the model is based solely on secondary data sources. As such, the results are conditional on the adopted assumptions for the components for which data were not available. In order to improve the accuracy of the assessment, the IPHC intends to incorporate into the model primary economic data collected directly from members of Pacific halibut dependent sectors… The subsequent revisions of the model incorporating IPHC-collected data will bring improved estimates on the Pacific halibut sectors' economic impact."* (Hutniczak, 2020).

The IPHC is currently conducting primary data collection in the form of surveys to commercial harvesters, processors, and charter business owners. The addition of primary data from the survey results is expected to substantially improve the accuracy of the model, particularly regarding modeling the linkages and variations between regions (B. Hutniczak, personal communication, March 1, 2021). Additionally, the in-progress PHMEIA model estimates economic impacts based on region wide shocks which may be less informative to the relative impacts of action alternatives that are specific to Area 4CDE.

[74] "The preliminary results suggest that the region-wide Pacific halibut commercial fishery's total estimated impact in 2018 amounts to USD 281 mil. (CAD 364 mil.) in GDP, USD 176 mil. (CAD 228 mil.) in labor income (including estimated USD 21.5 mil. (CAD 27.9 mil.) in wages in the Pacific halibut fishing sector), 4,453 in jobs, and USD 179 mil. (CAD 232 mil.) in household income, and over USD 666 mil. (CAD 863 mil.) in output. This is about 5.1 times the fishery output value of USD 129 mil. (CAD 168 mil.) recorded for 2018 (DFO, 2020; NOAA, 2020a). The estimate is the total economic impact, the sum of the direct, indirect, and induced effects from changes to the Pacific halibut fishing sector, as well as indirect and induced effects associated with forward-linked industries (e.g., the Pacific halibut processing sector) … These results are based on **the current version of the model incorporating only secondary data sources**. As such, **the results are conditional on the adopted assumptions for the components for which data were not available and are subject to change"** (Hutniczak, 2020).

Given the preliminary state of both the AFSC (10-region SAM) and IPHC (PHMEIA) models, and pending SSC review that was requested, these models are not used to estimate regional economic impacts for this analysis.

5.3.2 Amendment 80 impacts

5.3.2.1 Analytical approach for Amendment 80 revenue estimates

The analysts used a resampling approach to estimate a range of potential annual revenue totals for the A80 groundfish fishery under various PSC limits. The underlying data used for this analysis are NMFS observer data and NMFS Catch Accounting data that include date, groundfish target, mt of groundfish catch, wholesale value in 2018 dollars, and halibut PSC in mt for each haul by A80 vessels from 2010 through 2019 (see Table 5-1 for annual summaries of data). In 2015, as part of an Exempted Fishing Permit, deck sorted halibut were reported through logbooks rather than the observer data; therefore, 2015 data at the haul level are not comparable to other years and are excluded from this analysis. In this section, when a time period of data is referred to as 2010-2019 it is actually 2010-2014 and 2016-2019.

Table 5-1 Annual totals of the underlying haul-by-haul data used for the revenue estimation. *2020 data are preliminary and revenue data are not yet available.

Year	Groundfish catch (mt)	Wholesale value ($ 2018)	PSC (mt)	Hauls
2010	305,241	323,870,339	2,254	12,507
2011	302,157	385,153,549	1,810	11,163
2012	307,406	397,530,330	1,944	10,892
2013	306,775	307,582,132	2,166	11,338
2014	308,022	316,928,372	2,178	11,702
2015	Not used due to reporting structure			
2016	298,449	306,505,259	1,412	14,167
2017	278,771	359,357,539	1,167	13,821
2018	290,173	379,443,654	1,343	15,908
2019	288,302	335,260,125	1,458	16,574
2020*	290,382	Not available	1,097	14,430

For hauls before 2015 or from 2016-2019 where deck sorting was not utilized, haul-level PSC is estimated by applying the appropriate DMR to the observed incidental catch of halibut in the factory (See Section 3.4.1for description of halibut DMR estimation methods and DMRs). For hauls where deck sorting occurred, halibut PSC is calculated as the sum of the estimates of the mortality observed on deck and in the factory. For the deck mortality estimate, the observer identifies the viability of the halibut in a simple random sample and applies a weighted average DMR based on the weight of halibut at each viability level.[75] For factory halibut mortality, the weight of halibut in an observer's species composition samples in the factory are extrapolated to the entire haul. In 2015 through 2017, a standard DMR of 90% was applied to the halibut recovered in the factory. Beginning in 2018, a DMR is applied to the halibut recovered in the factory based on DMRs published in harvest specification tables in the **Federal Register** (Section 3.4.1).

The haul-level wholesale value is calculated by multiplying a round wholesale value to the weight of catch by species as reported in Catch Accounting. The round wholesale value is estimated by matching the price reported in COAR Production by product type, species and processor to the weekly production reports (WPR). If a match at the processor, species and product type is not achieved then an algorithm matches at different levels of aggregation of products and species from the same processor. If products

[75] The conditional mortality probabilities for halibut sorted on deck are 20% for "Excellent," 55% for "Poor," and 90% for "Dead"

are still not priced then the algorithm will look for matches across other processors and further aggregate products and species. The WPR include the product weight and round weight, allowing the COAR price to be converted to a round wholesale value in the WPR that is then applied to the Catch Accounting weight.

From the haul-by-haul data, the analysts randomly sampled hauls without replacement and summed the combined wholesale value, groundfish catch, and halibut PSC until either the total halibut PSC reached the PSC limit or the total groundfish catch reached a predetermined limit (representing a hypothetical groundfish catch limit that is in the range of recent TAC and catch history). The total wholesale value summed across hauls when the PSC limit or groundfish catch limit is reached is the estimated annual revenue for the A80 fleet under that specific PSC limit. Under this random sampling method, hauls are selected at random regardless of when they occurred throughout the year. In scenarios when the annual effort is reduced, it is reduced proportional to the temporal distribution of the underlying data; therefore, the likelihood of selecting hauls from any given month is based on the level of effort (number of hauls) in that month, regardless of the order in the year. This resampling was repeated 500 times creating 500 different combinations of resampled hauls, or "years," under each PSC limit. Nine PSC limits are used in these resampling scenarios ranging from 960 mt to 2,007 mt, corresponding to limits that are specified in the look up table for each alternative (Table 5-2).

Table 5-2 PSC limits used in revenue estimates and the associated Alternatives and look up table states

PSC limit	960	1047	1222	1309	1396	1483	1571	1745	2007
Alternative(s)	4	4	3	3	2,3,4	2	2	1,2,3,4	3

PSC limits and use varied over the last 10 years (Figure 5-1). To capture this underlying variation in the fishery, analysts subset the haul data into five datasets drawing from different time periods that represent different PSC use: (1) Data from 2013-14 were combined to capture the years where PSC was high and revenue was low to provide a lower bound example from the "worst case" in the data, (2) 2010-2014, representing high PSC use years, (3) all years in the data (2010-2019, excluding 2015), (4) 2016-2019 representing low PSC use years, and (5) data from 2017-2018 were combined to capture the years where PSC was low and revenue was high, to provide an upper bound example from the "best case" in the data. Analysts conducted the resampling analyses on each dataset separately. For each time period, analysts varied the groundfish catch limits to reflect maximum groundfish catch in the three most recent years (290,000 mt) and maximum groundfish catch throughout the decade (310,000 mt). This results in a total of ten "scenarios" that represent the range of possible outcomes for each of the nine PSC limits (five time periods or "datasets" x two catch limits).

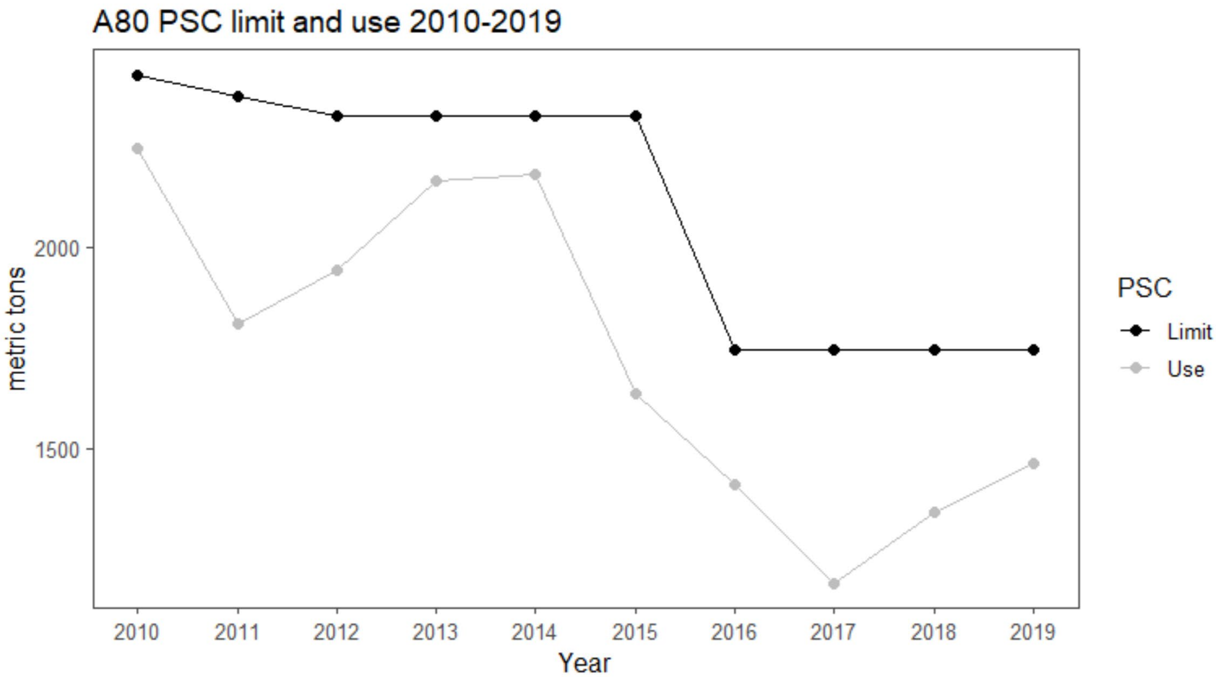

Figure 5-1 PSC limits and PSC use (mt) for the A80 sector, 2010 through 2019

The analysts did not predetermine a relationship between PSC use and the PSC limit to estimate revenue impacts. Rather, hauls were resampled until either the total PSC mortality reached the PSC limit (from the look up tables) or the total groundfish catch reached the groundfish limit (290k or 310k metric tons). This approach functions as an implicit assumption that 100% of PSC use is possible, although 100% PSC use is not met in scenarios where the groundfish limit is met before 100% of the PSC limit is reached. Figure 5-2 shows the relationship between PSC use and the PSC limit (top panel) and groundfish catch and the groundfish catch limit (bottom panel) in three different scenarios for a PSC limit of 1,745 (status quo). The top panel shows the distribution of PSC use in all scenarios. The PSC limit of 1,745 is represented by the red vertical line. When the grey bar stacks up against the red bar, 100% of the PSC limit was caught and the PSC limit was constraining. This is evident in the high PSC use scenario (2010-2014 data) under either groundfish limit (290k and 310k) and for 2010-2019 data with a 310k groundfish limit. The 2010-2019 data with a 290k groundfish limit is constrained by the PSC limit in some runs, but not all. The lower panel shows the distribution of groundfish catch with the red line representing the groundfish limit. The groundfish limit is constraining in the scenarios where the PSC limit was not constraining (the opposite of the top panel).

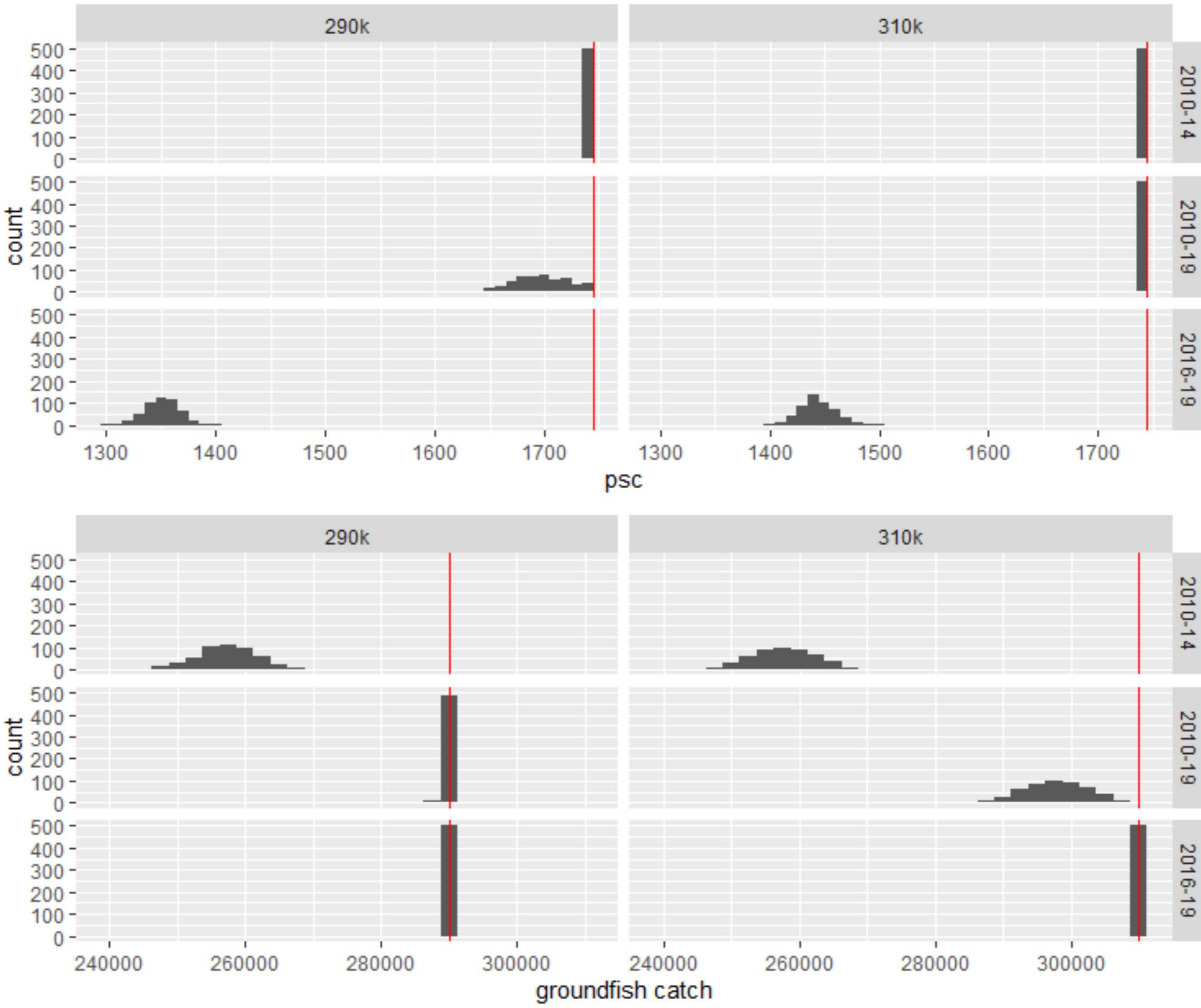

Figure 5-2 Distribution of PSC use (top panel) and groundfish catch (bottom panel) under each imposed groundfish catch limit (290k and 310k) for simulations of the status quo 1,745 mt PSC limit. PSC limit and groundfish limits are indicated by the vertical red lines.

5.3.2.1.1 Stratified random resampling approach

Analysts also completed revenue estimates using a stratified random resampling approach in response to SSC comments at the October 2020 Council meeting. This method stratifies the data by the month in which the haul occurred and resamples a number of hauls equal to the maximum hauls that occurred in that month during the years of the dataset (see Figure 5-3 for haul by month). Annual total revenues, groundfish, and PSC are summed over hauls in the order of the month in which they occur (starting with January), until the PSC limit or groundfish catch threshold is reached. The stratified sampling approach was used on only three datasets: (1) high PSC use years (2010-2014), (2) all years (2010-2019, excluding 2015), and (3) low PSC use years (2016-2019). The two additional datasets that were used in the random resampling representing "worst case" (2013-2014) and "best case" (2017-2018) scenarios in the data were not analyzed using the stratified random sampling method.

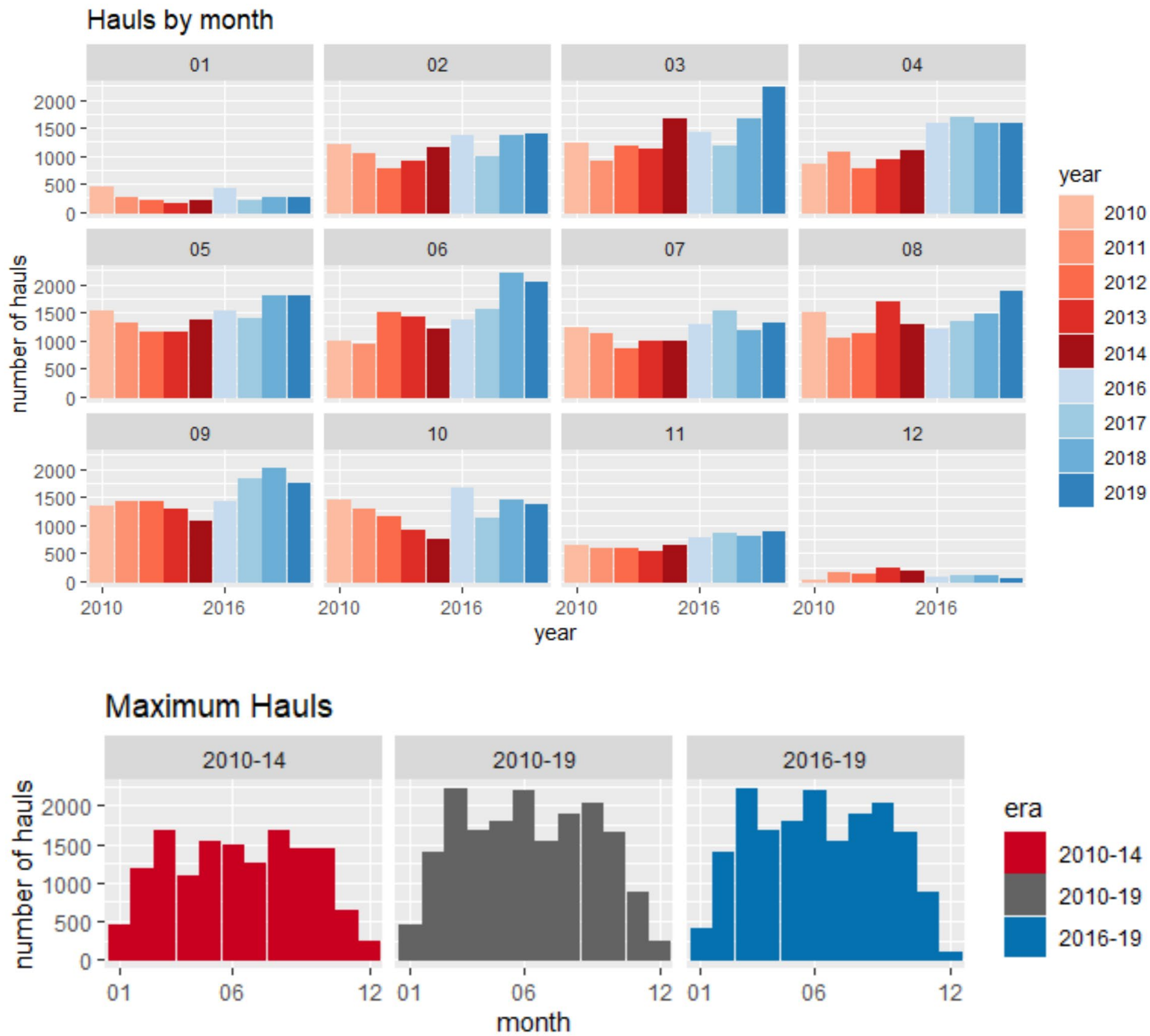

Figure 5-3 **Number of hauls per month by year from 2010 through 2019 (top panel) and maximum hauls by month in grouped datasets from underlying data used for the groundfish revenue analysis (bottom panel)**

Under the stratified sampling method, the represented effort is curtailed from the end of the year (backwards in time) for scenarios where effort is reduced by a PSC constraint. This means that hauls occurring earlier in the year are represented in the resampled data at the same effort levels as in the underlying data; later hauls are sampled at a reduced effort rate, if at all. Figure 5-4 shows the cumulative groundfish catch and PSC throughout each year, with vertical lines representing the new PSC limits and horizontal lines representing the imposed groundfish limits. In the stratified sampling scenario, the general effect is that hauls are only sampled if they occur below the groundfish threshold and to the left of the PSC limit.

In reality, it is not likely that, under new PSC limits, fishing effort in terms of hauls would continue in the same frequency by month throughout the year as in previous years until constrained by the new limits. However, the stratified approach is included to demonstrate a "business-as-usual" scenario that can be used as an informative benchmark to compare to the results from the random resampling method.

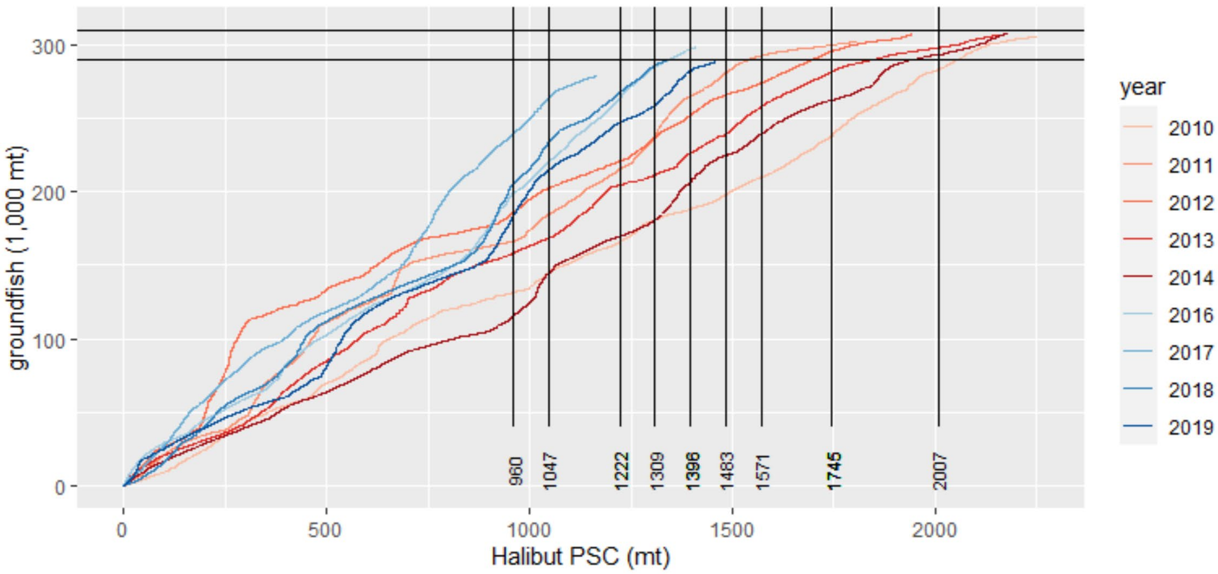

Figure 5-4 **Cumulative groundfish catch and halibut PSC for 2010 through 2019. Black horizontal lines represent groundfish limits of 290k and 310k mt; vertical lines represent PSC limits in the Alternatives (look up tables)**

Figure 5-5 shows the distribution of hauls by week in the underlying data in the top panel, compared to those of the resampled runs for the scenarios representing the lower and upper bounds under the random approach in the middle panel, and the stratified approach in the bottom panel. The distribution is displayed in kernel density estimates, which can be thought of as a smoothed-out histogram; higher "bumps" correspond to more observations within the fishery data (color) or the simulated results (black). The lower bound is represented by the scenario with a PSC limit of 960 mt (the lowest limit of the alternatives, corresponding to the look up limit under a Very Low setline survey and a Low trawl survey in Alternative 4), a groundfish catch limit of 290,000 mt (the lower of the two groundfish catch thresholds) and data from 2010-2014 (the higher PSC-use years). The upper bound is represented by the scenario with a PSC limit of 2,007 mt (the highest limit of the alternatives, corresponding to the look up limit when both surveys are in a High state in Alternative 3), a groundfish catch limit of 310,000 mt (the larger of the two thresholds) and data from 2016-2019 (the lower PSC-use years). The random resampled data generally follow similar temporal effort distributions as those in the underlying data and there is no substantial difference in distribution between the lower and upper bound scenarios. In the stratified approach it is clear that the early season effort is sampled and the later season effort is not – particularly in the lower bound scenario – although end of the year effort is still slightly curtailed in the upper scenario.

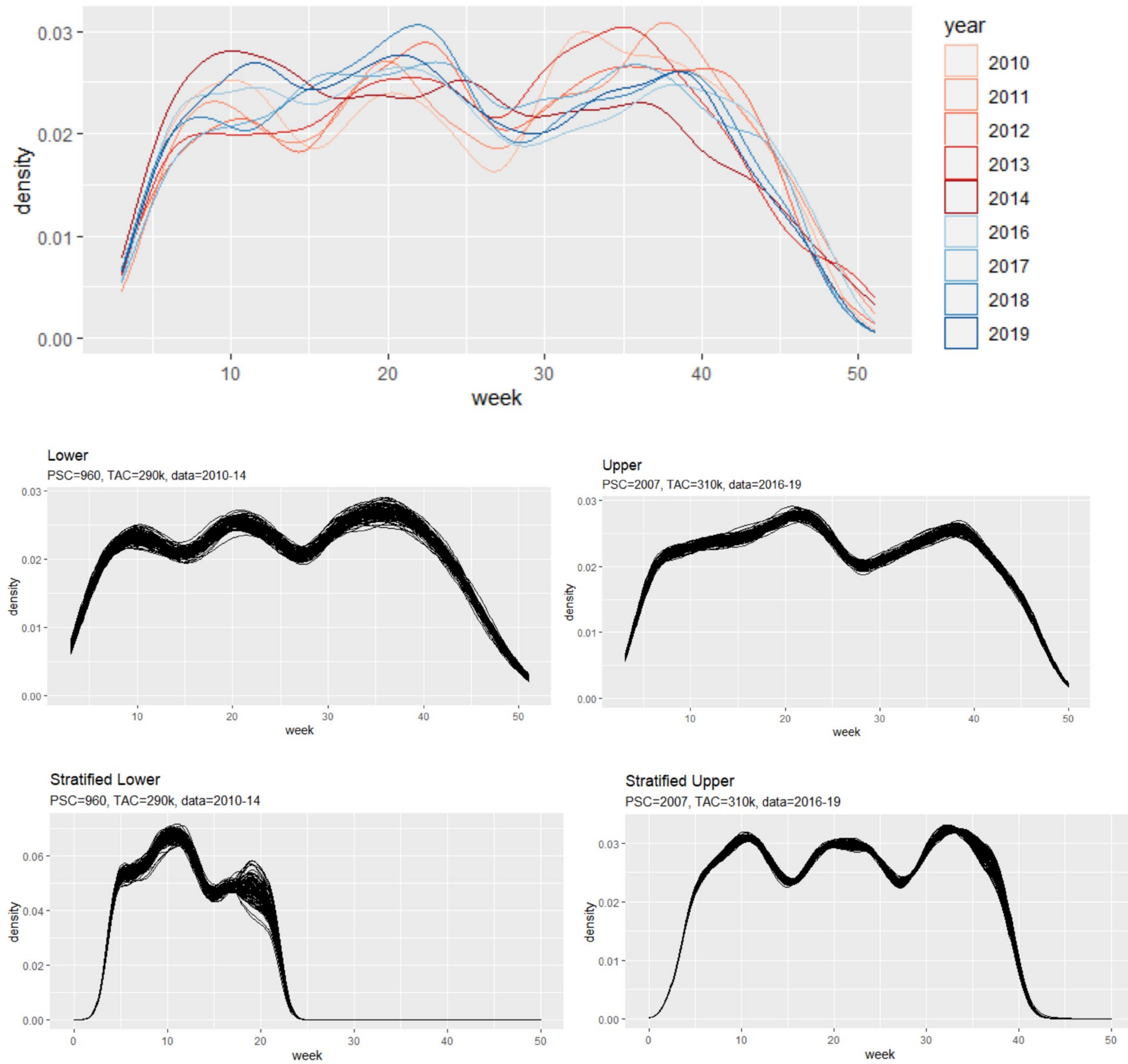

Figure 5-5 Distributions of hauls by week. Top panel = underlying data; middle panels = random sampled runs of lower and upper scenarios; bottom panels = stratified resampled runs of lower and upper scenarios

5.3.2.2 Amendment 80 sector revenue estimate results

The revenue estimates reported in this section should be read for comparison across alternatives. These results are not stand-alone predictions of future A80 revenues under each PSC limit. Harvesters are expected to make strategic choices that are different from the randomized or stratified random selection of hauls used in this analysis. The analysts estimated annual revenue, PSC use, and groundfish catch under a variety of scenarios for each of nine PSC limits identified in the alternatives. These estimates are meant to illustrate the potential impact of different variables on revenue – for example, how changing the groundfish catch limit by 20 mt or changing sector-level PSC use might affect estimated sector-level revenue. The range of estimates under each dataset (years sampled) should be considered when comparing alternatives. The different datasets (2010-14, 2010-19, 2016-19, 2013-14 and 2017-18) represent different levels of PSC use. The relevance of the estimates resulting from each of these datasets depends on numerous variables including, but not limited to, environmental conditions (i.e., aggregation of halibut and overlap with target species) and fleet behavior (i.e., prevalence of halibut avoidance strategies such as deck sorting). It is important for the reader to keep in mind that results are aggregated at the A80 sector level; the distribution of impacts across companies and vessels will certainly differ based on many factors, most notably a company's species allocation portfolio and whether it is relatively more dependent on species that tend to carry a higher halibut PSC rate. Background information on the A80 sector that frames the consideration of internal distributional impacts is provided in Section 3.3.

The results are summarized in the following tables and figures. The specific effects of each variable and sampling method as well as a discussion of the results across alternative and assumptions of the analytical approach are included in the subsections that follow.

Table 5-3 through Table 5-5, below, display the average estimated PSC use, revenue, and groundfish catch limit organized by the PSC limits that appear in the alternatives (look up tables). Unsurprisingly, lower PSC limits tend to result in reduced groundfish catch and revenue. Reductions in sector revenues are exacerbated under the high PSC-use datasets (2010-2014, 2013-2014) and minimized in the low PSC-use datasets (2016-19, 2017-18). Output estimates under higher PSC limits are more likely constrained by the groundfish catch limit (as demonstrated by blue shading in the tables) while those under lower PSC limits are more likely constrained by the PSC limit (demonstrated by green shading in the tables).

Figure 5-6 displays estimated revenue by PSC limit for each dataset under both the random and stratified sampling methods and under both considered groundfish limits. Annual totals from the underlying data are indicated by the black text for comparison purposes (10, 11, … 19). Proposed PSC limits are listed on the x-axis for reference. Figure 5-7 displays the estimated revenue across all PSC limits in each alternative, by dataset, groundfish limit and sampling method.

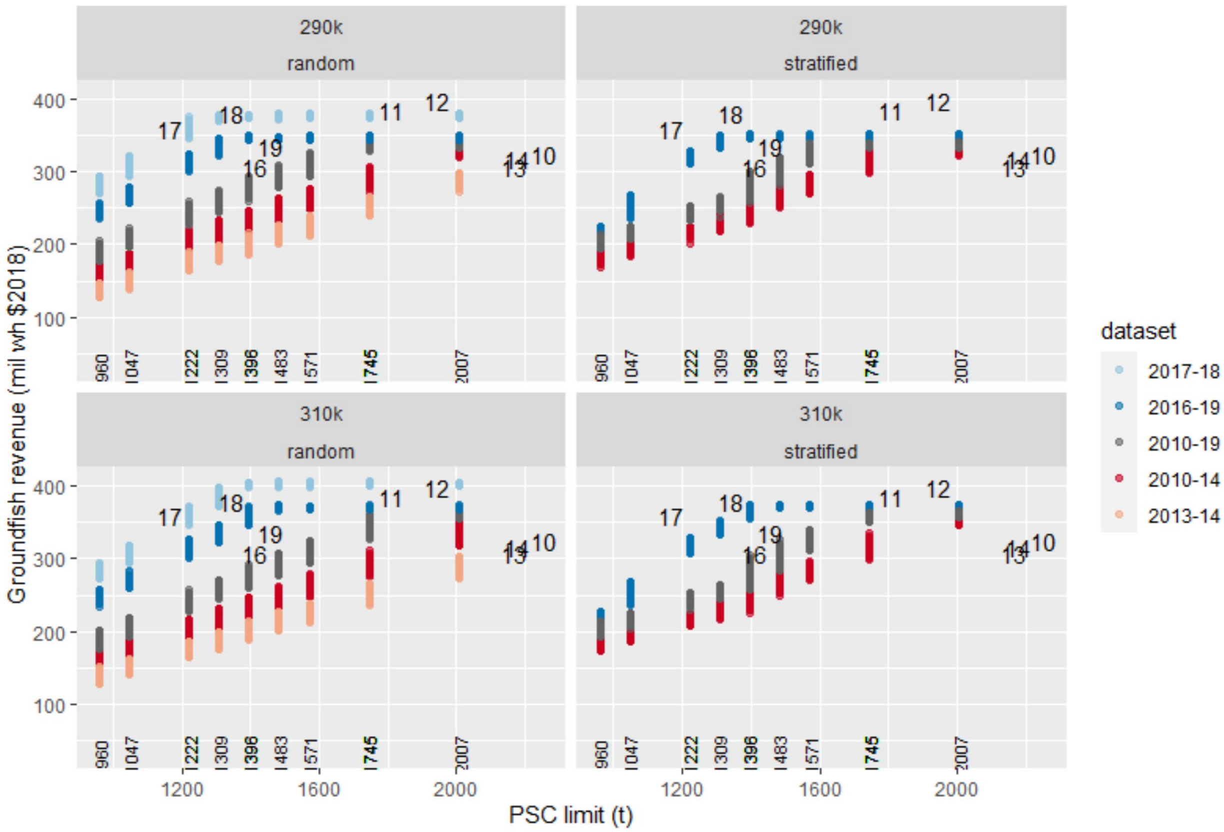

Figure 5-6 Estimated revenue by PSC limit for each dataset under both the random and stratified sampling method and both groundfish catch thresholds. Yearly totals from the underlying data are indicated by the black text (10-19) for comparison purposes. Proposed PSC limits are listed on the x-axis for reference.

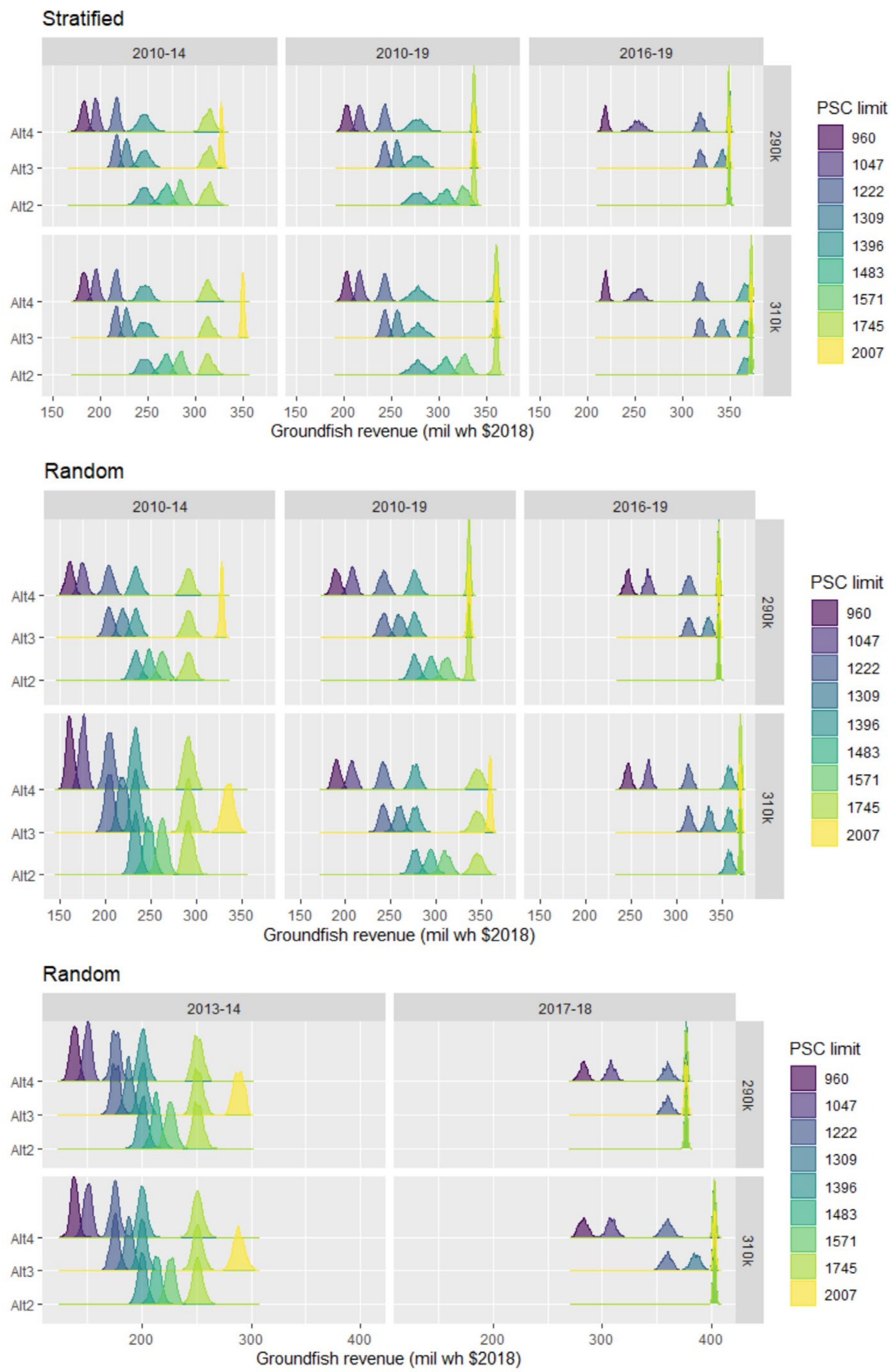

Figure 5-7 Estimated Amendment 80 sector gross wholesale revenue (2018$) associated with PSC limits specified in the look up tables by Alternative. Top panel uses stratified sampling method; middle and bottom panels use the random sampling method. Dataset is listed across top and groundfish limit is listed on the right of each panel.

Table 5-3 Average estimated groundfish catch (1,000 mt) by PSC limit and Alternative using different estimation methods. Green shading indicates the results were constrained by the PSC limit, blue shading indicates the results were constrained by the groundfish limit (290,000 or 310,000 mt).

Estimation method	PSC limit	960		1047		1222		1309		1396		1483		1571		1745		2007	
	Alternative(s)	4		4		3		3		2,3,4		2		2		1,2,3,4		3	
	GF limit (1,000 mt)	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310
Random	2010-14	141.87	142.08	154.64	154.84	180.30	180.60	193.62	193.18	206.31	206.06	219.45	218.93	232.20	232.01	257.39	257.73	289.83	296.41
	2010-19	163.68	164.03	178.98	178.64	208.84	208.68	223.74	223.47	238.37	238.53	253.43	253.17	268.16	267.55	289.89	297.92	289.98	309.98
	2016-19	206.15	206.20	225.00	225.06	262.45	262.51	280.97	281.14	289.99	299.95	289.98	309.98	289.99	309.99	289.99	309.99	289.99	309.99
	2013-14	135.87	135.96	148.12	148.27	173.09	172.68	185.01	185.05	197.65	197.23	209.83	209.77	222.39	222.41	247.19	247.13	283.86	283.97
	2017-18	217.60	217.53	237.19	237.22	277.07	276.67	289.96	296.63	289.99	309.97	289.99	309.99	289.99	309.99	289.99	309.99	289.99	309.99
Stratified	2010-14	167.26	167.25	179.74	179.73	199.56	199.38	209.93	209.99	223.89	224.00	240.13	239.85	252.87	252.54	278.24	278.01	289.98	309.98
	2010-19	179.03	178.93	191.50	191.57	214.87	214.88	226.38	226.65	243.07	243.71	264.26	264.35	281.00	281.28	289.98	309.59	289.98	309.98
	2016-19	184.07	184.22	210.79	210.86	264.14	264.04	283.60	283.57	289.99	304.60	289.99	309.98	289.99	309.98	289.99	309.99	289.99	309.98

Table 5-4 Average estimated PSC use (mt) by PSC limit and Alternative using different estimation methods. Green shading indicates the results were constrained by the PSC limit, blue shading indicates the results were constrained by the groundfish limit (290,000 or 310,000 mt).

Estimation method	PSC limit	960		1047		1222		1309		1396		1483		1571		1745		2007	
	Alternative(s)	4		4		3		3		2,3,4		2		2		1,2,3,4		3	
	GF limit (1,000 mt)	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310
Random	2010-14	960	960	1,047	1,047	1,222	1,222	1,309	1,309	1,396	1,396	1,483	1,483	1,571	1,571	1,745	1,745	1,960	2,007
	2010-19	960	960	1,047	1,047	1,222	1,222	1,309	1,309	1,396	1,396	1,483	1,483	1,571	1,571	1,698	1,745	1,699	1,817
	2016-19	960	960	1,047	1,047	1,222	1,222	1,309	1,309	1,350	1,396	1,349	1,443	1,350	1,443	1,350	1,443	1,350	1,443
	2013-14	960	960	1,047	1,047	1,222	1,222	1,309	1,309	1,396	1,396	1,483	1,483	1,571	1,571	1,745	1,745	2,006	2,007
	2017-18	960	960	1,047	1,047	1,222	1,222	1,280	1,309	1,279	1,367	1,280	1,368	1,278	1,368	1,281	1,368	1,280	1,368
Stratified	2010-14	959	959	1,047	1,047	1,222	1,222	1,309	1,309	1,396	1,396	1,483	1,483	1,571	1,571	1,745	1,745	1,808	1,911
	2010-19	960	959	1,047	1,047	1,222	1,222	1,309	1,309	1,396	1,396	1,483	1,483	1,571	1,571	1,620	1,719	1,619	1,721
	2016-19	960	960	1,047	1,047	1,222	1,222	1,309	1,309	1,337	1,396	1,338	1,419	1,338	1,420	1,337	1,421	1,337	1,419

Table 5-5 Average estimated revenue (million wholesale $2018) by PSC limit and Alternative using different estimation methods. Green shading indicates the results were constrained by the PSC limit, blue shading indicates the results were constrained by the groundfish limit (290,000 or 310,000 mt).

Estimation	PSC limit	960		1047		1222		1309		1396		1483		1571		1745		2007	
	Alternative(s)	4		4		3		3		2,3,4		2		2		1,2,3,4		3	
	GF limit (1,000 mt)	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310
Random	2010-14	160.582	160.815	174.982	175.215	204.050	204.313	219.181	218.550	233.493	233.235	248.384	247.668	262.813	262.705	291.338	291.603	327.968	335.497
	2010-19	189.686	190.121	207.396	206.935	241.993	241.715	259.314	258.923	276.215	276.468	293.723	293.380	310.690	310.046	335.887	345.264	335.937	359.123
	2016-19	246.206	246.385	268.807	268.887	313.489	313.519	335.524	335.829	346.417	358.232	346.366	370.300	346.425	370.269	346.417	370.311	346.454	370.271
	2013-14	137.994	138.184	150.453	150.591	175.812	175.384	187.950	187.992	200.795	200.295	213.141	213.202	225.934	225.979	251.137	251.123	288.273	288.545
	2017-18	282.581	282.479	307.928	308.073	359.795	359.146	376.517	385.223	376.582	402.458	376.509	402.584	376.623	402.591	376.558	402.546	376.604	402.554
Stratified	2010-14	182.258	182.272	195.088	195.065	216.307	216.059	227.666	227.668	246.072	246.276	268.338	267.997	283.966	283.479	313.799	313.520	327.054	349.666
	2010-19	202.931	202.828	216.382	216.445	242.752	242.719	255.780	256.090	277.083	277.964	305.385	305.515	326.047	326.307	336.782	360.053	336.793	360.511
	2016-19	218.741	218.978	253.143	253.251	319.090	318.907	341.704	341.720	349.070	366.178	349.027	372.528	349.165	372.536	349.034	372.499	349.147	372.479

Table 5-6 Average estimated status quo revenues (millions wholesale $2018) and percent difference from status quo by Alternative and PSC limit based on survey states. Percent differences are calculated across the rows (comparing estimates using same methods and datasets)

Estimation method	EBS Trawl Survey				Low		High		Low		High		Low		High		Low		High	
	Setline survey				Very Low		Very Low		Low		Low		Medium		Medium		High		High	
	PSC limit	1745			1396		1483		1396		1483		1483		1571		1571		1745	
	GF limit (1,000 mt)	290	310		290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310
Random	2010-14	291.338	291.603	Alternative 2	-20%	-20%	-15%	-15%	-20%	-20%	-15%	-15%	-15%	-15%	-10%	-10%	-10%	-10%	0%	0%
Random	2010-19	335.887	345.264	Alternative 2	-18%	20%	-13%	-15%	-18%	-20%	-13%	-15%	-13%	-15%	-8%	-10%	-8%	-10%	0%	0%
Random	2016-19	346.417	370.311	Alternative 2	0%	-3%	0%	0%	0%	-3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Random	2013-14	251.137	251.123	Alternative 2	-20%	-20%	-15%	-15%	-20%	-20%	-15%	-15%	-15%	-15%	-10%	-10%	-10%	-10%	0%	0%
Random	2017-18	376.558	402.546	Alternative 2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Strat.	2010-14	313.799	313.520	Alternative 2	-22%	-21%	-14%	-15%	-22%	-21%	-14%	-15%	-14%	-15%	-10%	-10%	-10%	-10%	0%	0%
Strat.	2010-19	336.782	360.053	Alternative 2	-18%	-23%	-9%	-15%	-18%	-23%	-9%	-15%	-9%	-15%	-3%	-9%	-3%	-9%	0%	0%
Strat.	2016-19	349.034	372.499	Alternative 2	0%	-2%	0%	0%	0%	-2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	PSC limit	1745			1222		1309		1309		1396		1396		1745		1745		2007	
	GF limit (1,000 mt)	290	310		290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310
Random	2010-14	291.338	291.603	Alternative 3	-30%	-30%	-25%	-25%	-25%	-25%	-20%	-20%	-20%	-20%	0%	0%	0%	0%	13%	15%
Random	2010-19	335.887	345.264	Alternative 3	-28%	-30%	-23%	-25%	-23%	-25%	-18%	-20%	-18%	-20%	0%	0%	0%	0%	0%	4%
Random	2016-19	346.417	370.311	Alternative 3	-10%	-15%	-3%	-9%	-3%	-9%	0%	-3%	0%	-3%	0%	0%	0%	0%	0%	0%
Random	2013-14	251.137	251.123	Alternative 3	-30%	-30%	-25%	-25%	-25%	-25%	-20%	-20%	-20%	-20%	0%	0%	0%	0%	15%	15%
Random	2017-18	376.558	402.546	Alternative 3	-4%	-11%	0%	-4%	0%	-4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Strat.	2010-14	313.799	313.520	Alternative 3	-31%	-31%	-27%	-27%	-27%	-27%	-22%	-21%	-22%	-21%	0%	0%	0%	0%	4%	12%
Strat.	2010-19	336.782	360.053	Alternative 3	-28%	-33%	-24%	-29%	-24%	-29%	-18%	-23%	-18%	-23%	0%	0%	0%	0%	0%	0%
Strat.	2016-19	349.034	372.499	Alternative 3	-9%	-14%	-2%	-8%	-2%	-8%	0%	-2%	0%	-2%	0%	0%	0%	0%	0%	0%
	PSC limit	1745			960		1047		1047		1222		1222		1396		1396		1745	
	GF limit (1,000 mt)	290	310		290	310	290	310	290	310	290	310	290	310	290	310	290	310	290	310
Random	2010-14	291.338	291.603	Alternative 4	-45%	-45%	-40%	-40%	-40%	-40%	-30%	-30%	-30%	-30%	-20%	-20%	-20%	-20%	0%	0%
Random	2010-19	335.887	345.264	Alternative 4	-44%	-45%	-38%	-40%	-38%	-40%	-28%	-30%	-28%	-30%	-18%	-20%	-18%	-20%	0%	0%
Random	2016-19	346.417	370.311	Alternative 4	-29%	-33%	-22%	-27%	-22%	-27%	-10%	-15%	-10%	-15%	0%	-3%	0%	-3%	0%	0%
Random	2013-14	251.137	251.123	Alternative 4	-45%	-45%	-40%	-40%	-40%	-40%	-30%	-30%	-30%	-30%	-20%	-20%	-20%	-20%	0%	0%
Random	2017-18	376.558	402.546	Alternative 4	-25%	-30%	-18%	-23%	-18%	-23%	-4%	-11%	-4%	-11%	0%	0%	0%	0%	0%	0%
Strat.	2010-14	313.799	313.520	Alternative 4	-42%	-42%	-38%	-38%	-38%	-38%	-31%	-31%	-31%	-31%	-22%	-21%	-22%	-21%	0%	0%
Strat.	2010-19	336.782	360.053	Alternative 4	-40%	-44%	-36%	-40%	-36%	-40%	-28%	-33%	-28%	-33%	-18%	-23%	-18%	-23%	0%	0%
Strat.	2016-19	349.034	372.499	Alternative 4	-37%	-41%	-27%	-32%	-27%	-32%	-9%	-14%	-9%	-14%	0%	-2%	0%	-2%	0%	0%

5.3.2.2.1 Effect of sampling method, groundfish limits, and dataset selection

The sampling method (random or stratified) has minimal impact on revenue results. One would expect a difference between these sampling methods if the distribution of revenue, groundfish, or PSC varied substantially by month. For example, if the fleet captured a majority of its revenue early in the season then a stratified approach would lead to higher revenue estimates than a random sampling approach since the early season revenue would be included in the resampling at the same effort levels in the stratified approach. To compare results based on sampling method, contrast the dark red, grey, and dark blue datasets between the left and right panels in Figure 5-6 or compare the top two panels in Figure 5-7. Comparison of average estimates can also be made by comparing rows with the same dataset across each sampling method in Table 5-3 and Table 5-4. There is slight variation in estimates for the earlier, higher PSC-use dataset (2010-14). Stratified sampling results in higher revenue estimates than random sampling, although this is muted at the highest PSC limit. This may be due to some years in which the early rate of groundfish catch was relatively steep, and in all years from 2010 through 2014 catch tends to taper off towards the end of the year (Figure 5-5). For the later, lower PSC-use dataset (2016-19), there is slight variation between sampling methods with stratified sampling resulting in lower revenue estimates at lower PSC limits. However, these differences do not persist at higher PSC limits when the entire dataset is more likely to be sampled regardless of the sampling method.

The lack of substantial difference in estimates by sampling methods indicates that results from both the stratified and random sampling method likely represent a lower bound of possible revenue estimates (and an upper bound of revenue impacts). This is not unexpected, as any changes in fleet behavior to adapt to changing PSC limits are likely to be more efficient than a proportional reduction in effort throughout a fishing year as estimated by the random sampling method, or a repeat of previous effort that is prematurely truncated as estimated by the stratified sampling method.

The impact of the groundfish limit can be seen by comparing the upper and lower panels in Figure 5-6, as well as the upper and lower strips within each panel in Figure 5-7 or the columns listed “290” and “310” in Table 5-3 through Table 5-5. Regardless of dataset or estimation method, there is no discernable difference in revenue estimates by groundfish limit until the PSC limit is large enough for the groundfish limit to become constraining. The PSC limit at which the groundfish becomes constraining depends upon the dataset, occurring earliest at a PSC limit of 1,309 for the lowest PSC use dataset (2017-18) and never occurring for the highest PSC use dataset (2013-14). Scenarios where the groundfish limit is constraining are shaded in blue in Table 5-3 through Table 5-5. In these scenarios the higher groundfish limit of 310,000 mt results in larger estimated revenue.

The choice of which dataset to use in the revenue analysis has the largest impact of any other variations between the scenarios. Changing the sampling method between random or stratified or changing the groundfish limit between 290,000 mt and 310,000 mt have smaller impacts on total revenue estimates. This is unsurprising since there is large variation in the rate of PSC use and revenue generated between years, and because the range of datasets were selected to demonstrate these differences. Datasets including more recent years generate higher revenues at all PSC limits. The differences in estimated revenues from higher PSC use and lower PSC use datasets are larger at lower PSC limits and become less substantial at higher PSC limits.

5.3.2.2.2 Comparison across alternatives

Figure 5-7 displays the estimated A80 wholesale revenues by the PSC limits associated with each alternative. Alternative 1 is not shown but can be determined by comparing the results under the 1,745 PSC limit (shown in the lightest green/yellow color) to the other Alternatives. The range of potential revenue outcomes for each alternative is related to the range of the PSC limits associated with each alternative. Alternative 2 has the narrowest range of PSC limits (1,396-1,745) and thus the narrowest range of revenue estimates. Alternative 3 includes a wider range of PSC limits (1,222-2,007) than Alternative 2 and is the only alternative that includes a potential increased limit from status quo (2,007), shown by the yellow ridge. Alternative 4 includes the two lowest potential PSC limits and peaks at the status quo limit (960-1,745).

The PSC limit applied in each alternative is based on the combinations of the survey states as defined in the look up tables. Table 5-6 displays the percent change in average estimated revenue from status quo by the PSC limit associated with each alternative under equivalent survey states. These percent-differences are calculated across rows, so they are compared to the status quo revenue estimates using the same methodology and dataset as shown in the Alternative 1 column (in blue and green shading). The purple shading indicates reductions from status quo and yellow shading indicates increases from status quo; darker shading corresponds to larger changes.

Presidential Executive Order (E.O.) 12866 (58 FR 51735, October 4, 1993) requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." The EO lists multiple definitions of a "significant regulatory action," one of which is an action that is likely to have an annual effect on the economy of $100 million or more. The percentage change in average estimated revenue from status quo reported in Table 5-6 represent changes of $100 million or more in some scenarios under the Alternative 4 PSC limits of 960 or 1,047mt. The difference in average estimated revenue represents $100 million or more in 13 of the 16 scenarios under a PSC limit of 960mt (all but those using the random approach with the 2017-2018 dataset or the 2016-2019 dataset and a groundfish limit of 290,000 mt) and in five of the 16 scenarios under a PSC limit of 1,047mt (scenarios using the random approach and datasets 2010-2014 and 2010-2019 as well as the stratified approach using 2010-2019 data and a 310,000mt groundfish limit).

The likelihood of falling into one of the cells in Table 5-3 through Table 5-6 is based on multiple factors. The first, most direct, factor is determined by the survey indices and the applicable PSC limit as determined by the alternatives (look up tables). The second factor determining which cell represents the most likely outcome is which dataset was used to create the estimate. The lowest bound is represented by the 2013-14 dataset and the highest by the 2017-18 dataset. Given reductions in PSC limits and operational changes such as increased deck sorting, it is most likely that future PSC use will be similar to what has been seen in the years since 2015 – i.e., estimates using 2016-19 or 2017-18 data are most likely. However, it is possible that estimates using the earlier, higher PSC-use datasets may be representative if encounter rates were to increase and efforts to reduce mortality became less effective.

Currently, both the setline and the trawl surveys are in the Low categories, which correspond to PSC limits that represent immediate reductions from the status quo PSC limit of 1,745 mt. Revenue estimates under the resulting PSC limits using the 2016-19 dataset range from no change to a reduction of 3% under Alternative 2, reductions of 3% to 9% under Alternative 3, and reductions of 22% to 32% under Alternative 4.

5.3.2.2.3 Discussion

This section discusses some of the assumptions and limitations of the resampling approach and resulting revenue estimates. One advantage of the resampling approach is that it is based on actual fishery data. The analysts are not creating any individual hauls that have not occurred during actual fishing. A limitation of this approach is that estimates only reflect the environmental conditions and fishing behavior that occurred during the past 10 years. As a result, this approach does not estimate outcomes under a changed environmental or management regime, nor does it incorporate fishing adaptations or behavioral changes that may occur in the future.

Under the random sampling method, there is no specified order to the combination of hauls so any haul is equally likely to be selected regardless of when it occurred. This does not impose any external structure on a fishing year; however, when effort is reduced it is equally likely to be reduced from any portion of the fishing year based on the basic effort distribution in the underlying data. Under the stratified method, effort reductions truncate the fishing year starting with the end of the calendar. While both sampling methods may accurately reflect fishing in that harvesters have a limited amount of control over the species composition in each haul, neither method captures behavioral adjustments such as changes in targeting, fishing location, or other halibut avoidance strategies that might be employed depending on the emphasis being placed on PSC at the time. As such, the resulting estimates likely represent an upper bound for impacts, in that adaptive behaviors could mitigate the impact of PSC limit reductions more than random or stratified random sampling methods reflect. The extent to which this is true is unknown; a key unanswered question is how close the A80 sector is to the point of diminishing returns in halibut PSC mitigation. This is discussed further in Section 5.4 which also notes that A80 companies are not homogeneous in the extent to which a marginal PSC limit reduction could affect expected groundfish revenues.

The random resampling of actual hauls might also underestimate the range of uncertainty in annual revenue estimates since results based on historical haul data tend to center around the mean. While this may represent the most likely outcome because hauls are selected based on their prevalence in the underlying distribution, it is less likely to include the most extreme examples such as a year in which the fleet has difficulty avoiding halibut and accumulates PSC at a more rapid rate. This method is unlikely to select rare "lightning strike" events that could result in adverse impacts for the A80 fleet simply because they are rare. This is particularly the case for this analysis because the distribution of the underlying data is skewed with many hauls capturing a small amount of PSC and very few hauls capturing relatively large amounts of PSC.

To incorporate a larger range of uncertainty in the results, the analysts separated the data into relatively high PSC-use years (2010-2014) and low PSC-use years (2016-2019) as well as selecting additional year combinations to bookend the results. Those combinations were 2013-2014 to capture the years where PSC was high and revenue was low and 2017-2018 to capture when PSC was low and revenue was high. Given recent mortality patterns and substantial changes in fleet operation, including widespread adoption of deck sorting, it seems unlikely that future years will be similar to those before 2015. Overall, the analysts presume that results from more recent years are likely to be better representative of future outcomes. Grouping datasets captures more uncertainty but results still cluster around the means of the grouped years and thus they do not capture the full range of potential outcomes – particularly in a scenario when halibut abundance and PSC limits are low but halibut encounters are high, which could have more negative consequences to the fleet.

The assumption that 100% PSC use is possible may contribute to less uncertainty in the revenue estimates for scenarios where the PSC limit is constraining. This assumption may also lead to relatively higher PSC use estimates than are likely, given that the fleet has not used 100% of the PSC limit in any of the past 10 years (Figure 5-1). This is not an uncommon challenge in PSC limit analyses and the Council has historically understood that in this case the analysts are presenting an estimate of the maximum adverse impact. The analysts considered other options for defining the relationship between PSC use and the limit. It makes sense to consider all types of relationships between the PSC limit and use – random, constant, or scaled (i.e. higher use-rate at a lower limit). Ultimately, for purposes of presentation, the analysts concluded that the results are most easily understood by showing 100% use as a maximum-impact and allowing the reader to adjust downward based on what is qualitatively understood. The implementation of a groundfish limit in this analysis also mutes the cases in which 100% of the PSC limit is attained. In most scenarios, at higher PSC limits, the groundfish limit is constraining before the PSC limit is met. It is possible that expected PSC use should be higher, all else equal, if halibut are more abundant in the BSAI, but this document has discussed the multiple, complex determinants of PSC encounter and mortality and in comparison to survey indices at several points (e.g., Sections 3.4.3 and 3.4.4).

Another reason not to take the 100% use assumption at face-value is that the marginal change in the constraint posed by a mt of PSC limit reduction (or increase) is not linear and is not experienced the same across A80 companies, per their groundfish quota portfolios. The analysts expect that an A80 operator's behavior would be modified to a similar extent if expected use relative to the PSC limit is, say, 85%, 95%, or 100%. In other words, it is not the analysts' impression that A80 companies create fishing plans to push their PSC use to the limit, given the substantial risk; this is borne out in the historical data shown in Figure 5-1. If an A80 company – or the sector as a whole – feels that it is making substantial investment and giving maximum practicable effort to minimize halibut mortality when PSC use is a fraction of the limit, then it is possible that additional efforts might yield less PSC reduction or have no effect. For example, A80 PSC limit use was 63% in 2020 (1,097 mt use vs. 1,745 mt limit). It is difficult for the analysts to draw a *direct* line between a reduced hard cap (either through the alternatives or the options) and lower use. Given the variability in annual halibut encounter and mortality, similar efforts – all else equal – could yield more or less halibut PSC in a different year. The relatively loose nature of the relationship between the PSC limit and mortality on an annual basis – especially given the efforts to avoid PSC that are currently being employed – make it difficult to quantify what "incentive" a given percent reduction in the limit would provide. This is not to say that a marginal reduction in the PSC limit or a rollover/flexibility option would carry no incentive; rather, that the incentive partially lies in how the Council is framing the limit and the options.

The analysts also note that PSC use is a function of many factors, some of which are outside of the fleet's direct control. For example, changing environmental conditions could disperse groundfish or cause them to move out of well-known, fishable areas. This could cause the fleet to tow more hours for the same amount of catch, increasing gross costs as well as the possibility of high-bycatch events. A changing environment might also change the extent to which groundfish and halibut are comingled, also changing the probability of bycatch. The extent of these changes is presently unknown, meaning that at this time they can be thought of as risk factors that may affect the fleet's ability to maintain harvest levels under a lower PSC limit in a practicable manner.

Finally, it is important to note that these estimates represent gross revenues and do not attempt to estimate the costs associated with changing fishing operations to avoid halibut that are described in Section 5.3.2.3. Estimates are fleet-wide and, thus, potential distributional impacts within the sector based on operational differences and fishing portfolios are considered qualitatively. A key figure for that consideration is Figure 3-15 in Section 3.3, which compares the quota share portfolios by species group across the presently active A80 companies.

5.3.2.3 Practicability of bycatch avoidance/meeting PSC limits by the A80 sector

This section addresses the practicability of further bycatch reduction under the action alternatives considered here, and in some cases, greater than the reduction instituted by Amendment 111 and considers this under the mandate to address competing National Standards in the purpose and need statement.

5.3.2.3.1 Balancing competing requirements among the national standards

The Council's problem statement addresses both National Standard 1 (prevent overfishing and achieving OY) and National Standard 9.

> *The Council intends to establish an abundance-based halibut PSC management program in the BSAI for the Amendment 80 sector that meets the requirements of the Magnuson-Stevens Act, particularly to minimize halibut PSC to the extent practicable under National Standard 9 and to achieve optimum yield in the BSAI groundfish fisheries on a continuing basis under National Standard 1.*

The current management structure for halibut is employed to ensure that halibut is not being overfished in either the directed halibut fisheries (IPHC) or as bycatch (NPFMC) in groundfish fisheries (See Sections 4.2 and 4.3). Section 5.6 describes expected changes in net benefits to the Nation and concludes that constraining halibut PSC limits set for species harvested by the A80 sector that result in reduce catch and marketing of those species are likely to result in negative impacts to net benefits to the Nation. When considering non-economic impacts, the BSAI FMP[76] defines the OY of the BSAI groundfish complex (consisting of stocks listed in the 'target species' category, as listed in Table 3-1 of the FMP) is 85% of the historical estimate of MSY, or 1.4 to 2.0 million mt. The OY specification for BSAI groundfish was established as part of Amendment 1 to the BSAI Groundfish FMP. Analysis of Amendment 1, was completed in August, 1981 (NPFMC 1981) and stated that the 15% reduction from MSY was "intended both to assure the continued health of the target species themselves and to mitigate the impact of commercial groundfish operations on other elements of the natural environment." The EIS for Amendment 1 described a variety of direct and indirect impacts likely to result from this specification, including incidental harvest of other marine resources. A programmatic supplemental environmental impact statement (PSEIS) was completed in June 2004 that analyzed impacts on prohibited species as well as other species and habitats. The important social and economic factors summarized in the PEIS includes:

> 1. The OY range is not likely to have any significant detrimental impact on the industry. On the contrary, specification of OY as a constant range helps to create a stable management environment in which the industry can plan its activities consistently, with an expectation that each year's total groundfish catch will be at least 1.4 million mt.
>
> 2. The OY range encompasses the annual catch levels taken in the period immediately before its implementation, during which the fishery operated profitably.

Given that in 2021 the A80 sector's apportionment of all BSAI groundfish species is about 12% of the 2 million mt limit, it would be possible to achieve OY as defined in the FMP without harvesting any of the A80 allocation, based on current groundfish stock conditions. However, that would negatively impact the A80 sector and potentially reduce net benefits to the Nation.

National Standard 9 (NS 9) states that "conservation and management measures shall, to the extent practicable, (a) minimize bycatch and (b) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." NS9 has three primary components as it relates to halibut bycatch for the A80 sector.

1. The conservation and management measure must be practicable.
2. Bycatch should be avoided to minimize the catch of that species. A priority is placed on avoiding catching halibut.
3. If bycatch cannot be avoided, the mortality of the bycatch species should be minimized.

"The priority under this standard is first to avoid catching bycatch species where practicable" 50 C.F.R. 600.350(d). Inconvenience is not an excuse; however, at the same time, practicability means more than mere possibility.

Merriam-Webster defines practicable as "capable of being done or carried out." While this definition is useful when considering technologies that are currently being used and have been proven to be effective, it does not provide a straightforward answer to how the term should be applied when considering impacts on harvest, the economic viability of firms, or technological changes that may be developed in the future. For example, the term does not state whether the PSC reduction needs to be achieved every year under the proposed action or how much of a negative impact on specific fleets is acceptable.

At the least, practicability implies that firms can operate under the proposed management measures and remain economically viable. Here, given all of the measures that could be implemented to reduce halibut mortality would have a cost to the fleet, the increased costs limit how those tools can be implemented while keeping the fleet economically viable.

[76] https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf

A general description of the A80 fleet's operations and annual planning to harvest its allocation is presented in Section 3.3.3. This section describes in more detail the tools that are available to the fleet that may or may not make proposed PSC reductions practicable. The following sections include a brief background section on the A80 fleet, a summary of issues that affect the A80 fleet's ability to avoid halibut bycatch, current halibut bycatch avoidance measures that have been implemented by the A80 fleet, mortality mitigation measures that have been implemented for halibut that could not be avoided, a discussion of potential bycatch avoidance measures that could be considered in the future, and a conclusion.

5.3.2.3.2 Background

The history of A80 and participants in the A80 sector is provided in other sections of this document. A detailed discussion of the sector is provided in Section 3.3.1. That section describes the consolidation of the firms within the sector. These changes are expected to make comparisons of halibut usage in the past less directly comparable to halibut usage rates in the future because individual firms have employed different strategies to address halibut bycatch and in the past bycatch rates were more divergent across firms.

Exogenous and endogenous factors impact A80 companies' ability to reduce halibut mortality. Factors they cannot control include environmental factors and annual allocations that are based on past catch history. The annual allocation was established by vessel based on qualifying landings history of the vessel. Vessels can be sold or replaced (QS is then assigned to the LLP license associated with the original vessel), but the number of QS units originally assigned to the vessel are static over time. Current (2021) QS holdings by vessel or license are provided on the NMFS website and summarized by firm in Table 5-7. Those data indicate two firms have small allocations of Atka mackerel and Rockfish (POP). In terms of target fisheries, these two firms are most heavily reliant on flatfish from their A80 allocation. The other three firms have more diverse A80 species portfolios, with two of the firms receiving about 85% of the Atka mackerel and POP allocations, combined. Even though firms are allocated varying portfolio mixes of A80 species, all firms and vessels rely on flatfish as an essential part of their annual fishing cycle.

Table 5-7: Percentage of A80 QS units held by company, 2021

Company	Atka Mackerel	Flathead Sole	Pacific Cod	Pacific Ocean Perch	Rock Sole	Yellowfin Sole
1	0.34%	36.40%	23.95%	0.03%	24.94%	20.85%
2	2.32%	14.90%	21.14%	0.43%	20.82%	12.33%
3	10.55%	9.74%	16.12%	14.32%	13.10%	9.44%
4	32.85%	28.53%	21.39%	28.41%	26.52%	32.57%
5	53.93%	10.43%	17.41%	56.81%	14.62%	24.81%
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source: https://www.fisheries.noaa.gov/sites/default/files/akro/21A80_Owner_List.csv

Standard bycatch rates are established for each target fishery as part of the HAP implemented by the cooperative (discussed further in Section 3.4.5). Firms that have larger allocations of round fish, that historically has had lower bycatch rates of halibut, must still be careful when participating in their annual fishing cycle to ensure that individual vessels do not exceed the annual halibut standard bycatch rates by fishery established by the cooperative. For example, a firm could decide to send a vessel to the AI to fish Atka mackerel early in the year. When the vessel returns to the BS to fish yellowfin sole[77] it will need to

[77] Yellowfin sole target tows in the late winter and spring that are fished in shallower water 10 to 20 fathoms are reported to have lower halibut bycatch rates than when yellowfin sole is fished later in the year and in deeper water.

ensure that halibut bycatch rates are low enough that each vessel will not be over a target fishery standard bycatch rate for halibut since they may have limited opportunities to reduce the rate later in the year when catch composition tends to be more mixed. The issue of a vessel exceeding a directed species halibut PSC rate is further complicated by the targeting algorithm used by NMFS (and applied by the cooperatives to determine if vessels are within their allowable bycatch rates in the cooperative during a year or quarter) that is based on catch composition and the mixed flatfish species tows that often occur in the late summer and fall fisheries. A vessel could be intending to target yellowfin sole on a tow, but the tow could be defined as a rock sole target based on catch composition. If the trip takes place after the traditional rock sole with roe fishery in the late winter or early spring and the vessel has not established a lower average rate based on earlier rock sole fishing, it could be difficult for the vessel to target rock sole later in the year and reduce the halibut bycatch rate in that target fishery sufficiently to meet the rock sole standard bycatch rate and avoid penalties imposed under the HAP.

A summary of halibut mortality by A80 sector is provided in Section 3.4.1. Table 3-20 shows that since 2015, halibut rates (kg halibut mortality per mt target species) in the Atka mackerel and rockfish fisheries and have been about 1/6th the rates of the flatfish species. The first wholesale value derived from those species per mt of halibut mortality is also substantially higher than the flatfish species (see Figure 3-33). Firms that are allocated very small amounts of these fisheries have limited ability to participate in fisheries that are relatively less impacted by halibut PSC, but as stated earlier all vessels/firms are reliant on flatfish. Rock sole typically has slightly higher halibut PSC rates than yellowfin sole. However, since the fishery typically occurs early in the year (in part due to schooling of the fish and roe availability), that fishery may be less constrained by annual halibut PSC limits.[78] Still, vessel operators in the fleet will attempt to ensure that the halibut bycatch rate is within the standard bycatch rate established under the HAP for rock sole.

The relative first wholesale value derived from the flatfish fisheries per mt of halibut mortality vary by year but are, in general, fairly similar. The majority of the flathead sole target fishery typically takes place in the second half of the year and that is when the halibut mortality associated with that fishery is realized (see Figure 3-30). However, the magnitude of the flathead sole fishery (18,432 mt in 2021) is relatively small compared to the yellowfin sole fishery (15% of 123,154 mt in 2021) (85 FR 13553) and the halibut PSC associated with the fishery is accounted under a combined arrowtooth founder/flathead sole fishery within the cooperative. The amount of yellowfin sole that is allocated to the A80 sector and the way the sector choses to fish it through-out the year make it the most vulnerable to negative economic impacts of reducing the halibut PSC limits.

Warmer Bering Sea water temperatures, in years like 2019, are reported to have impacted the aggregations and movements of certain species (Spencer, et al. 2019[79]). In that study, yellowfin sole was one of several fish stocks that were seen as potentially more resilient to warmer water temperatures because they may be able to move to areas that are more beneficial to their growth and survival. Members of the A80 sector have indicated that in years when the water temperature is warmer and the ice edge is farther north, the fish are more dispersed during the March through May fishery and seem to move north. The dispersion of the fish during the winter and spring fishery was stated to result in lower CPUE and the longer fishing times and yielded higher halibut PSC bycatch. Figure 5-8 (Area 513) and Figure 5-9 (Area 514)[80] shows that halibut mortality rates were generally higher in the yellowfin sole fishery during years when bottom temperatures were higher (e.g., 2019). However, there is considerable variation in halibut

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[78] Markets also play an important role in determining when vessels harvest a species. If there is excess inventory or the buyers request the fish later in the year, the A80 sector must modify their fishing plans to accommodate their clients. The first wholesale market and client demand for products at a given time are outside of the control of the A80 sector.

[79] https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.14763

[80] Source: NMFS car240_halibut_PSC annual reports of weekly PSC bycatch

mortality rates by week, and the greater use of deck sorting to reduce mortality in years when halibut could not be avoided makes drawing definitive conclusions from the figure difficult. Areas 513 and 514 were selected because relatively large percentages of the CP yellowfin sole fishery are harvested from those two areas annually. These areas routinely comprise the majority of catch by area of yellowfin sole annually with the highest proportion of overall catch occurring between February and April (Spies et al., 2020). Of the years considered in this figure, only 2017 was considered to be a ‘cold’ year, with 2020 described as ‘average’ water temperatures based on modeling indications as compared with previous years (Kearney, 2020).

Yellowfin sole survey biomass estimates have been shown to be positively correlated with bottom temperatures (Nichols, 1998) with lower estimates during colder years. The survey biomass estimates were highest in 2016 (a very warm year in the EBS) but have been declining since (Spies et al, 2020). In 2016 the adults were assumed to be more distributed in in the shelf area during the survey and outside of the traditional spawning areas having exhibited earlier spawning. Biomass of yellowfin sole has also been increasing in the Northern Bering Sea as assessed in recent years. The assessment authors are committed to continuing to explore spatial shifts in the population attributed to climate change and changing environmental conditions in the Bering Sea (Spies et al, 2020).

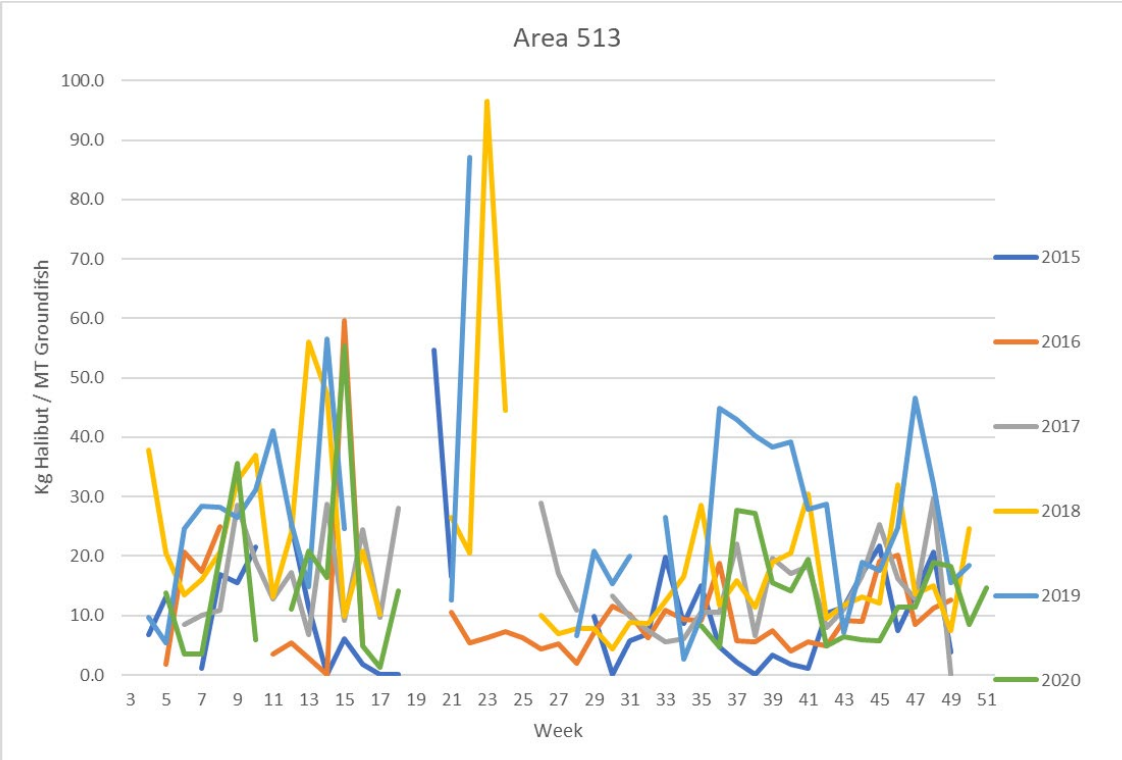

Figure 5-8 Halibut PSC rates in area 513 when targeting yellowfin sole 2015 through 2020

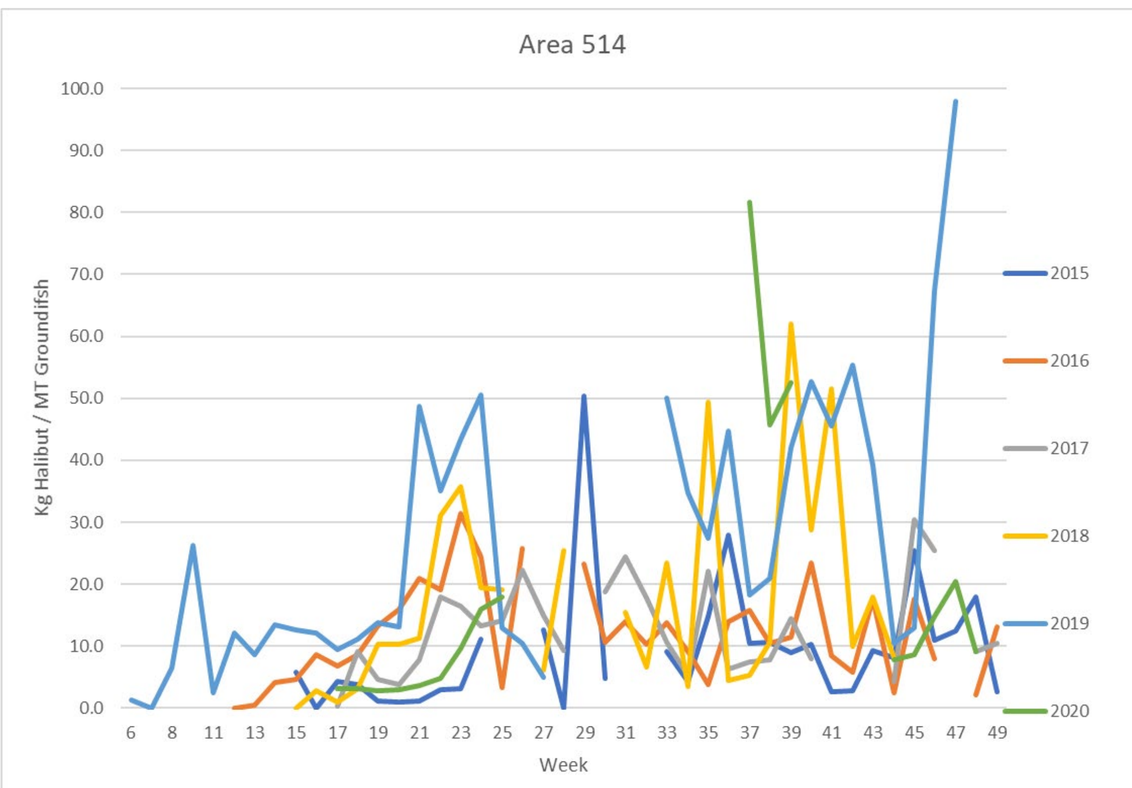

Figure 5-9 Halibut PSC rates in area 514 when targeting yellowfin sole 2015 through 2020

To the extent the A80 fleet spends additional time trying to find areas with higher CPUE and lower halibut bycatch, it will incur higher operational costs. Relatively weak markets for some A80 species in recent years, likely as a result of a variety of market factors including tariffs and changing consumer preferences, mean that the increased harvesting costs result in lower profits for the A80 firms.

5.3.2.3.3 Current bycatch avoidance/mitigation strategies

Information presented in this section describes the efforts that have been undertaken by the A80 fleet in recent years to reduce halibut bycatch and halibut bycatch mortality. Additional information is provided in Section 3.4.4. All of the tools utilized to avoid halibut or reduce mortality of halibut increase total costs associated with fishing. Following that discussion, information is provided on potential additional steps the fleet could take to reduce halibut bycatch or reduce its mortality. Finally, the information is considered in light of the proposed bycatch reductions to provide information on the practicability of the fleet's and individual firms' ability to comply with the proposed reductions.

A fleet's last response to constraining halibut PSC limits is to reduce total groundfish harvest. This fishing strategy includes an assumption that fishermen will optimize their harvest in response to constraining limits. For example, prioritizing fishing operations to the best target fishery, area, and time to maximize net revenue, and reducing effort in the target fishery, area, and time that produce less net revenue.

Estimated halibut mortality and not halibut catch or halibut interactions with the fleet's nets drives each firm's decisions regarding halibut, because that is the metric used to determine when the PSC limit becomes constraining. Accounting for halibut mortality is thought to be more accurate when deck sorting is used because the fish are all observed, and their condition estimated.[81] The use of excluders without deck sorting makes estimating actual halibut mortality less reliable because it is assumed that some unknown amount of injury or mortality results from the interaction with the net without being quantified. While this would not change the amount of mortality attributed to the A80 sector, it may impact actual halibut mortality. An FAO paper (Suuronen, 2005)[82] stated that,

> *"most scientific work on escape survival applies to towed gears, in particular trawl gears. In general, relatively high survival has been observed for many species, particularly gadoids and flatfishes, which escape from trawl codends. Substantially lower survival rates have been recorded for some pelagic species, but few studies have adequately explained the full range of stress, injury and mortality that can occur when fish escape from trawl codends under commercial fishing conditions."*

While not explicitly listed in the A80 HAP as a tool used by the fleet, tow duration may impact halibut mortality. The effects of tow duration on the proportion of fish that had reflex impairment (RAMP) in rock sole and Pacific halibut was studied by Davis (2007)[83] under laboratory conditions. He found that the percent of halibut that had RAMP greatly increased starting at tow durations of about 225 minutes. Indicating that tows lasting longer than 3.5 hours could have greater negative impacts on halibut RAMP. While, halibut showed a wider range of RAMP scores over which mortality increased, fish condition as measured by RAMP was a significant predictor for mortality in Pacific halibut under experimental conditions. Predictions of mortality using RAMP derived from laboratory fish are not expected to be valid for wild fish. However, he concluded that the concept of predicting mortality based on reflex impairment should be valid in field conditions.

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[81] Viability estimates may vary by observer, based on each observer's best estimate of condition and application of established standards.
[82] Suuronen, Petri. 2005. Mortality of Fish Escaping Trawl Gears. Food and Agricultural Organization of the United Nations Fisheries Technical Paper 478. Rome, 2005
[83] Davis, M. W. 2007. Simulated fishing experiments for predicting delayed mortality rates using reflex impairment in restrained fish. – ICES Journal of Marine Science, 64: 1535–1542.

5.3.2.3.4 Cooperative Fishing Strategy

In an effort to avoid catching halibut and reducing its mortality when caught, the A80 firms have all agreed to a general cooperative fishing strategy to manage their groundfish allocations and PSC limits. A cooperative fishing strategy has been achieved because of the vessel level allocations defined under A80. Participating A80 firms formed two cooperatives in earlier years but since 2018 they have coalesced around a single cooperative (the AKSC). Additional information on their participation in cooperatives is provided in Section 3.3.1. Part of the cooperative fishing strategy was the development of the HAP. The HAP establishes standard bycatch rates for each target fishery and provides a suite of tools designed to reduce halibut mortality that were either required to be implemented by the fleet under the HAP or were recommended to be implemented. In general, the HAP is a tool that provides various halibut avoidance measures that can be employed at the captain's or firm's discretion to keep the vessel from exceeding the defined standard bycatch rates. Firms typically rely on the captains to determine the best halibut avoidance measures to employ at any given time, because they have access to fishing data in real time and the best understanding of actual fishing conditions. The companies provide support to the captains and communicate with them on a daily basis. The firms get data from SeaState, but there is a delay of a few hauls or a day, so while they can direct a captain to employ specific measures, it is most often left to the captain's discretion. The captain has a variety of incentives to, at a minimum, keep halibut bycatch mortality within the standard bycatch rates established under the HAP. For example, captains could be responsible for any fines incurred by the firm for exceeding the standard bycatch rates. Based on discussions with members of industry this has not happened to date, and would most likely only be implemented if the captain's rates were well outside the rates realized by other vessels fishing in the target fishery at a similar time.

5.3.2.3.5 Setting Standard Bycatch Rates

Among the measures used by the cooperative to maintain low bycatch rates is a HAP that establishes standard bycatch rates by target fishery. This plan uses rate standards, which if not met, result in monetary or halibut allocation penalties. The monetary fines are viewed as a deterrent to high PSC rates, but are considered less severe than reductions in a firm's annual halibut allocation within the cooperative. Annual standards are used to create incentives for vessels to maintain halibut bycatch mortality rates similar to the historical fleet average. It has not been uncommon for vessels in the fleet to be close to exceeding the standard and needing good rates at the end of the year to avoid exceeding the standard in that target fishery. A fourth quarter standard is also set to motivate vessels to continue their halibut avoidance efforts through the end of the year, regardless of whether their allocation of halibut is likely to be constraining. If a vessel does not achieve the standard rate established for the fishery, the following year they are subject to quarterly standard halibut mortality rate requirements. Because the rates must be adhered to each quarter, it creates greater pressure for the vessel not to have a tow with high halibut rates. These measures appear to be having the desired effects, as all vessels complied with the standards in the 5th year of the plan. In addition to rate standards, the HAP also recommended weekly meetings as necessary to discuss overall Bering Sea halibut PSC performance. Meetings include discussions of halibut bycatch rates and performance, success of the various bycatch avoidance strategies, ideas regarding development of additional measures to reduce bycatch, and participate in working groups to reduce halibut bycatch.

5.3.2.3.6 Communication

Improved communication between members of the A80 fleet to reduce halibut catch is a central feature of the HAP. Improved communication was designed to occur through the sharing of information between company offices and their captains, vessel captains actively fishing, and through data collected by NMFS that is provided to SeaState. All firms in the AKSC are required to join the agreement with SeaState, so that it can provide notices to the fleet if high bycatch rates are encountered. SeaState also compiles and reviews catch and bycatch data and provides information as necessary to the fleet to help avoid areas and times of high bycatch rates. Captains are also required to communicate the most up-to-date and complete information on the grounds concerning halibut bycatch rates. The HAP defines the types of information that should be shared on the grounds including:

- prevailing bycatch rates and changes in those rates,
- catch rates of O26 halibut (particularly in the 4CDE IPHC regulatory area),
- effectiveness of deck sorting in the different target fisheries under various conditions and bycatch levels,
- effectiveness of halibut excluders in the different target fisheries under various conditions and bycatch levels, and
- any factor that may be relevant to U26 bycatch rates and O26 bycatch rates, including the effects of:
  - time of day
  - fishing depth
  - water temperature
  - areas of halibut concentrations
  - effects of any gear modifications.

While sharing of information is a valuable tool in halibut avoidance, captains and firms have greater incentives to share information on fishing locations that allow the vessel to harvest more target catch under a cooperative program relative to the open access or when certain species constrain catch. In the A80 sector a firm may be less willing to share information when they find an area with low halibut bycatch in the yellowfin sole fishery, if they are concerned about taking their entire PSC limit. The other vessels in the fleet will eventually deduce a vessel has found a good location based on its consistent activity at that location. However, the vessel may be able to fish several tows before other members of the fleet converge on the location and harvest the yellowfin sole available. Once the location is fished to the point CPUE declines and halibut rates increase vessels will disperse. The longer the vessel is able to fish the area without competition, the more yellowfin sole it could harvest at relatively low bycatch rates. This strategy is beneficial to the firm with a set halibut and yellowfin sole limit, but it is not beneficial to reducing halibut mortality relative to CPUE for the sector as a whole. This behavior is not unique to the A80 sector as, for example, it has been noted in other cooperative fisheries in Alaska as well as the West Coast cooperative fisheries when rockfish have been a constraining species.

The measures implemented to improve communication are not without costs as they increase the time spent exchanging information and the costs associated with accessing the data. These measures also benefit the firms by allowing them to better coordinate the activities of their vessels and the data collected through SeaState provides information of value to their other day-to-day operations. The gross or net cost directly associated with reducing halibut mortality is not estimated in this analysis.

5.3.2.3.7 Small Test Tows

The HAP states that when appropriate, vessels will use smaller test tows to ensure that halibut bycatch rate is acceptable before fishing an area. In addition to conducting test tows the crew will pay close attention to haul composition when the codend is dumped to quickly assess the halibut bycatch rate and halibut O26 bycatch rate. Close monitoring of the codend is also designed to increase communication with deck crew concerning halibut bycatch (and halibut O26 bycatch) trends. All the A80 firms indicated that they utilize test tows to gauge halibut bycatch before fishing a new area.

Small test tows provide information to the vessel operator regarding halibut bycatch rates in the area they are considering fishing. Conducting test tows slows the rate of fishing and increases costs. Costs are expected to be greatest in fisheries where catch bycatch rates do not allow the factory to consistently operate at full capacity.

5.3.2.3.8 Reduce Night Fishing

Fishing at night is discouraged under the HAP, particularly in fisheries with historically higher nighttime halibut bycatch rates. If vessels do fish at night, they are directed to give extra attention to halibut bycatch rates (and 4CDE O26 halibut bycatch rates in particular). When a vessel cannot achieve night fishing bycatch rates that are demonstrably similar to day fishing bycatch rates, the vessel is strongly encouraged to end night fishing. This provision does not prohibit night fishing, which is not practicable in fisheries that occur in the winter or spring and fall months when operating fishing gear only during the short daylight hours would not allow the plant to operate at an efficient level. High silt levels in the water that reduce water clarity during certain times or the year or in certain areas may also reduce the impact of limiting night fishing on halibut bycatch.

5.3.2.3.9 Excluder Use

Excluders are designed to decrease the number of halibut that are caught by allowing halibut to escape through openings in the net while target catch is funneled to the codend. The use of excluders in the A80 sector have resulted in halibut PSC reductions, but have not, to date, proven to be a panacea. Some firms use excluders almost all of time. Other firms do not, as they feel that deck sorting provides lower halibut mortality and more accurate accounting of that mortality. Each firm makes the decision based on their perception of how well the various tools work in their fishing operation, with some firms using one tool or the other on a specific tow and other firms using both tools.

There are many different excluder designs that are used in various fisheries around the world[84] that have been developed by several different net manufacturers. Research to improve the effectiveness of these devices is ongoing. The HAP encourages the use of excluders that are designed for the various fisheries in which they operate. Data available to the analysts in the CAS and observer data do not indicate when excluders are being used in the fishery. Comparisons of bycatch rates when vessels are using excluder devices by fishery, area, or season are not possible because of this lack of data. The HAP does indicate that during the fishing season, vessels routinely experimented with new designs of excluders and tuned existing designs with a variety of modifications. These modifications over time have improved excluder effectiveness by increasing the exclusion of halibut (though not stated in the HAP they have also worked to incorporate floatation in the nets to raise the gear off the bottom, in part, to reduce injuries and unobserved halibut mortality) and decreasing loss of target catch. Research on the West Coast fisheries to use recapture nets to study the condition of halibut that have escaped through an excluder indicated that halibut were generally in excellent condition.[85]

Lomeli's work indicated that based on previous studies the mortality rates for trawl-caught Pacific halibut discarded at sea were graded as excellent (20% assumed mortality), poor (55% assumed mortality), and dead (90% assumed mortality) condition when excluders are not used (Hoag 1975, Clark et al. 1992, Williams and Chen 2004).[86] Given the lack of information on mortality rates for halibut that escape out of an excluder, he used a recapture bag to estimate condition. The viability estimates suggest that the semirigid grids of the excluders used in that study did not increase mortality, as almost all halibut that escaped were classified as being in excellent condition. Lomeli found that while research referenced above has provided more information for the fisheries on the West Coast that were part of the study, the application of flexible sorting grids also has potential uses in other fisheries nationally and internationally.

Further evaluation of excluders over various fishing conditions would provide important information to determine their true efficacy in BSAI fisheries. Individual experimentation with operation and

[84] https://www.bycatch.org/category/reduction-technique/excluder-devices?page=1
[85] Lomeli, Mark & Wakefield, W. (2015). Testing of Pacific Halibut Bycatch Reduction Devices in Two US West Coast Bottom Trawl Fisheries. 10.4027/fbgics.2015.01.
[86] Clark, W.G., S.H. Hoag, R.J. Trumble, and G.H. Williams. 1992. Re-estimation of survival for trawl caught halibut released in different condition factors. International Pacific Halibut Commission, Report of Assessment and Research Activities 1992, pp. 197-206

configuration is needed to get the greatest return from an excluder. As a result, the A80 sector has stated that it continues to support excluder development and modification to existing devices to further reduce catches of halibut and losses of target catch. An EFP application, submitted by John Gauvin on behalf of the AKSC, was reviewed by the Council at its February 2021 meeting. The EFP was issued by NMFS in April and the one trip is to be completed between August 2021 and December 2022 to test the excluder. This EFP would enable a collaborative study with A80 fishermen of halibut excluders in the Bering Sea flatfish trawl fishery and to conduct field testing to explore improved designs.[87] The goal of the EFP is "to enable collaborative study of halibut excluders for the Bering Sea flatfish trawl fishery and to conduct scientifically robust field testing to yield data for objective assessment of excluder fishing performance, particularly focusing our test on the excluder design among the various excluders in use that flatfish fishermen feel is most likely to provide the best and most useful selectivity under today's fishing conditions." The goals of that study are focused on testing existing excluder design's functionality and not developing new excluder designs. Because the EFP is determining the effectiveness of current halibut excluder designs, its results could allow the fleet to increase use of the current excluder designs that are most effective to achieve lower halibut bycatch per mt of groundfish harvested. The results are not expected to be available until July 2022, at the earliest.

Another project is currently in the planning stages, in addition to the EFP described above. The project is focusing on using illumination on the nets to avoid halibut and is being led by the Alaska Fisheries Science Center and Pacific States Marine Fisheries Commission. This work is building off of a West Coast study by Lomeli et al.[88] Findings on the West Coast indicated that depending on the species and length of the fish, illuminating the headrope of the selective flatfish trawl could have positive or negative effects on catch. While the differences in the catch rates and catch efficiencies were not significant, there was a general tendency to catch fewer Rex Sole, Arrowtooth Flounder, and Lingcod when the head-rope was illuminated. The catches of halibut were reduced when using illumination; however, the results were not statistically significantly different between the treatment and control trawls. The scientists working on that project hope to test the designs in the BSAI flatfish fisheries to determine if reductions in halibut catch can be achieved, that are statistically significant. Several differences in the West Coast fisheries and the BSAI fisheries could impact the effectiveness of the design including catch per unit effort, fishing depth, fishing speed, seaweed and other organic matter suspended in the water, tow duration, and the size of the tow. The experiment developers are working to test the design under real world conditions in the BSAI, but those studies have not yet been conducted. The researchers hope to conduct this study in 2022, but timing is dependent on funding and access to a vessel using a twin-trawl. Results would not be available until sometime in 2023 at the earliest.

Because the proposed use of illumination has not been tested in the BSAI flatfish fisheries to verify its effectiveness, it is not currently considered a practicable option for the A80 sector to deploy to improve halibut avoidance. This statement is not intended to indicate that the new designs and studies may not ultimately provide useful tools to the A80 sector. Depending on the study results, they may be practicable solutions to reduce halibut bycatch in the future.

In addition to the work that is currently being contemplated, it is anticipated that the pressure to reduce halibut bycatch will continue to motivate the fishing industry, agency scientists, and the public to continue to develop new technologies. The speculative nature of what those may ultimately be and how effective they are makes their current use not practicable.

[87] https://meetings.npfmc.org/CommentReview/DownloadFile?p=924c31f1-0bdf-4625-a44d-c7f643b16024.pdf&fileName=D2%20Halibut%20Excluder%20EFP%20Application.pdf
[88] Lomeli, Mark & Wakefield, W. & Herrmann, Bent. (2018). Illuminating the Headrope of a Selective Flatfish Trawl: Effect on Catches of Groundfishes, Including Pacific Halibut. Marine and Coastal Fisheries Dynamics Management and Ecosystem Science. 10. 10.1002/mcf2.10003.

Practicability of excluders also is related to the loss of target catch. Excluders must be efficient enough to limit the amount of target fishery loss to make their use cost effective[89]. The increased pressure to reduce halibut bycatch will result in the fleet being willing to be somewhat less efficient, but there is a point where the increased costs and reduced revenue would make the fishery unprofitable. The studies underway are expected to help quantify the loss of target catch under the various technologies considered, but they are not expected to go so far as to determine the point where a change in technology allows the fleet or firms within the fleet to remain viable over the long-term.

Combined Impact of Regulations Relative to Halibut Avoidance

As fishery management has evolved in the North Pacific, regulations have been developed that require firms to balance the need to meet one objective against the impact those decisions have on other management actions and their objectives.

Balancing incidental catch of other target species

For example, as Section 3.3 states, Pacific cod is often reserved to cover bycatch needs in the flatfish fisheries. Given the current low TAC of Pacific cod, it is a potential constraining species if the incidental catch is too high. When Pacific cod is considered a constraining species, vessels operators must weigh the costs of fishing an area with low halibut bycatch if Pacific cod bycatch is too high and could limit other directed fisheries in the fall/winter. This could cause a vessel to move from an area of low halibut bycatch, trying to find an area that produces both low halibut bycatch and low Pacific cod bycatch. In years when Pacific cod TAC are higher, relative to other target species, or if excess Pacific cod is available later in the fishing year it would have less impact on decisions to move flatfish fishing and remaining Pacific cod cooperative quota could be used in a directed fishery.

Other management actions that impact the fleet's ability to avoid halibut includes closed areas (Also see Section 3.3.3). Area closures have been implemented for a variety of reasons including to reduce crab bycatch and as habitat protection areas.[90] Those areas are represented in Figure 5-10. These areas could be more limiting if A80 target species migrate farther North and open areas are less productive.

[89] The EFP application also notes that the loss of target catch could result in the vessel making more tows which could increase total halibut mortality.
[90] https://www.habitat.noaa.gov/application/efhinventory/docs/npfmc_datasheet.pdf

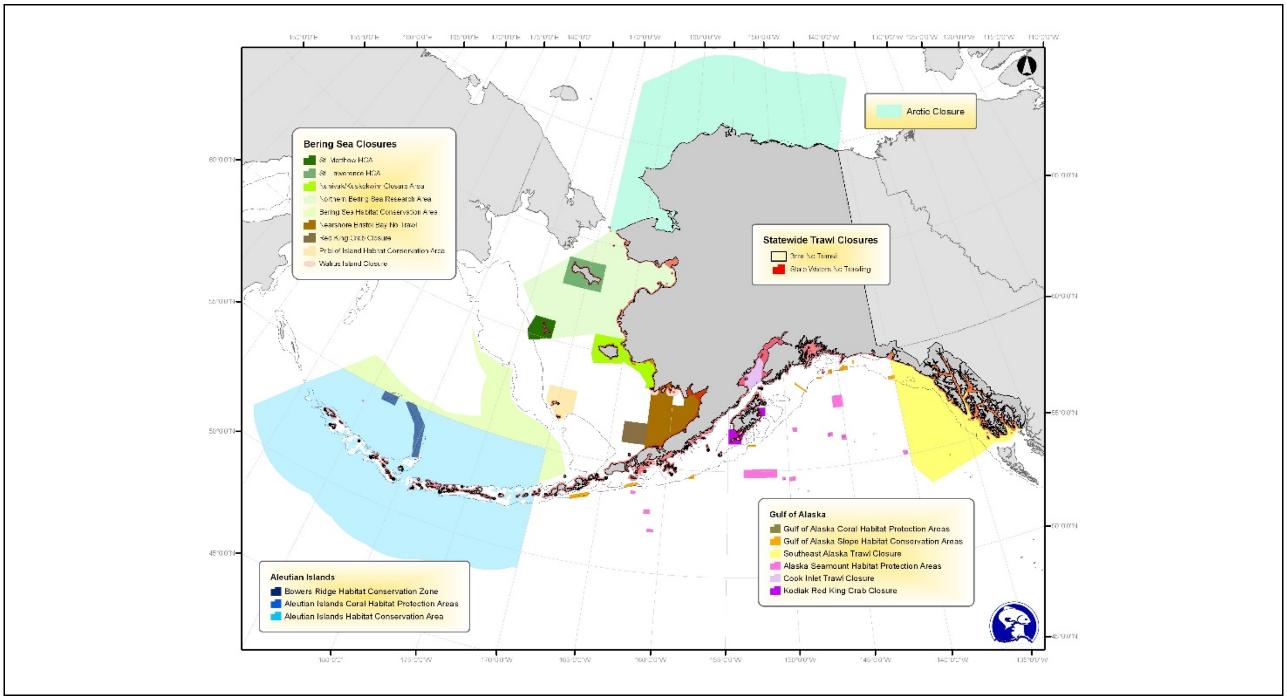

Figure 5-10 Areas closed to bottom gear

Mitigation of Halibut mortality (deck sorting)

The HAP encourages the use of deck sorting to reduce mortality of halibut (particularly O26 halibut in the 4CDE accounting area). Avoiding halibut remains the highest priority for the sector, in part because of the limited time halibut can remain on deck and be viable and the increased inefficiencies associated with deck sorting halibut. When a vessel is deck sorting halibut it must close the processing plant to allow the observer to move on deck to observe the deck sorting process and make viability estimates. The factory is closed to processing and moving fish from the deck to the plant. The plant cannot resume operating until the observer is back in the factory. This process can take about 30 minutes to complete. A80 representatives estimate that vessels make between three and seven tows per day, with an average closer to five. The result is that a vessel can lose as much as one tow per day when they are deck sorting and can add an additional day or more to a fishing trip before the vessel needs to offload product. The loss of efficiency is directly related to minimizing by bycatch mortality.

The use of deck sorting in conjunction with excluder devices varies by firm. Some firms utilize both measures on almost all tows. Recall that the observer may choose not to deck sort if the weather conditions are poor or for other reasons. Other firms tend not to utilize excluders in their nets and deck sort on tows that provide the greatest benefit. Other firms fall in-between these strategies, based on their own experiences utilizing the bycatch reduction tools.

Figures 3-40 and 3-41 indicate that deck sorting halibut was a likely factor in reducing halibut mortality in the BSAI flatfish fisheries in 2017 and 2018 and in all A80 fisheries during 2019. The analysts conclude from that data that the A80 sector's increased use of deck sorting helped yield declines in total halibut mortality in the A80 sector from 2015 through 2020.

Like the use of halibut excluders, deck sorting halibut is reported by the A80 sector to work best when halibut have different size and shape characteristics from the target species. Larger halibut are reported to remain viable longer and are easier to identify and quickly separate from the target catch. Halibut that are about the same size and shape as the target catch makes it difficult to quickly and efficiently separate halibut from the target catch. Being able to separate the halibut and return them to the water quickly and unharmed increases their viability since mortality rates appear to increase after the halibut have been out of the water for about 15 minutes. After 35 minutes, the remaining halibut are not sorted and sent to the factory where they are assigned the factory mortality rate.

AKFIN staff reviewed the data to attempt to estimate the maximum achievable reductions in halibut PSC mortality by utilizing deck sorting. The average DMR for deck sorting was fairly consistently estimated to be about 39%. The DMR varied slightly between target fisheries. DMRs also exhibited some variation by vessel, with some vessels averaging in the low 30% DMR range. The variation between vessels was thought to be a function of the harvesting capacity of the vessel and how the vessel was operated, as the DMR was reported to be fairly consistent for a vessel but varied between vessels. Some variation can also be attributed to how each observer interprets the viability of halibut during the viability grading process. Other variability could be contributed to the crew and configuration of the vessel to efficiently sort halibut from the target catch and return them to the sea.

The amount of deck sorting achieved varied during the 2016 through 2019 period and decreased in 2020. When deck sorting was reported on a vessel during any week from 2016 through 2019 the vessel was deck sorting about 70% to 80% of halibut that were brought on-board the vessel. A change occurred in 2020 that resulted in the percentage of halibut that were deck sorted falling to 61%; in 2021 (through mid-April) the percentage of halibut deck sorted was estimated to be 49%. The declines in deck sorting after 2019 have been attributed to lower overall halibut bycatch rates.

Deck sorting frequency does not vary substantially during the year for an individual vessel. As captains and firms have determined which tools work best for them to minimize halibut mortality to the extent practicable. Based on past performance in the fisheries, an estimated achievable rate for deck sorting across the fleet could be close to 80% of the halibut caught. Observer data indicates that vessels achieved a deck sorting rate of 77% of halibut when deck sorting in 2019 and 80% in 2016. One vessel was reported to have achieved a 90% deck sorting rate for several years. As stated earlier, the vessel configuration and crew capabilities directly impact the percentage of halibut that is deck sorted.

Assuming that deck sorting is utilized[91] at an 80% rate with a 39% DMR, combined with the 84% factory DMR estimate for the other 20% of halibut caught, the vessel would achieve a total DMR of 48%. The A80 sector DMR in 2019 was 47.6% (recall the NMFS estimated factory DMR was lower in 2019 75% relative to the 84% rate used by NMFS in 2020). Given the high reliance on deck sorting in 2019, because halibut were reported to be difficult to avoid, it appears the fleet was able to capture most of the benefits that can be derived from deck sorting. Members of the sector also indicated that in years when the halibut encounter rates are not as high as realized in 2019, the total DMR that would be expected from deck sorting would likely be closer to 35%. Because avoidance measures were reported to be more effective in 2020 and 2021, the fleet was less reliant on mortality reduction measures to minimize total halibut mortality.

5.3.2.4 Impacts at the Firm Level

Much of the information provided in this analysis is presented at the sector level due to confidentiality restrictions placed on releasing catch data unless it is aggregated over a minimum of three firms. These limitations make providing useful data at the firm level challenging. PSC limits are managed and enforced by NMFS at the sector level. NMFS only assigns PSC to vessels/LLP licenses to determine the amount that should be assigned to cooperatives or the limited access sector. The apportionment of PSC limits to firms is done within the cooperative. The A80 cooperative representatives provided information regarding how the cooperative distributes the PSC limit to each firm. The result is that each firm has its own PSC limit within the cooperative based on a percentage of the overall limit. Because each firm’s PSC limit is

[91] The observer has the final decision whether to deck sort or not. An observer may choose not to deck sort in bad weather or for other reasons, so deck sorting every tow is not practicable.

based on a percentage of the total sector limit, it increases or decreases proportionally to the overall sector limit.

This section provides information relative to individual firm's historical PSC use relative to the proposed PSC limits being considered under the different alternatives. The intent is to provide the reader basic understanding of how the firm level division of the PSC limit has differential impacts on firms that may not be obvious from simply reviewing sector level PSC use relative to the proposed limits.

Table 5-8 shows the number of A80 firms that would have exceeded their initial cooperative PSC limit from 2017 through 2020 if the proposed alternatives had been in place that year[92]. For example, under Alternative 2, out of all the halibut abundance estimates considered only at the High EBS Trawl Survey/High Setline Survey level would all the firms have been below their limit every year from 2017 through 2020; however, in each limit there was at least one year where no firm exceeded the limit. Under the limits in Alternative 2 from each of the other survey state combinations, either no firms were over their initial limit or up to as many as three firms would have been over their limit depending on the historical halibut usage year considered. Under Alternative 2 at least one firm would have exceeded their limit in one year over the period except under the High/High survey years and in the lowest PSC limit years as many as three firms would have been over their limit at least once during the period. Under Alternative 3, all firms would have been over their limit at least one year if the PSC limit was set at 1,309 mt or lower. At that same level there were other years when all the firms would have stayed within their limit. If the PSC limit had been set at 1,309 mt or lower there was at least one year when all firms would have exceeded their limit. Finally, under Alternative 4, only at the 1,745 mt limit would all of the firms not exceeded their initial limit. All firms would have exceeded their limit at least one year if the limit was set at 1,222 mt or less.

Table 5-8 Firms over proposed halibut PSC limits based on past halibut mortality by firm from 2017 through 2020.

EBS Trawl Survey Setline survey	Low Very Low	High Very Low	Low Low	High Low	Low Medium	High Medium	Low High	High High
Alternative 2 PSC Limit	1,396	1,483	1,396	1,483	1,483	1,571	1,571	1,745
Minimum number of firms over limit during a year	0	0	0	0	0	0	0	0
Maximum number of firms over limit during a year	3	2	3	2	2	1	1	0
Alternative 3 PSC Limit	1,222	1,309	1,309	1,396	1,396	1,745	1,745	2,007
Minimum number of firms over limit during a year	1	1	1	0	0	0	0	0
Maximum number of firms over limit during a year	5	5	5	3	3	0	0	0
Alternative 4 PSC Limit	960	1,047	1,047	1,222	1,222	1,396	1,396	1,745
Minimum number of firms over limit during a year	3	3	3	1	1	0	0	0
Maximum number of firms over limit during a year	5	5	5	5	5	3	3	0

Source: AKFIN summary of CAS data and A80 sector supplied initial PSC limits by firm

Figure 5-11 provides an alternative method of considering the impacts of the proposed halibut PSC limits on the A80 firms, based on their historical usage. The stacked bar figure shows that in 2017 and 2020 not all firms would have exceeded their annual limit under the most restrictive options. During 2019 all of the firms would have exceeded their annual limit under an option that was less than 1,396 mt and at least one firm would have exceeded their limit under any option that was less than the current limit. The figure highlights that individual firms would be impacted differently depending on the size of the PSC limit.

[92] These years were used because they better reflect the current ownership structure of the A80 sector.

Count of A80 firms that would have exceeded the proposed halibut PSC limits 2017 through 2020

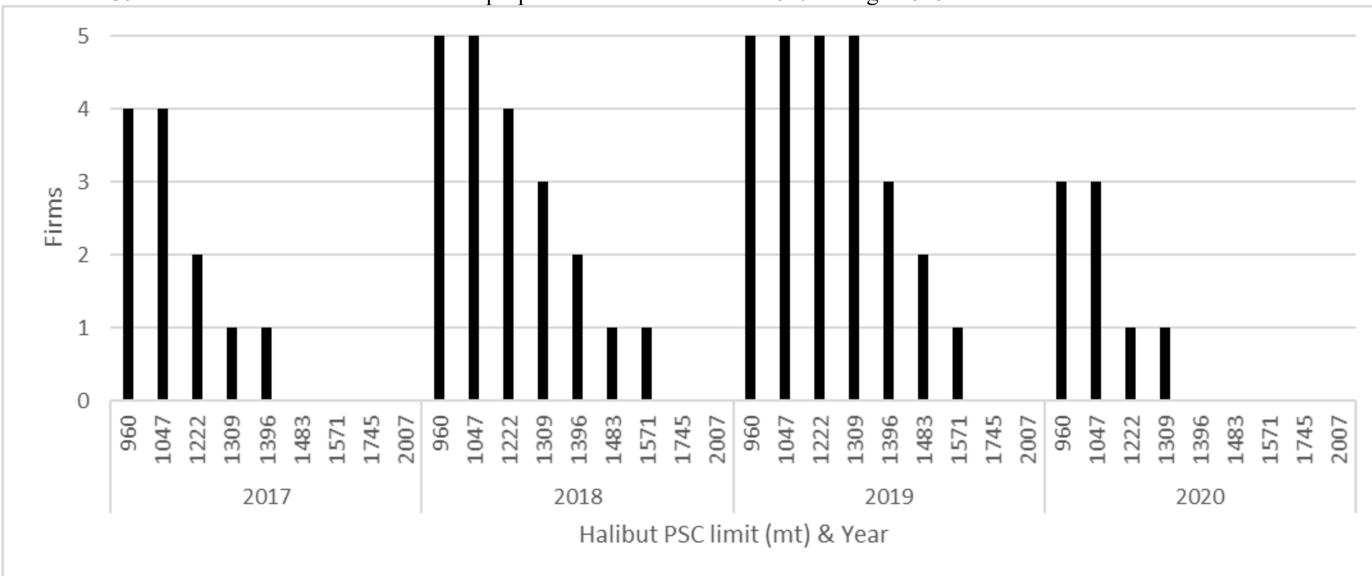

Figure 11 Count of A80 firms that would have exceeded the proposed halibut PSC limits 2017 through 2020

Source: AKFIN summary of CAS data and A80 sector supplied initial PSC limits by firm

When considering the impacts on firms, all firms cooperate within the cooperative structure but are competitors in the world market for A80 species. As discussed earlier in this section, firms may need to fish at times of the year that are not optimal for halibut PSC mortality minimization to meet market demand for clients, or not fish when halibut PSC is known to be low because buyers will not accept delivery at that time. Firms that are unable to provide a level of service that the clients demand, could risk losing the client to a competitor in the world whitefish market.

The structure of the A80 program allows firms to either join a cooperative or fish in the limited access fishery on an annual basis. It has been well documented in the A80 program review that firms will, in general, benefit from the cooperative structure where they do not have to race to harvest a portion of the allocated directed fisheries before the directed fishery allocations or the halibut PSC limit has been fully taken. It is assumed that members of the A80 sector will continue to participate in a cooperative. Restrictive PSC limits may create an incentive for one firm to leave the cooperative structure and fish the "limit access fishery" as an IFQ fishery. The firm could operate in the limited access fishery because NMFS would allocate their portion of the halibut PSC limit and the directed fishery limits to the limited access fishery and they would be the only firm that could harvest the allocation. In doing so they would forfeit the ability to trade PSC species or directed fishery species with members of the cooperative. If more than one firm joins the limited access fishery, it is assumed the firms would be better off under a cooperative structure, since they would compete for a share of the harvest. When the firms are in a cooperative, the cooperative agreement is anticipated to impose penalties that would correct a firm's behavior if they exceed their halibut mortality limit. If the penalties do not curb the unacceptable behavior, in terms of PSC usage or directed catch, the cooperative would cease to function as intended. Meaning that harvesters would disregard the cooperative rules and fish as they would have under a limited access fishery, because the short-term benefits derived would exceed the penalties imposed by the cooperative. It is not anticipated that a cooperative would allow this behavior to occur over multiple years. Either the penalties would need to be modified or the firm operating outside the rules would be prohibited from participating in the cooperative.

All the firms are different and have different business plans. These business plans and the markets they service may result in the firms operating differently throughout the year. The business plan is driven by many factors including the goals and objectives of the firm's operators, markets they serve, portfolio of fish that are available to the firms, financial reserves, and a variety of other factors. The ability of the firms to alter those annual plans and the flexibility of firms within and across years will vary. The need to change fishing plans on a short-term basis increases the uncertainty firms must address and limits longer-term financial and business planning. In addition, many firms have made substantial investments in vessels, equipment, and quota. Changes in external factors that increase uncertainty make development of a long-term business plan difficult. This is not unique to the A80 sector since the directed halibut participants have also had to deal with high quota prices, low commercial catch limits, and fluctuating halibut prices. Making their planning environment difficult.

5.3.2.5 Conclusions

The A80 sector has been utilizing a variety of halibut avoidance and mortality mitigation measures for several years and those efforts have intensified as halibut mortality limits for the sector have been reduced. During that time, the A80 sector has invested in technology and reduced the efficiency of their operations to reduce halibut mortality. Those efforts were undertaken to help ensure that they will be able to harvest as much of their groundfish allocations as is economically viable given market conditions. Because of the efforts and expenditures already undertaken by the sector, dramatic increases in halibut avoidance or reductions in mortality are not expected with the tools that are currently available to the fleet. Some marginal improvements are anticipated to continue to be realized, especially if halibut limits are further reduced and the fleet forgoes some amount of profitability to reduce halibut mortality further. Reductions in halibut mortality that are realized are expected to result from the sector increasing costs or reducing efficiency. The amount of marginal mortality reductions cannot be quantified with any certainty. If substantial reductions in halibut mortality are realized, they are likely to be derived from the development and implementation of new technologies that are not currently available or practicable.

Factors exogenous to the operations are anticipated to have as much or a greater impact on A80 halibut mortality rates than implementing changes to the current tools. Because halibut encounter has not been strongly correlated with halibut abundance (Section 3.4.4), exogenous factors other than estimated halibut abundance (e.g., climate change) may be more significant in changing halibut mortality rates in the A80 sector. The lack of correlation between surveyed abundance and A80 encounter may affect the potential impacts of the action and the ability of the fleet to avoid halibut catch, particularly in years in which the surveyed abundance is low, resulting PSC limits are low, but A80 PSC encounter is high.

Finally, as halibut limits become more constraining it could potentially result in more consolidation of the A80 sector. Consolidation would result as firms that are less efficient at addressing halibut bycatch experience less profitability and sell to A80 firms that are more efficient, firms that derive more revenue from other fisheries to provide revenue during years halibut is a constraint or have access to more cash reserves than the A80 firms. In other words, as A80 firms are required to implement more measures to reduce halibut mortality it will increase their operating costs and potentially reduce revenue when the halibut limits constrain target catch, making annual net revenue more volatile. Firms that cannot remain viable under the new conditions would eventually exit the fishery. Consolidation was realized in 2014 when an AFA firm acquired an ownership interest and full management of the four A80 vessels. Consolidation occurred again in the A80 sector when the halibut PSC limits were reduced in 2015 and one firm left the fishery in 2017.

The current A80 ownership and control limits leave room for one firm to exit the fishery, because a person may not individually or collectively hold or use more than 30% of the aggregate A80 QS units initially assigned to the A80 sector and resulting CQ. The vessel caps are set so that an A80 vessel may not be used to catch an amount of species greater than 20% of the aggregate A80 sector's species ITACs. The number of vessels in the fishery could be reduced to a minimum of five under the cap. While the number of vessels could decline, it is not anticipated to decrease to that level because the fleet would still need sufficient capacity to harvest the CQ that can be supported by the available halibut PSC mortality limit.

5.3.3 Discussion of Options

This section discusses potential impacts of selecting Options 1, 2 and/or 3 compared to selecting any of the action alternatives without the addition of any of the options.

5.3.3.1 Option 1

As discussed in Section 2.1.1, Option 1 employs a three-year rolling average to determine the survey state for the most recent year for the look up table. This option is to smooth potential inter-annual variability in the survey biomass values. Table 5-9 shows the resulting difference in PSC limits when employing Option 1 as opposed to the most recent value using the historical time series of both surveys (shown in Table 2-5). In this example in the years 2004, 2005 and 2018 the use of the rolling average would have established a PSC limit higher than the use of the single year survey values while in 2007 it would have resulted in a lower PSC limit than that resulting from the within year survey value.

Table 5-9 Back-calculated PSC limits based on Alternatives 2-4 with Option 1 are shown. Changes (in grey shading and red font) are highlighted where the historical use of a 3-year rolling average modified the PSC limit resulting from the single year considerations (the single year base case PSC limit is shown in parentheses). Survey values associated with these PSC limit determinations are shown in Table 2-5

Option 1: 3-yr rolling average

	PSC Limits from Look up tables		
PSC limit year	Alt 2.1	Alt 3.1	Alt 4.1
2001	1745	2007	1745
2002	1571	1745	1396
2003	1571	1745	1396
2004	1571(1483)	1745(1396)	1396 (1222)
2005	1571(1483)	1745(1396)	1396 (1222)
2006	1483	1396	1222
2007	1483(1571)	1396(1745)	1222(1396)
2008	1483	1396	1222
2009	1571	1745	1396
2010	1483	1396	1222
2011	1483	1396	1222
2012	1571	1745	1396
2013	1571	1745	1396
2014	1571	1745	1396
2015	1571	1745	1396
2016	1571	1745	1396
2017	1571	1745	1396
2018	1571(1396)	1745(1309)	1396(1047)
2019	1571	1745	1396
2020	1396	1309	1047

Option 1 could help to reduce interannual variability in PSC limits if there are large single year differences in survey indices. If there are large year to year fluctuations in survey indices in future years, Option 1 may reduce the potential impacts by maintaining more stability in PSC limits. However, the look up table limits remain the same regardless of whether Option 1 is selected. Therefore, while Option 1 may reduce the likelihood of changing survey states, the change in PSC limit if the survey state changes will remain the same.

5.3.3.2 Option 2

Option 2, if selected, constrains the new PSC limit from 1,745 mt to either 10% or 15% of the look up table value in the first year of implementation. The purpose of this option is to reduce the initial jump in the PSC limit in the first year of implementation only. Regardless of the PSC limit determined from the look up table, the PSC limit in the first year of implementation must fall within the range 1,483 to 2,006 (representing a variability of +/- maximum 15% change from status quo 1,745 mt). Following the first year of implementation this constraint would no longer be applied, and the PSC limit would be as determined by the look up table. Depending upon the alternative selected and the survey states at that time to determine the look up table PSC limit, application of this option could provide a step-down year before application of the regulatory PSC limit the subsequent year. For example, assuming the current survey states (as with 2019, see Table 2-5), Table 5-10 shows what the PSC limit would be in year 1 of implementation for each alternative based upon a constraint from status quo and what year 2 would be (assuming the survey states do not change from year 1 to 2 in this example). Should the survey values increase (e.g. to values similar to 2016-2017) by the first year of implementation the constraint would be applied under this alternative but result in less variability from year 1 to year 2 for Alternative 4 and the look up table PSC limit for Alternatives 2 and 3 are close to or at the status quo limit (see Table 5-11).

Table 5-10 Hypothetical example of the application of Option 2 in the first year of implementation assuming survey states are similar to 2019 and remain the same in Year 2 of implementation

Alternative	Year 1 (<10%)	Year 2	Year 1 (<15%)	Year 2
2	1,570	1396	1,483	1396
3	1,570	1309	1,483	1309
4	1,570	1047	1,483	1047

Table 5-11 Hypothetical example of the application of Option 2 in the first year of implementation assuming survey states are similar to 2016-2017 (e.g. 'medium' for setline and 'high' for EBS trawl surveys; see Table 2.x for more information on historical survey states) and remain the same in Year 2 of implementation

Alternative	Year 1 (<10%)	Year 2	Year 1 (<15%)	Year 2
2	1,570	1,571	1,571	1,571
3	1,745	1,745	1,745	1,745
4	1,570	1,396	1,483	1,396

The selection of Option 2 may reduce the potential impacts of a large change in PSC limits in year 1. This could allow the A80 sector more time to adjust operations and plans to adapt to a new regulatory program and potential reductions in PSC. However, after year 1, Option 2 has no effect on potential impacts.

5.3.3.3 Option 3

The purpose of the annual limit (80-90% of the PSC limit generated from the Alternatives 2-3 look up tables) is to incentivize the A80 sector to achieve halibut bycatch mortality levels that are lower than the look up table PSC limit at all times. As such, the A80 sector would be permitted to incur an amount of halibut PSC mortality that is above the annual limit but below the PSC limit generated by the look up table in 3 of any 7 consecutive years, as assessed on a rolling 7-year timeline. If the A80 sector exceeds the annual limit in 3 of 7 years, then the annual limit proportion of the PSC limit generated by the look up table is a hard cap the following year. It then reverts to an annual limit the subsequent year and remains as such until exceeded again. If exceeded the following year and within the 3 of 7-year timing it would again be applied as a hard cap the subsequent year.

In any given year, the A80 sector's PSC mortality is assessed against the annual limit to determine whether or not it has been exceeded.[93] Next, the result from that year plus the results for the six preceding years will be assessed in total to determine whether the annual limit was exceeded in 3 of 7 years. If so, the annual limit becomes a hard limit in the following year. This process is triggered only following a year where PSC mortality exceeds the annual limit. Therefore, in years where the annual limit is not exceeded, the mortality in the previous 6 years is irrelevant. The sector does not remain under a hard cap each subsequent year until the sector is out of the 3 in 7 trigger,[94] however if the next time it is exceeded is within that trigger time frame, the subsequent year will again trigger a hard cap set at the level of the annual limit. It is therefore possible historically to have more than 3 times in a 7-year period in which the annual limit is exceeded. **If the Council selects this option at final action it may wish to clarify that the intent is not to retain the annual limit as a hard cap in subsequent years and only if triggered again following an annual limit[95] being exceeded**. It is therefore impossible to have the annual limit imposed as a hard cap two years in a row. For practical purposes as currently formulated Option 3 is most likely to result in an every other year hard cap application at the annual limit level once the 3 in 7 time frame has been triggered unless the A80 sector is able to maintain multiple years in a row below the annual limit level.

As noted in Section 2.1.3, there may also be unintended negative incentives to avoid bycatch in situations where the annual limit is close to or likely to be exceeded under this option. As currently structured, once the annual limit is exceeded in a given year, based on within year PSC mortality the incentive to continue to reduce bycatch within that year is negligible until the PSC limit itself is being approached. Similarly, bycatch that remains below the annual limit is acceptable even if the annual limit is narrowly approached (e.g. 1 mt below is still counted as a 'below' year therefore the incentive to remain substantially below the annual limit may be weak). Some additional mechanisms to provide for continued PSC mortality reduction under these circumstances could be considered in conjunction with the structure of Option 3, such as evaluating whether or not an overage occurs on a rolling multi-year basis rather than only within a single year to determine a closure. Under that circumstance, PSC mortality would be assessed based on a rolling number of years to determine if the annual limit is exceeded rather than only based upon the within year PSC mortality. In that case, the overall PSC mortality in any one year remains relevant to bycatch avoidance actions that could impact the following year. This would provide incentives to continue to reduce bycatch to the extent practicable in any single year, regardless of the likelihood of exceeding the limit and even under a situation of a single year overage. This type of rolling average assessment of PSC mortality could also provide flexibility such that the impacts of a particularly high PSC year are "spread out" if it is preceded or followed by a lower PSC year. This could be particularly relevant in years where survey abundance is low and fleet encounter is high. Under these circumstances it may be more difficult for the sector to avoid halibut and remain under low limits and the option to have previous or future PSC savings in the bank to disperse impacts of particularly difficult years will help provide flexibility to the fleet and incentivize PSC avoidance in good years because any savings could be utilized in future years.

Additional modifications to Option 3 could be considered similarly to some aspects of the Amendment 91 Bycatch Management Program which was designed both with a cap and threshold system as well as mandatory Incentive Plan requirements (similar to the HAP design components which are currently

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[93] See Section 2.5 for a discussion of potential for post-season adjustments to A80 mortality and implications for imposition of a hard cap.

[94] The language in the option should be modified to clarify this.

[95] For consistency with regulations at § 679.21(f)(6) if this option is selected as part of the Preferred Alternative (PA) the Council may wish to redefine the term 'annual limit' as 'annual threshold'.

voluntary and not mandated in regulation). Some additional information on the Bering Sea Chinook Bycatch Management Program is provided below.

5.3.3.4 Chinook salmon management in the EBS pollock fishery

Amendment 91 provides an example of a PSC limit system combined with an annual threshold evaluated as a performance standard on a rolling year basis, which is similar to (but with distinct differences from) that which is being contemplated under Option 3. However, it may provide some guidance should the Council wish to consider modifications to Option 3 as currently construed. Amendment 91 established two Chinook salmon PSC limits/thresholds for the Bering Sea pollock fishery: 60,000 fish limit and 47,591 fish threshold. The PSC limit is an overarching hard cap while the threshold is an annual threshold that is evaluated as a performance standard. Both the limit and the annual threshold are applied at the sector level. The sector-level performance standard ensures that the IPA is effective and that sectors cannot fully harvest the Chinook salmon PSC allocations under the 60,000 (or 45,000) Chinook salmon PSC limit in most years. Each year, each sector is issued an annual threshold amount that represents that sector's portion of 47,591 (or 33,318) Chinook salmon. For a sector to continue to receive Chinook salmon PSC allocations under the 60,000 (or 45,000) Chinook salmon PSC limit, that sector can only exceed its annual threshold amount two times within any seven consecutive years. Under the current program, if a sector fails this performance standard, it will continue to be allocated a portion of the 47,591 (or 33,318) Chinook salmon PSC limit each subsequent year. NMFS would issue transferable allocations of the 47,591 (or 33,318) Chinook salmon PSC limit to all sectors, cooperatives, and CDQ groups, if no IPA is approved, or to the sectors that exceed the performance standard.

The PSC limits/thresholds are lowered in years of low Chinook abundance to 45,000 and 33,318 Chinook salmon (Amendment 110).[96] For each PSC limit, NMFS issues A-season and B-season Chinook salmon PSC allocations of the PSC limit to the catcher/processor sector, the mothership sector, the inshore cooperatives, and the CDQ groups. When a PSC allocation is reached, the affected sector, inshore cooperative, or CDQ group is required to stop fishing for pollock for the remainder of the season even if its pollock allocation had not been fully harvested.

NMFS issues transferable allocations of the 60,000 (or 45,000) Chinook salmon PSC limit to the sectors that participate in an Incentive Plan Agreement (IPA) and remain in compliance with the performance standard.[97] Sector and cooperative allocations would be reduced if members of the sector or cooperative decided not to participate in an IPA. Vessels, cooperatives, and CDQ groups that do not participate in an IPA would fish under a restricted opt-out allocation of Chinook salmon. If a whole sector does not participate in an IPA, all members of that sector would fish under the opt-out allocation. If a vessel, cooperative, CDQ group, or sector opts out of an IPA, NMFS allocates that entity's portion of the 28,496 opt-out cap to the opt-out allocation for that fishing year and the entity would fish under that opt-out

[96] See Section 2.6.1 of this paper for additional information on the threshold for determination of a low abundance year.

[97] Note the definition of the performance standard is as follows (from § 679.21(f)(6)): "Chinook salmon bycatch performance standard. If the total annual Chinook salmon bycatch by the members of a sector participating in an approved IPA is greater than that sector's annual threshold amount of Chinook salmon in any three of seven consecutive years, that sector will receive an allocation of Chinook salmon under the 47,591 PSC limit in all future years except in low Chinook salmon abundance years when that sector will receive an allocation under the 33,318 Chinook salmon PSC limit. (i) Annual threshold amount. Prior to each year, NMFS will calculate each sector's annual threshold amount. NMFS will post the annual threshold amount for each sector on the NMFS Alaska Region Web site (http:// alaskafisheries.noaa.gov). At the end of each year, NMFS will evaluate the Chinook salmon bycatch by all IPA participants in each sector against that sector's annual threshold amount. (ii) Calculation of the annual threshold amount. A sector's annual threshold amount is the annual number of Chinook salmon that would be allocated to that sector under the 47,591 Chinook salmon PSC limit, as shown in the table in paragraph (f)(3)(iii)(B) of this section or the 33,318 Chinook salmon PSC limit in low Chinook salmon abundance years, as shown in the table in paragraph (f)(3)(iii)(D) of this section.. If any vessels in a sector do not participate in an approved IPA, NMFS will reduce that sector's annual threshold amount by the number of Chinook salmon associated with each vessel not participating in an approved IPA."

allocation. NMFS would manage the opt-out allocation as an open access PSC limit and close the pollock fishery to opt-out vessels when the Chinook bycatch by those vessels approaches that allocation.

The IPA component was created to encourage participants to design their own agreements with incentives for each vessel to avoid Chinook and chum salmon bycatch at all times and maintain Chinook salmon bycatch at levels below the regulatory PSC limits. Each IPA entity is required to provide an annual report to the Council that evaluates whether the plan was effective at providing incentives for vessels to avoid Chinook salmon at all times while fishing for pollock. 50 CFR 679.21(f)(13) stipulates that IPA entities report annually on the following:

- Incentive measures in effect in the previous year to avoid Chinook and chum including rolling hot spot program and salmon excluder use;
- Measures to ensure that chum salmon were avoided in areas and at times where chum salmon are likely to return to western Alaska;
- How incentive measures affected individual vessels;
- Restrictions or penalties that target vessels that have consistently higher Chinook PSC rates relative to other vessels;
- Restrictions or performance criteria to ensure Chinook PSC rates in October are not significantly higher than other months;
- How incentive measures affected salmon savings beyond current levels;
- IPA amendments approved by NMFS since the last annual report and the reasons for amendments;
- Sub-allocation to each participating vessel;
- Number of Chinook PSC and amount of pollock (mt) at the start of each fishing season;
- Number of Chinook PSC and amount of pollock (mt) caught at the end of each season;
- In-season transfers among entities of Chinook salmon PSC or pollock among AFA cooperatives;
- Transfers among IPA vessels; and amount of pollock (mt) transferred.

5.3.3.5 Summary comparison across Options 1 and 3

Table 5-12 shows the suite of PSC limits calculated using data from 1999 through 2020 for comparative purposes across all alternatives, options 1 and 3, and suboptions. Also shown are the mortality associated with the A80 sector from 2010-2020 (pink shaded) and where the values in the look up tables for the alternatives historically would have been exceeded. The comparison of back calculated PSC limits and actual A80 PSC mortality in previous years *are for comparison purposes only. The analysts are not implying that the A80 sector would necessarily have been shut down during parts of those years* because fishery participants have the opportunity to make operational choices that might allow the sector as a whole to function under a lower limit (See Section 5.3.2.3 on the practicability of operation under lower PSC limits). This table is shown here merely to compare calculated levels historically across all of the alternatives.

The analysts note that as described in Section 5.3.2.3, using past performance as a projection of future PSC use does not account for external factors that influence PSC encounter rates and effective mortality such as halibut abundance, distribution, and comingling with groundfish target species to name only a few. Other factors that could influence future PSC use include groundfish TAC levels and catch-per-unit-effort – whereby a greater number of hauls required to meet groundfish harvest goals could result in higher levels of gross halibut encounter. In short, taking an “all else equal” approach to projecting future PSC use based on past performance is not a precise methodology; historical PSC usage years that came close to a PSC limit or annual limit (plus or minus) could easily have fallen on the other side for reasons that are not accounted for when simply looking at the annual total.

Table 5-12 Back-calculated PSC limits for Alternatives 2-4 and limits resulting from application of Options 1 and 3 and Amendment 80 PSC use (highlighted cells = A80 sector would/could have reached the limit). Note that the limits for Option 3 are calculated based on the table limits using the most recent survey year available, and not based on the Option 1, 3-year rolling average survey indices. Notations for options are as follows: Option 3 suboptions 1 X.3.1 (e.g. Alt 2.3.1). Grey shading indicated where the look up table limit using the most recent year would have resulted in a different value had Option 1 (3 year rolling average) been applied (value for Option 1 shown in red, value for most recent year in parentheses below). See Table 2-4 for details on the comparison of actual values for Option 1 as compared to the within year value.

Look up tables				Option 3								
	Alternative			80% of look up table			90% of look up table			A80		
	2	3	4	2.3.1	3.3.1	4.3.1	2.3.2	3.3.2	4.3.2	Limit	Encounter	Mortality
2010	1571	1745	1396	1257	1396	1117	1414	1571	1256	2,425	2,823	2,254
2011	1571	1745	1396	1257	1396	1117	1414	1571	1256	2,375	2,277	1,810
2012	1571	1745	1396	1257	1396	1117	1414	1571	1256	2,325	2,469	1,944
2013	1571	1745	1396	1257	1396	1117	1414	1571	1256	2,325	2,677	2,166
2014	1571	1745	1396	1257	1396	1117	1414	1571	1256	2,325	2,667	2,178
2015	1571	1745	1396	1257	1396	1117	1414	1571	1256	2,325	2,200	1,638
2016	1571	1745	1396	1257	1396	1117	1414	1571	1256	1,745	1,965	1,412
2017	1571	1745	1396	1257	1396	1117	1414	1571	1256	1,745	1,976	1,167
2018	1571 (1396)	1745 (1309)	1396 (1047)	1117	1047	838	1256	1178	942	1,745	2,555	1,343
2019	1396	1309	1047	1117	1047	838	1256	1178	942	1,745	3,067	1,461
2020	1396	1309	1047	1117	1047	838	1256	1178	942	2,425	2,823	2,254

5.4 Impacts on BSAI halibut commercial catch

PSC reductions could indirectly lead to increases in directed halibut catch through two means. First, reductions in the U26 portion of the PSC could lead to longer term benefits to the commercial halibut fisheries throughout the distribution of the halibut stock. Benefits from reduced mortality of these smaller halibut could occur both in the Bering Sea and elsewhere as these halibut migrate and recruit into the commercial halibut fisheries. Second, the current IPHC interim harvest policy subtracts the projected O26 portion of non-directed discard mortality (bycatch) from the TCEY by IPHC Regulatory Area when calculating fishing limits. Therefore, given current harvest policy,[98] near term benefits to BSAI halibut fisheries would result from the PSC mortality reductions of halibut that are over 26 inches in length (O26). A portion of these halibut would be available to the commercial halibut fishery in the area that the PSC mortality is foregone, in subsequent years or when the fish reach the legal size limit for the commercial halibut fishery (greater than or equal to 32 inches in total length).

The magnitude of the relationship between PSC limits and directed catch limits depends on many variables. According to the IPHC interim management procedure, the non-directed discard mortality projection used when calculating catch limits is the three-year average non-directed discard mortality from the most recent year (specified during AM096 para. 97). Therefore, a change in the PSC use in a specific year will only begin to affect the trade-off with the directed halibut limit in the next year. Furthermore, as shown in Section 3.4, the relationship between the PSC limit and PSC use varies, therefore a reduction in the PSC limit may not always generate an increase in directed catch limits in the short-term and even when it does, the magnitude may vary based on the actual A80 O26 PSC mortality.

[98] Noting that IPHC decisions may deviate above or below the harvest policy limits and may maintain or increase directed fishing opportunities given changes in the PSC with potential long-term impacts. See section 4.3 for examples of potential management departure from the interim harvest policy.

Assuming no change to IPHC harvest policy or implementation, and a constant relationship between PSC use and limit, the relationship between PSC and directed catch limit will still vary with the relative proportions at age observed in the bycatch (which could be influenced by factors such as selectivity and recruitment allocation varying over time). Because the IPHC only deducts O26 non-directed discard mortality by area when calculating catch limits (U26 are accounted for separately see Section 4.4), an increase in halibut fishery catch is mostly a result of reducing the O26 component of the PSC limit. The length-distribution of Pacific halibut caught as bycatch in fisheries targeting other species is reported to the IPHC each year by NMFS for Alaska and Washington-Oregon-California, and DFO for British Columbia. Historically, the raw length frequencies are summarized by target fishery within gear type (i.e., trawl, hook-and-line, and pot), then aggregated to better represent the differing contributions and sampling rates for each fishery. Weighted length-frequencies of the estimated bycatch are used in the annual harvest policy calculations and catch tables specifically to delineate O26 and U26 removals (Stewart and Webster 2020).

The IPHC uses length estimates at the gear level. Given that A80 PSC accounts for ~60-82% of trawl discards (Table 4-2), a larger percentage of A80 PSC that is O26, results in a lower directed halibut fishery catch limit. Table 5-13 shows the relative percentage of A80 halibut PSC that is O26 calculated as a three-year average weighted based on observer sampling hierarchy as follows: halibut length data collected at the haul level are expanded within each level of the sampling hierarchy, within each sampling strata. Since sampling rates vary not only at each level of the hierarchy but also between sample units (e.g., proportion of halibut measured varies between hauls on a fishing trip), this weighting is important to ensure unbiased estimation. To estimate the proportion of O26 halibut discards, the estimates of the O26 proportion are weighted by the total weight of discarded halibut estimated at each level. The estimated proportion can then be multiplied by the halibut discard (or mortality) to estimate the amount of O26 halibut discarded. This methodology is similar to the one that is now used in the estimation of halibut discard mortality rates. Because the directed halibut fishery catch is the TCEY (mortality limit of O26 halibut) minus the O26 PSC use, a larger percentage of PSC that is O26, results in a lower directed halibut fishery limit. The three-year average percent of A80 PSC that are O26 has varied from 34-61% over the past 10 years depending on the methodology used (straight or weighted).

Table 5-13. Three-year average percentage of O26 Amendment 80 halibut PSC by weight from observer data as calculated by weighted average based on sampling hierarchy, 2010-2020. These results include data from deck sorting (2016 through 2020). No DMRs are applied.

Year	% O26 bycatch by weight
2010	34.2%
2011	43.0%
2012	50.9%
2013	52.4%
2014	51.5%
2015	38.4%
2016	28.2%
2017	46.3%
2018	49.6%
2019	60.6%
2020	41.5%
Average 2010-20	45.1%

Because the relationship between PSC limits and directed halibut catch limits is uncertain and varies year to year, an example of potential changes in directed halibut catch resulting from the PSC limit changes that could occur under the alternatives is provided in Table 5-14. These changes are calculated using ratios of 0.0, 0.25, 0.5, 0.75 and 1.0, selected to provide a broad descriptive range of potential relationships between PSC limits and directed catch limits. For example, using a ratio of 1, the entirety of the PSC limit change is transferred into the directed catch limit in the opposite direction. This scenario of a PSC limit reduction leading to an equivalent increase in directed catch represents a scenario in which 100 % of the PSC limit is taken as O26 PSC for the previous three years given that the projected PSC removal is the three-year average of recent O26 PSC usage rather than the PSC limit. A ratio of 1 is the maximum because that implies all PSC usage is composed of O26 halibut and has a direct trade-off with the directed halibut limit. Ratios less than one indicate that PSC usage occur wholly or partially on Pacific halibut less than 26 inches. Such fish would be subject to natural mortality and movement out of the region. Both of these processes, while being uncertain, lower the impact of PSC usage on potential gains to the directed Pacific halibut fishery. Given recruitment variability, variable fishing patterns resulting in annual changes to selectivity, and variable population processes such as growth and movement, the ratio may occur anywhere in this range in a given year.

Table 5-14 Change from status quo (SQ) BSAI directed catch limits (million net pounds) resulting from proposed PSC limits (mt) given an assumed ratio between the PSC limit and the directed halibut limit. The bottom four rows display change from status quo directed BSAI catch limits resulting from the PSC listed at top, calculated using the quartiles of potential ratios.

		Alternative(s)	**4**	**4**	**3, 4**	**3**	**2,3,4**	**2**	**2**	**1,2,3,4**	**3**
		PSC Limit (mt)	**960**	**1047**	**1222**	**1309**	**1396**	**1483**	**1571**	**1745**	**2007**
difference from SQ PSC Limit		(mt)	-785	-698	-523	-436	-349	-262	-174	0	262
		(mil net pounds)	-1.298	-1.154	-0.865	-0.721	-0.577	-0.433	-0.288	0	0.433
ratio (PSC limit: directed catch limit)	1.00	change in directed catch limit (mil net pounds)	1.298	1.154	0.865	0.721	0.577	0.433	0.288	0	-0.433
	0.75		0.973	0.866	0.649	0.541	0.433	0.325	0.216	0	-0.325
	0.50		0.649	0.577	0.432	0.360	0.289	0.217	0.144	0	-0.217
	0.25		0.324	0.289	0.216	0.180	0.144	0.108	0.072	0	-0.108
	0.00		0	0	0	0	0	0	0	0	0

Additionally, the ratios may have asymmetric effects that are not fully captured by reporting a range. For example, a PSC limit of 960 mt may be more congruent with one end of the range while a higher PSC may be more representative of the opposite end of the range. As noted above regarding the size (ages) taken as PSC mortality, the ratio will vary over time (Stewart et al. 2021) depending on the halibut population age-structure and the relative availability of different age groups to the directed fishery and those halibut taken as PSC. Therefore, this approach provides a thought process to understand the direction and approximate magnitude of the relationship between PSC and commercial catch in the BSAI. Given the many uncertainties, these results are best used for looking *across* the table to compare the PSC limits embedded in the alternatives to one another on a relative basis.

The IPHC analyzed the relationship between bycatch and yield in the directed halibut fishery by comparing results of the coastwide assessment with and without coastwide bycatch, concluding that "potential yield to the directed fishery was generally larger than a simple reallocation from non-directed discards (115% on average), [and] that the rate of exchange is variable over time (range of 86–139%)" (Stewart et al. 2021). Comparable results for the BSAI are likely to be smaller than these as a majority of the directed halibut fishery occurs outside of the BSAI and a majority of the PSC bycatch occurs within the BSAI and BSAI Pacific halibut are markedly smaller/younger than those from the coastwide PSC analysis. Stewart et al. focused only on the coastwide impact estimates, which is less applicable to the proposed action due to the different sizes (ages) in the BSAI PSC. In a review of their method, the IPHC's Scientific Review Board stated that this analysis should "be interpreted with caution, as there are multiple methods for evaluating how bycatch in non-directed fisheries impact stock productivity and biomass over time" and that:

> '*what if' questions about past behaviour are not appropriate for stock assessment models because those analyses do not adequately reflect the information available at the time or information feedbacks to future decisions over time. An MSE analysis, on the other hand is specifically designed to answer 'what if' questions under particular future scenarios while properly accounting for stock assessment errors in response to changing information*." (IPHC–2019–SRB015–R, IPHC-2018-SRB012-R, para. 23).

The analysis done by Stewart et al. (2021) and the analysis of outcome based on the ratios in Table 5-2 could both be enhanced by looking at long-term outcomes using closed loop simulation models. A key outcome of Stewart et al. (2021) is that the rate of exchange – sometimes referred to in the ABM context as yield gain or the PSC-to-directed-catch ratio – is variable over time.

Table 5-15, below, calculates a range of revenues associated with the potential changes in the net pounds of directed halibut catch limits reported in Table 5-14. The ex-vessel values are reported in 2018-dollar adjusted ex-vessel values for Area 4 as reported in Section 4. The ex-vessel value represents the amount paid to fishermen by a primary processor for raw fish. Ex-vessel prices are the most appropriate value to represent halibut fishery revenues given that this is the most common halibut supply chain in Alaska, particularly in the BSAI or Area 4 (see Section 4). In response to requests from public comments, halibut revenues are also reported in wholesale values in Table 5-15. The wholesale values in this table are estimates of first wholesale production values for head and gut fish as reported in the Economic SAFE report (NMFS, 2021). The wholesale values are based on COAR data that rely on the accuracy of processor reporting and are aggregated at the statewide level. COAR data for processors located in the BSAI region that primarily purchase Area 4 halibut come from a small set of reporting entities and are sometimes excluded due to identified reporting gaps. The estimates in Table 5-15 might not be a reliably precise indicator of value-added production at the primary processing level in the BSAI/Area 4 region, or the Area 4CDE region in particular. As noted in Section 4.5.1, ex-vessel values in Area 4 consistently trail statewide values.

The analysts attempted to estimate wholesale values that are more specific to Area 4; however, this is not a straightforward calculation due to limited data sources, as alluded to above and in Section 5.3.1. Unlike for the A80 sector, there is no link from round weights to product weights by product type and processing facility for the halibut fishery. Without this link, the only available method to connect purchases and sales for each processor is to compare the annual sum of the processed product weights (sold) and the unprocessed weights (purchased) in COAR tables. Those weights will not match exactly due to volume lost during processing and year-to-year differences if a processor purchases the fish in one year and sells the fillets the next year (e.g., holdover inventory). The analysts applied a "screen" to filter out annual data from processors whose sales include too much holdover product from the previous year.[99] The screen is the ratio of the annual purchased weight divided by the annual sold product weight. Due to the fact that a majority of product in Area 4 are gutted and glazed (head-on), an additional scaling is used to adjust to "head-and-gut" prices (weight bought multiplied by 0.903 – or 0.75/0.83 – the head-and-gut to gut ratio). When setting the screen value to accept data that falls between 0.6 and 1.5 and only including processors operating in the BSAI region, the estimated wholesale value is $6.02 in 2019 (2018$) with a 5-year average of $7.90 (2015-2019). This range comes out slightly higher than the estimates taken from the Economic SAFE. These data issues and limitations are not uncommon in fishery analyses. For that reason, the analysts encourage the reader to understand Table 5-15, below, as a series of catch volumes that is multiplied through by a set of informed unit-value estimates. A reader could multiply through by a

[99] That screen also filters out cases where data reporting gaps could skew local average weights or unit values. For example, a specific processing facility might be known to have received a substantial percentage of the Area 4 halibut catch but did not report any halibut production in its COAR submission.

different unit-value based on information that he or she has or based on an entirely different value-scope if they wanted to reflect additional downstream values that are not included here due to data limitations or concerns about data quality and the appropriateness of certain cross-sector comparisons.

Setting aside the uncertainty surrounding future halibut ex-vessel and wholesale value estimates, the numbers in Table 5-15 may overestimate potential changes in revenue as they assume 100% usage of the additional catch limit. The Area 4 TAC utilization rate was roughly 91% from 2011 through 2020 and was roughly 85% in 2020. The reader can compare the values in the table to historical Area 4 ex-vessel revenues shown in Table 4-9. Area 4 gross ex-vessel revenue in 2018-dollars ranged from $32.6 million to $54.4 million from 2010 to 2012 but has been between $16.9 million (2018) and $24.9 million (2016) in more recent years. Section 4.5 highlights the reasons why recently observed per-unit values for gross ex-vessel halibut revenues might not be a reliable predictor of future value in the near term due to significant market disruptions.

PSC mortality is incorporated into the IPHC commercial limit-setting process in terms of actual PSC use, not the limit as it exists as a number on paper. In a scenario where abundance is high and the PSC *limit* is also high – e.g., 2,007 mt – one should really infer "yield gain" to the halibut fishery based on changes in PSC use. Crucially, Table 5-15 is showing negative values under the "High/High" PSC limit of 2,007 mt, but this is assuming 100% use of the limit. That is likely a poor assumption. It is possible that greater halibut abundance could increase halibut encounter, but one must also account for the pressure and incentives for constant halibut avoidance and mortality mitigation (e.g., deck sorting, excluder use, etc.). In other words, it is possible that if halibut abundance indices reach high levels, PSC use may not increase as fast as abundance, thus increases in abundance would result in increased directed limits due to both the increase in abundance and the slower increasing rate of PSC use.

Table 5-15 Potential change in revenue from status quo based on PSC limit (2018$)

			ratio	960	1047	1222	1309	1396	1483	1571	1745	2007
ex-vessel values	2019	$4.33	1.00	5,620,218	4,997,340	3,744,425	3,121,548	2,498,670	1,875,792	1,245,755	0	-1,875,792
			0.75	4,215,163	3,748,005	2,808,319	2,341,161	1,874,003	1,406,844	934,316	0	-1,406,844
			0.50	2,810,109	2,498,670	1,872,213	1,560,774	1,249,335	937,896	622,878	0	-937,896
			0.25	1,405,054	1,249,335	936,106	780,387	624,668	468,948	311,439	0	-468,948
	Average 2015-19	$5.54	1.00	7,190,764	6,393,826	4,790,789	3,993,851	3,196,913	2,399,975	1,593,876	0	-2,399,975
			0.75	5,393,073	4,795,369	3,593,092	2,995,388	2,397,685	1,799,981	1,195,407	0	-1,799,981
			0.50	3,595,382	3,196,913	2,395,395	1,996,925	1,598,456	1,199,987	796,938	0	-1,199,987
			0.25	1,797,691	1,598,456	1,197,697	998,463	799,228	599,994	398,469	0	-599,994
wholesale head and gut	2019	$6.37	1.00	8,268,080	7,351,745	5,508,543	4,592,208	3,675,873	2,759,538	1,832,670	0	-2,759,538
			0.75	6,201,060	5,513,809	4,131,407	3,444,156	2,756,904	2,069,653	1,374,503	0	-2,069,653
			0.50	4,134,040	3,675,873	2,754,271	2,296,104	1,837,936	1,379,769	916,335	0	-1,379,769
			0.25	2,067,020	1,837,936	1,377,136	1,148,052	918,968	689,884	458,168	0	-689,884
	Average 2015-19	$7.04	1.00	9,137,721	8,125,006	6,087,934	5,075,219	4,062,503	3,049,787	2,025,431	0	-3,049,787
			0.75	6,853,291	6,093,754	4,565,951	3,806,414	3,046,877	2,287,340	1,519,073	0	-2,287,340
			0.50	4,568,861	4,062,503	3,043,967	2,537,609	2,031,251	1,524,894	1,012,716	0	-1,524,894
			0.25	2,284,430	2,031,251	1,521,984	1,268,805	1,015,626	762,447	506,358	0	-762,447

5.4.1 Impacts within IPHC Regulatory Area 4

NMFS reports pacific halibut mortality from non-directed commercial fisheries (fisheries where the retention of Pacific halibut is prohibited) to the IPHC on an annual basis by IPHC Regulatory Area and gear type. Table 5-16 shows IPHC catch limits and non-directed discard mortality as well as A80 PSC by IPHC area. A80 PSC are included for comparison purposes although IPHC does not distinguish discard mortality beyond the trawl level. A80 PSC are reported in round mt however IPHC converts to net million pounds using the following calculations: net =round*0.75, lb=t/0.000453592. A80 PSC accounts for varying proportions of total non-directed discard mortality by area (Figure 5-12)

Table 5-16 **IPHC catch limits and non-directed discard mortality in million net pounds and metric tons**

		million net pounds				metric tons		
Year	Area	FCEY adopted	Directed Commercial Fishery Limits	Directed Commercial Total Removals	non-directed discard mortality	non-directed discard mortality	Trawl non-directed discard mortality	A80 PSC
2020	4A	1.41	1.41	1.23	0.28	170	148	98
	4B	1.10	1.10	0.93	0.10	59	49	29
	4CDE	1.73	1.73	1.69	2.45	1480	1380	969
	Area 4	4.24	4.24	3.85	2.83	1709	1577	1096
	All Areas	27.48	23.09	22.39	4.67	2827		1096
2019	4A	1.65	1.65	1.46	0.35	209	169	104
	4B	1.21	1.21	1.03	0.15	92	83	46
	4CDE	2.04	2.04	1.71	3.50	2116	2021	1309
	Area 4	4.90	4.90	4.20	4.00	2416.9	2273.2	1459.1
	All Areas	29.43	24.87	24.34	6.56	3970		1459
2018	4A	1.37	1.37	1.29	0.33	200	164	87
	4B	1.05	1.05	1.06	0.14	86	76	55
	4CDE	1.58	1.58	1.44	2.98	1800	1709	1207
	Area 4	4.00	4.00	3.80	3.45	2086	1949	1349
	All Areas	28.04	23.51	23.57	6.11	3695		1349
2017	4A	1.39	1.39	1.33	0.43	258	184	115
	4B	1.14	1.14	1.08	0.21	127	117	83
	4CDE	1.70	1.70	1.65	2.75	1662	1476	973
	Area 4	4.23	4.23	4.06	3.38	2047	1777	1171
	All Areas	31.40	26.36	26.61	6.21	3757		1171
2016	4A	1.39	1.39	1.40	0.60	362	282	131
	4B	1.14	1.14	1.14	0.15	89	83	60
	4CDE	1.66	1.66	1.53	3.24	1962	1751	1222
	Area 4	4.19	4.19	4.07	3.99	2413	2116	1413
	All Areas	29.89	28.00	25.64	7.16	4330		1413

2015	4A	1.39	1.39	1.42	0.67	404	292	140*
	4B	1.14	1.14	1.12	0.23	137	122	99*
	4CDE	1.29	1.29	1.23	3.43	2071	1816	1166*
	Area 4	3.82	3.82	3.76	4.32	2612	2230	1404*
	All Areas	29.22	24.42	25.29	7.61	4601		1404*
2014	4A	0.85	0.85	0.87	0.83	503	372	245
	4B	1.14	1.14	1.15	0.13	82	61	36
	4CDE	1.29	1.29	1.30	4.80	2901	2543	1897
	Area 4	3.28	3.28	3.32	5.76	3486	2976	2178
	All Areas	27.52	23.06	24.31	9.08	5492		2178
2013	4A	1.33	1.33	1.29	0.87	528	367	317
	4B	1.45	1.45	1.26	0.14	85	70	42
	4CDE	1.93	1.93	1.82	4.98	3010	2486	1807
	Area 4	4.71	4.71	4.36	5.99	3622	2922	2166
	All Areas	31.03	29.50	29.96	8.93	5398		2166
2012	4A	1.57	1.57	1.64	1.47	890	795	445
	4B	1.87	1.87	1.76	0.26	154	130	89
	4CDE	2.47	2.46	2.41	4.26	2576	2091	1410
	Area 4	5.91	5.90	5.80	5.99	3621	3016	1944
	All Areas	33.54	32.01	33.02	9.29	5620		1944
2011	4A	2.41	2.41	2.48	0.97	588	477	331
	4B	2.18	2.18	2.08	0.48	288	243	67
	4CDE	3.72	3.72	3.60	3.02	1829	1510	1412
	Area 4	8.31	8.31	8.16	4.47	2705	2230	1810
	All Areas	41.07	39.69	41.41	8.50	5141		1810
2010	4A	2.33	2.33	2.41	1.06	640	484	245
	4B	2.16	2.16	1.84	0.48	289	224	48
	4CDE	3.58	3.58	3.38	4.18	2529	2074	1961
	Area 4	8.07	8.07	7.62	5.72	3457	2782	2254
	All Areas	50.67	49.38	52.21	9.75	5894		2254

Source: IPHC https://www.iphc.int/data/time-series-datasets IPHC-2021-TSD-025, IPHC-2020-TSD-018

A80 PSC: AKFIN (*does not include 234t of deck sorted PSC),

trawl non-directed discard mortality reported in round mt, converted to net lb, (net lb=round t*0.75/0.000453592)

net =round*0.75

t=lb* 2204.623

lb=t/0.000453592

Figure 5-12 Proportion of non-directed discard mortality (PSC) from 2010 to 2020 for all fisheries (red), all trawl fisheries (green), and A80 trawl fisheries (blue).

NMFS methodology to apportion PSC to IPHC area has changed in recent years. Prior to 2015, PSC was assigned to an IPHC area based on the NMFS federal reporting area, assigning an entire NMFS reporting area to an IPHC area. This method provided estimates at low spatial resolution relative to where fishing activity occurred, resulting in estimates that cross boundaries and attribute too little or too much catch to an IPHC area. In most situations, this method was acceptable given the large size of an IPHC area relative to a NMFS reporting area and the location of fishing activity. However, in Area 4 (BSAI), the boundaries of NMFS areas and IPHC areas are poorly aligned and generally have large amounts of fishing effort along their boundaries (Figure 5-13). In 2015, improvements in the Alaska Regional Office (AKRO) Catch Accounting System (CAS) improved the spatial resolution for which estimates are available in the database. Due to these improvements, since 2016, for observed fisheries such as A80, the IPHC area is determined by the observed haul retrieval latitude and longitude.

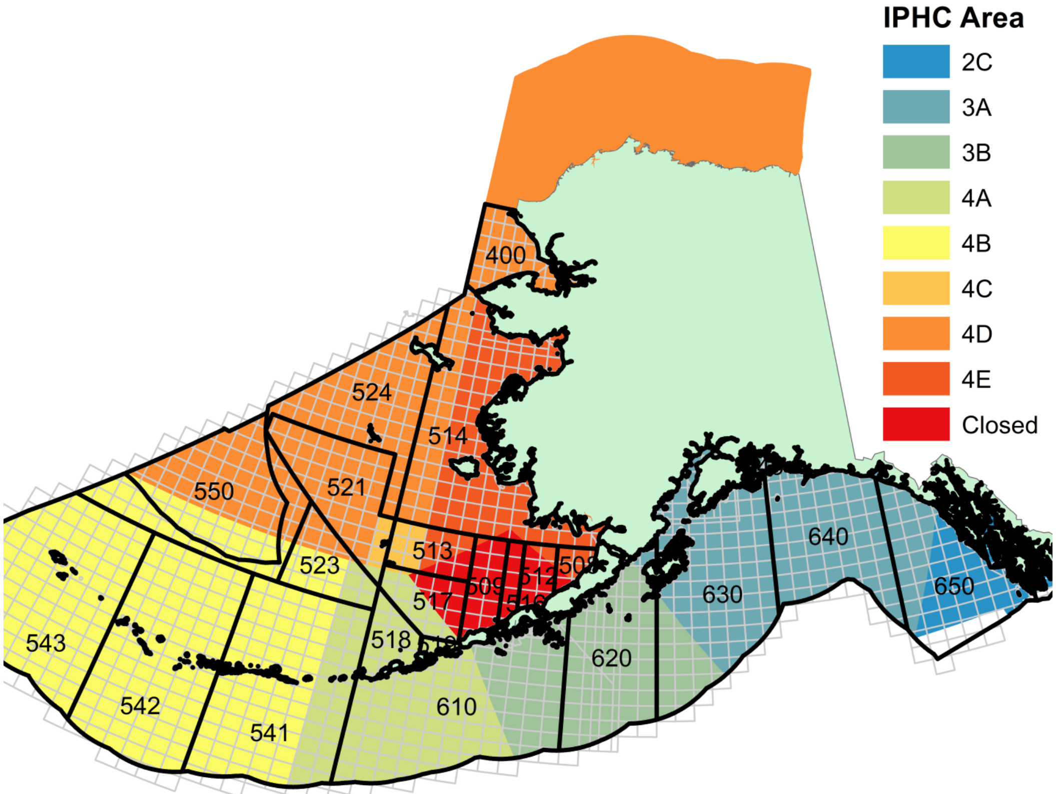

Figure 5-13 Agency reporting areas: NMFS (black lines), ADFG (small grid), and IPHC (colored blocks).

Given that IPHC catch setting policy removes O26 bycatch by IPHC regulatory area, the spatial distribution of PSC may impact the distribution of directed fishery catch limits within Area 4. Total A80 PSC has decreased since 2015 however the distribution within Area 4 has stayed fairly consistent with Area 4CDE accounting for between 83% and 90% of annual A80 PSC since 2015 (Figure 5-14). If the spatial distribution of PSC within Area 4 remains consistent in the future, the directed halibut fishery in Area 4CDE would have the greatest potential for experiencing whatever incidental reallocative effects may occur under the proposed action alternatives.

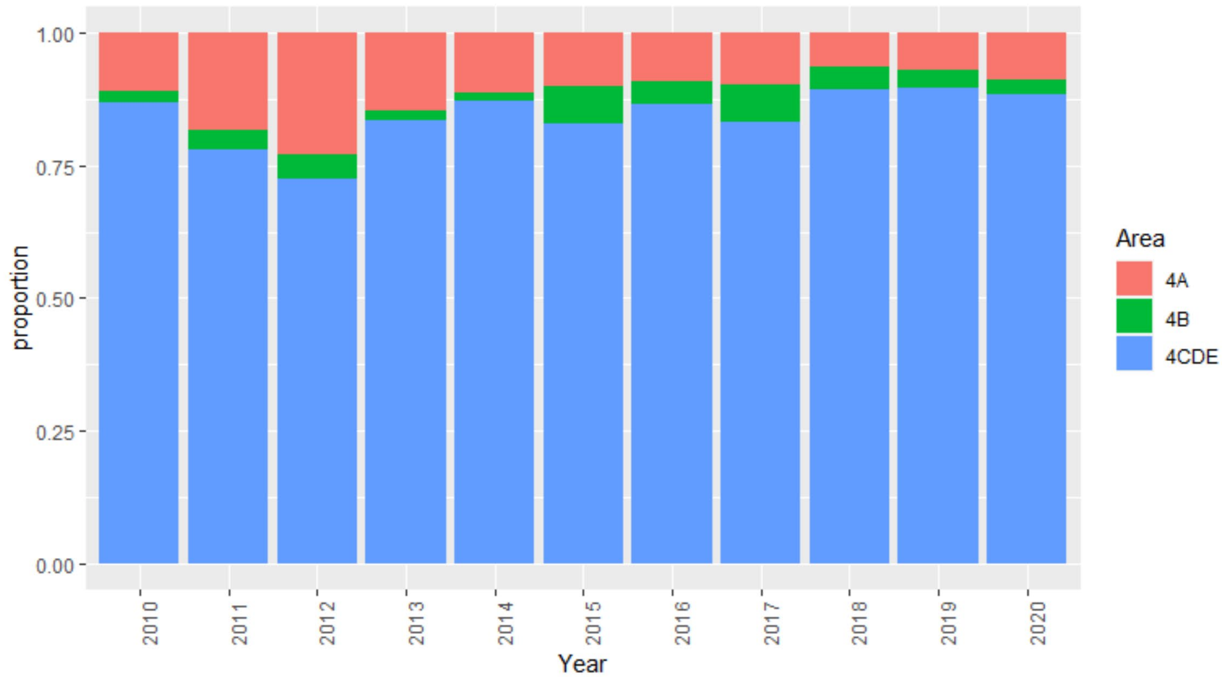

Figure 5-14 Proportion of A80 PSC by IPHC Regulatory Area from 2010 to 2020.

While total PSC has decreased since 2015, the new NMFS method for apportioning to IPHC area may have unintentionally negatively impacted 4CDE. Of the NMFS reporting areas that overlap IPHC areas, 521 and 523 apportionment changed very little with the new methodology, while 541 apportioned approximately half of the PSC that would have previously been deducted from 4B to 4A and 517 apportioned varying amounts of PSC that would have previously been deducted from 4A to 4CDE (Figure 5-15).

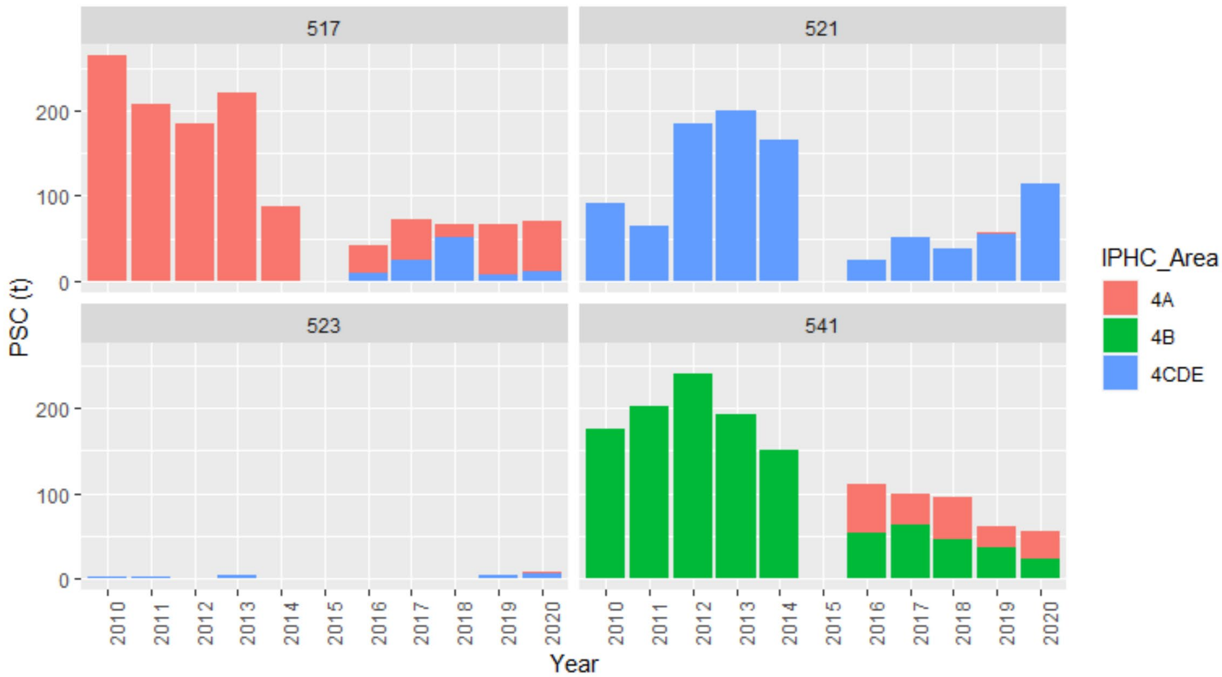

Figure 5-15 A80 PSC by NMFS reporting area and IPHC Regulatory Area

The above figures and tables include all PSC regardless of length, but IPHC only deducts O26 by area when calculating catch limits (U26 are accounted for at the coastwide level, see Section 4.4.1). Regardless, Figure 5-15 illustrates that the PSC in statistical areas that overlap two IPHC Regulatory Areas have significant amount of PSC which may occur in either IPHC Regulatory Area. With changes in the age structure of the halibut population and movement of target fish species between areas, a particular year may show a relatively higher amount of PSC, or possibly an increasing trend in PSC in an IPHC Regulatory Area. For example, area 517 showed a higher proportion of PSC in IPHC Regulatory Area 4CDE (Figure 5-15) in 2018 than other years. This type of variability can result in unexpected changes in the directed halibut catch limit since the PSC is removed from the TCEY to calculate the FCEY, and the impacts to the directed halibut fisheries in a particular IPHC Regulatory Area, such as 4CDE, may be greater than in the entire BSAI.

5.5 Social and Environmental Justice

Appendix 1, the Social Impact Assessment (SIA), evaluates community and regional participation patterns in BSAI Amendment 80 groundfish fishery and the Area 4 halibut commercial fishery as well as potential community level impacts from (1) the no-action alternative (Alternative 1) and (2) the three action alternatives as a group (Alternatives 2-4). Potential impacts to regional subsistence and sport halibut fisheries are also evaluated. This section summarizes those SIA evaluations and provides additional evaluation of the individual action alternatives.

5.5.1 BSAI groundfish fishery engagement, dependency, and vulnerability to community-level Impacts of the proposed action alternatives

5.5.1.1 Alaska communities

The screening criteria for the selection of Alaska communities for inclusion in the BSAI groundfish component of the SIA were designed to identify Alaska communities that had at least a minimal, ongoing level of engagement in the relevant BSAI groundfish fisheries, as measured by an annual average of one or more active Amendment 80 sector groundfish trawl catcher/processor(s) with a local ownership address that participated in the BSAI groundfish fisheries 2010-2019 inclusive and/or being the location of catcher/processor product transfers. The latter criterion selected for those BSAI communities where, on an annual average basis 2010-2019, 5.0 percent or more of combined state shared fisheries tax revenue (i.e., Fisheries Business Tax revenue [associated with landings at shore-based or stationary floating processing operations] and Fisheries Resource Landing Tax Revenue [associated with product transfers by catcher/processors]) was attributable to Fisheries Resource Landing Tax revenue.

Using these screening criteria, five Alaska communities have been selected for analysis as potentially substantially engaged in, and/or potentially substantially dependent on, the BSAI groundfish Amendment 80 sector that would be directly affected by one or more of the proposed action alternatives. These Alaska communities are shown graphically in Table 5-17. Also shown in this table for reference is the level of engagement of these same five communities in the Area 4 halibut catcher vessel and shore-based processing sectors. Not shown in this table is the level of engagement of Pacific Northwest communities, including the greater Seattle area, which has the highest level of engagement among all communities in all categories (except being the location of Area 4 halibut shore-based processing).

Table 5-17 Graphic representation of potentially affected Alaska BSAI groundfish communities relative annual average engagement in BSAI groundfish and halibut fisheries, 2010-2019 (table legend is provided in lower panel)

		BSAI Groundfish Engagement		Area 4 Halibut Engagement	
Alaska Community	Relative Community Size	Local Ownership Address Amendment 80 CPs	CP Product Transfer Location	Local Ownership Address CVs	Shore-Based Processing Location
Adak		(none)		(< 0.5)	
Atka		(none)			
Sand Point		(none)		(none)	
Togiak		(none)			(< 0.5)
Unalaska/Dutch Harbor		(none)			

Table Legend

Type/Level of Engagement			
Community Size	2010 Population = less than 1,000	2010 Population = 1,000-9,999	2010 Population = 10,000 or more
BSAI Amendment 80 Participation	2010-2019 annual avg = 0.5 -- 0.9 CPs	2010-2019 annual avg = 1.0 -- 2.9 CPs	2010-2019 annual avg = 3.0 or more CPs
BSAI Product Transfer Location Tax Revenues	2010-2019 annual avg. FRLT = 5.0-24.9% of FBT+FRLT total	2010-2019 annual avg. FRLT = 25.0-49.9% of FBT+FRLT total	2010-2019 annual avg. FRLT = 50.0% or more of FBT+FRLT total
Area 4 Halibut Catcher Vessel Participation	2010-2019 annual avg = 1.0 -- 4.9 CVs	2010-2019 annual avg = 5.0 -- 9.9 CVs	2010-2019 annual avg = 10.0 or more CVs
Area 4 Halibut Shore-Based Processor Participation	2010-2019 annual avg = 0.5 -- 0.9 SBPRs	2010-2019 annual avg = 1.0 -- 1.9 SBPRs	2010-2019 annual avg = 2.0 or more SBPRs

Vulnerability of communities to adverse community-level impacts from the proposed action alternatives is in part a function of dependence of the community on the potentially affected BSAI groundfish Amendment 80 sector fisheries and the economic resiliency and diversity of the community. Dependency is influenced by the relative importance of the relevant BSAI groundfish Amendment 80 fisheries to vessels participating directly in the fisheries in comparison to all area, species, and gear fisheries in which those same vessels participate (community Amendment 80 sector vessel diversity); the relative importance of the relevant BSAI groundfish fisheries to all local ownership address catcher/processor vessels participating in all area, species, and gear fisheries combined (community catcher/processor fleet diversity); and the relative importance of the overall community fishery sector(s) within the larger community economic base both in terms of private sector business activity and public revenues (community economic diversity). Also important to adverse community-level impact outcomes and community resilience is the specific nature of local engagement in the potentially affected BSAI groundfish Amendment 80 fishery sector and alternative employment, income, business, and public revenue opportunities available within the community because of the location, scale, and relative economic diversity of the community.

The relative importance of the BSAI Amendment 80 groundfish fisheries likely to be affected by the proposed alternatives within the larger local fisheries sector and within the larger local economic base varies widely among the engaged Alaska communities. Similarly, the socioeconomic structure of the engaged communities varies widely along with the relative diversity of their respective local economies. These conditions over the period 2010-2019 are summarized by region and community in the following sections, along with potential community level impacts associated with the proposed action alternatives and associated environmental justice concerns, as relevant.

5.5.1.1.1 Unalaska/Dutch Harbor

Unalaska/Dutch Harbor, with its relatively well-developed fishery support service sector and its role as the major shipping port of the BSAI area, could experience indirect impacts from the proposed alternatives through a decline in economic activity related to the Amendment 80 catcher/processor fleet if port calls were to decline because of the proposed action. Unalaska/Dutch Harbor, unique among Alaska communities, also derives substantial public revenues from BSAI groundfish catcher/processors offloading/transferring processed product in the port. Unalaska/Dutch Harbor accounted for two-thirds of all Amendment 80 Alaska port calls during the years 2010-2019. Unalaska/Dutch Harbor could experience indirect impacts from the proposed action alternatives through a decline in economic activity related to the Amendment 80 catcher/processor fleet if product transfers and/or other port calls were to decline because of the proposed action; however, there is no straightforward way to quantitatively estimate these impacts.

While Unalaska/Dutch Harbor is clearly the Alaska community most closely associated with activity of the Amendment 80 fleet and therefore potentially the most vulnerable to adverse impacts under the proposed action alternatives, it is also substantially engaged in the commercial directed BSAI/Area 4 halibut fishery, both in terms of its local catcher vessel fleet and local shore-based processing operations and therefore potentially vulnerable to adverse impacts during halibut low abundance conditions under the no-action alternative. Although it is an Alaska Native Claims Settlement Act (ANCSA) village and is home to a federally recognized tribe, Unalaska did not qualify as a CDQ community and its local small boat fleet does have access to CDQ halibut as an underpinning of local operations, unlike most halibut-dependent local fleets in the BSAI region.

5.5.1.1.1.1 Potential Environmental Justice Concerns

The demographics of the owners and crew of the specific halibut vessels that would potentially be most likely to experience adverse impacts under the no-action alternative in halibut low abundance conditions are unknown, but a general knowledge of the fleet would suggest that its demographics are largely reflective of the general/residential population of the community. In contrast, processing workers in Unalaska/Dutch Harbor have tended to be relatively demographically distinct from the rest of the local population. Processing workers are overwhelmingly recruited from outside the community and have tended to include a high proportion of minority workers. Impacts to processing workers could occur as the result of implementation of the no-action alternative during halibut low abundance conditions in the form of reduced income or employment opportunities, depending on how specific plants and, importantly, their delivering fleets, adapt to changing conditions. It is not likely, however, that implementation of the no-action alternative would result high and adverse impacts to processing workers in the form of substantial processor workforce reductions, given the relatively modest level of dependency of the shore-based processing plants in Unalaska/Dutch Harbor on BSAI/Area 4 halibut deliveries compared to those from other BSAI fisheries in which these plants are engaged.

5.5.1.1.2 Atka and Adak

Direct engagement of both Atka and Adak in the Amendment 80 fishery is limited to locally occurring product transfers, which contribute to local public revenues, and port calls of Amendment 80 vessels that generate local economic activity among support service suppliers, at least in Adak. Like Unalaska/Dutch Harbor, Atka and Adak could experience indirect impacts from the proposed action alternatives if Amendment 80 product transfers were to decline in either community and/or other port calls were to decline in Adak because of the proposed action; however, there is no straightforward way to quantitatively estimate these impacts, which could be locally important, if modest in scale in comparison to Unalaska/Dutch Harbor. Atka, as a member of the Aleutian Pribilof Islands Development Association CDQ group, benefits indirectly from the leasing of CDQ quota to the Amendment 80 sector for harvesting. Adak, in contrast, is not a CDQ community.

Both Atka and Adak were the site of locally operating shore-based processors that accepted deliveries of Area 4 halibut in most years 2010-2019. While Adak has had challenges in recruiting and retaining a local residential fleet, Atka has historically had a local halibut fleet. However, both communities have had challenges in the processing sector in recent years, with the plant in Adak closing intermittently (most recently in June 2020) and the plant in Atka not having operated since 2017. Under the no-action alternative, adverse impacts to the Area 4 directed halibut fishery under low abundance conditions could make the restart of the Atka and Adak plants and the reestablishment of active local fleets more challenging than would otherwise be the case. Adak shore-based processing has also faced, from the local perspective, several fishery management related challenges over the years, compounded by the basic logistical and economic challenges of operating in a local economy that remains in transition from that of relatively large military community to a small civilian community.

Both communities are particularly vulnerable at present to cumulative impacts related to losing working age residents as the local halibut fishery represented, especially in Atka, one of the few private sector income and employment opportunities in the community. The schools in both communities are near minimum enrollment levels needed to qualify for state funding, which complicates residential retention and increases the consequences of not being able to do so.

5.5.1.1.2.1 Potential environmental justice concerns

According to the 2010 census, Atka and Adak have populations that are 95 and 82 percent minority, respectively, and both have populations that, as of 2019, had 14.0 and 16.4 percent of their respective populations living below the poverty threshold, which are both considerably higher figure than the Alaska state-wide figure (10.7 percent). Additionally, Atka is also the location of a federally recognized Alaska Native tribe. While Adak is not home to a federally recognized tribe and is not an ANCSA village, it does have multiple ties to the Aleut Corporation, the ANCSA regional corporation for the Aleutian Pribilof region, and a number its subsidiaries. Given the nature of potential impacts to both communities summarized above, disproportionate high and adverse impacts to minority and/or low-income populations in both communities are theoretically possible, under both the action alternatives and, under halibut low abundance conditions, the no-action alternative.

Most of Adak’s minority residents at the time of the census, were processing workers living in group housing and it is likely that processing workers accounted for most of the community’s low-income population as well. With the processing plant currently shuttered, those individuals are no longer present in the community. If that situation continues to the time of the ultimate implementation of a selected alternative, both the minority population and the low-income population of Adak may more closely resemble that of the general population of Alaska, meaning that environmental justice may be less of an issue of a concern.

5.5.1.1.3 Togiak

Direct engagement of Togiak in the Amendment 80 fishery is limited to locally occurring product transfers, which contribute to local public revenues, and port calls of Amendment 80 vessels. The contribution to public revenues is relatively modest compared to other sources of general fund revenue and port calls reportedly generate little in the way of support service economic activities as, like Atka, Togiak does not have facilities of the size and scale to regularly support larger vessel operations. Togiak could experience indirect impacts from the proposed action alternatives if Amendment 80 product transfers and/or other port calls were to decline because of the proposed action; however, it is assumed that any such impacts would be minor. Togiak is the home of a federally recognized tribe and, as a member of the Bristol Bay Economic Development CDQ group, benefits indirectly from the leasing of CDQ quota to the Amendment 80 sector for harvesting.

With respect to engagement in and dependency on the Area 4 commercial halibut fishery, catcher vessels with Togiak ownership addresses active in the Area 4 halibut fishery derived about 83 percent of their total ex-vessel gross revenues 2010-2019 from fisheries other than the BSAI/Area 4 halibut fishery; all commercial fishing vessels with Togiak ownership addresses derived approximately 93 percent of their total ex-vessel gross revenues from fisheries other than the BSAI halibut fishery during this same time period. Given this lack of dependence, Togiak as not as acutely vulnerable in economic terms to community level adverse impacts under the no-action alternative during periods of low halibut abundance as are several other halibut communities. This is not to say that the Area 4 halibut fishery is unimportant to Togiak harvesters and/or the shore-based processors in Togiak (and nearby Twin Hills) as resource that is available during an otherwise slow time and a diversification opportunity in an area that has otherwise been largely dependent on the herring and salmon fisheries.

5.5.1.1.4 Other CDQ communities

CDQ entities and their constituent communities could be impacted by potential changes to the BSAI groundfish Amendment 80 sector fisheries related to the proposed action alternatives in multiple ways, two of the most direct of which are (1) through revenues generated by leasing the harvest of their BSAI multispecies groundfish CDQ quota holdings to potentially affected Amendment 80 industry partners and (2) through CDQ group investments in direct participation in the potentially affected Amendment 80 sector.

Four of the six CDQ groups routinely have their BSAI multispecies groundfish CDQ quota harvested in whole or in part by industry partners in the Amendment 80 sector. These groups vary in the number of communities and residents represent, the composition of the CDQ fishery portfolios they hold, and the relative scale of the fishery and non-fishery portions of their local economies, among other attributes. To the extent that the proposed action alternatives have the potential to reduce royalty payments by Amendment 80 entities to CDQ groups due to increased harvest expenses and/or leaving CDQ fish in the water, the harvest of which has been contracted to Amendment 80 entities, CDQ groups, and their constituent communities are at potential risk of adverse impacts under these alternatives. How effectively these risks would be mitigated by adaptive fishing behaviors on the part of the Amendment 80 partners is unknown and it is otherwise not possible to quantify these risks with available data. Amendment 80 entities have varying fishing portfolios in which leasing CDQ groundfish quota plays a part in an overall operational strategy in combination with their own cooperative quota and other CDQ fisheries quota. Given that the CDQ halibut PSC limit (315 mt) would not change under any of the proposed action alternatives (unlike Amendment 80 halibut PSC limits that would vary with halibut abundance under the proposed action alternatives), it is assumed adverse (or beneficial) impacts, if any, to CDQ quota leasing practices and leasing revenues accruing to CDQ groups resulting from implementation of any of the action alternatives would be indirect and would vary by contracted entity, based on multiple factors. These would include circumstances unique to individual Amendment 80 entities including cooperative quota portfolio holdings, CDQ fishery leasing agreement portfolios, in-season operational decision making, and strategic partnering considerations, among other factors. If, however, there were to be a reduction revenues to CDQ entities as the result of the implementation of a proposed action alternative, the level of impact experienced by any specific CDQ group would vary based on a range of factors specific to that group, including the scale of Amendment 80 revenues relative to other CDQ fishery revenue streams, the viability of alternative revenue generation options for all or some portion of CDQ fishery portfolio leased by current Amendment 80 sector partners, either within or outside of the Amendment 80 sector, and the socioeconomic/demographic context of the communities represented by the CDQ group itself.

A fifth CDQ group holds partial ownership interest in multiple vessels in the Amendment 80 sector and thus is at some financial risk under the proposed action alternatives (similar to any other entity with Amendment 80 ownership interests), but again this risk is not quantifiable with available data. This CDQ group, as well as the sixth CDQ group, does not routinely use Amendment 80 entities to harvest their BSAI multispecies groundfish CDQ quota. While potential adverse impacts resulting from the amounts of quota at potential risk are not quantifiable with available data, they are understood to be minimal.

St. Paul has averaged the fourth highest number of port calls of Amendment 80 vessels among Alaska communities on an annual average basis 2010-2019. Available data suggest, however, that these port calls do not involve an amount of revenue from taxable product transfers that is substantial compared to other fishery tax revenue sources. St. Paul also does not appear to experience substantial private sector economic benefits from these port calls, based on a lack of port facilities and support service businesses of a scale capable of supporting relatively large vessels on a routine basis. As a result, no substantial adverse impacts to St. Paul related to any changes to patterns of Amendment 80 port calls resulting from implementation of any of the action alternatives are anticipated.

5.5.1.1.4.1 Potential environmental justice concerns

Amendment 80-derived revenues are an important source of income for multiple CDQ groups and are used to fund to greater or lesser degrees a range of benefits programs that, among others, include helping to address basic health, safety, and infrastructure needs in communities with limited alternative revenue sources and funding opportunities. Given that CDQ groups overwhelmingly represent communities with high proportions of Alaska Native residents and low-income residents and communities that are home to one or more federally recognized tribal entities, adverse impacts to these CDQ entities would be of potential environmental justice concern.

5.5.1.2 Pacific Northwest communities

Given the degree of centralization of ownership of the BSAI groundfish Amendment 80 sector in the Seattle Metropolitan Statistical Area (Seattle MSA), the centralization of the support services provided by Seattle-based firms, and the concentration of Amendment 80 crew member residence in the state of Washington, potential adverse economic impacts associated with proposed action alternatives described in Section 5.3.2 would largely accrue to the Seattle MSA in particular and the Pacific Northwest in general, with the limited exceptions described above.

As noted in Section 2.2, under both Alternative 2 and Alternative 4: the PSC limit would: (1) remain the same as the status quo PSC limit under combined “high setline index + high trawl index” halibut abundance conditions (only) and (2) under all other combinations of abundance conditions PSC limit reductions would occur. In contrast, under Alternative 3: (1) the alternative PSC limit would be higher than the status quo PSC limit under combined “high setline index + high trawl index” abundance conditions (the only circumstance under any alternative not modified by an option that this would occur); (2) the alternative PSC limit would remain the same as the status quo PSC limit under “high setline index + low trawl index” and “medium setline index + high trawl index” conditions; and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit. When reductions in PSC limits would occur, the amounts of those reductions for any combination of conditions would vary by alternative, as detailed in Section 2.2.

As noted in Section 5.3.2, numerous variables would influence the impacts of PSC limit reduction on the Amendment 80 sector, including environmental, regulatory, and behavioral variables. While sector participants cannot directly modify environmental or regulatory variables, they can alter behavioral variables through halibut avoidance strategies, all of which come with avoidance costs. These costs are incurred regardless of whether the PSC limit becomes a constraint and cannot be quantified with available data. Other costs associated with PSC reduction include foregone groundfish revenues if halibut becomes constraining. These costs impact gross revenues but quantifying costs of foregone groundfish revenue resulting from PSC limit reductions is not straightforward. Estimates of revenue impacts within the constraints of available data are provided in Section 5.3.2.

Finally, as noted in the Section 5.3.2.3 practicability of bycatch avoidance discussion, if halibut PSC limits become sufficiently constraining under an ultimately implemented proposed action alternative, additional consolidation of the Amendment 80 sector could occur. Consolidation could result as firms that are less efficient at addressing halibut bycatch constraints experience less profitability and sell to firms that are more efficient. In terms of the maximum level of consolidation that could occur under existing Amendment 80 ownership and control limits (and given current participation levels), only one firm could exit the fishery (because a person may not individually or collectively hold or use more than 30 percent of the aggregate Amendment 80 quota share units initially assigned to the Amendment 80 sector and resulting cooperative quota). Current vessel caps are set so that an Amendment 80 vessel may not be used to catch an amount of a species greater than 20 percent of the aggregate Amendment 80 sector’s species

ITACs, meaning the number of vessels in the fishery could theoretically consolidate to a minimum of five under the current caps. However, that degree of consolidation is not considered a realistic possibility, as the fleet would still need sufficient capacity to harvest the cooperative quota that can be supported by the available halibut PSC mortality limit.

5.5.1.2.1 Potential Environmental Justice Concerns

While no recent information from secondary sources on sector-wide catcher/processor crew demographics is readily available, for this analysis five firms representing a total of 19 Amendment 80 BSAI groundfish catcher/processors provided employee demographic data for 2019. As shown in the supplied data, 68 percent of all employees working on the catcher/processors represented in these data are minority employees. Minority representation is substantially higher for two of the job categories (factory foreman/quality control and processing labor/galley crew/cleaning, both over 75 percent), and in all but two job categories (captains and engineers) minority employees represented greater than 50 percent of all employees in that category. Asian Americans, Native Hawaiians, and Pacific Islanders as a group accounted for over 25 percent of all employees. Given these data, if disproportionate high and adverse impacts were to accrue to the BSAI Amendment 80 catcher/processor workforce due to implementation of a proposed action alternative, environmental justice would potentially be an issue of concern.

Of potential concern would be loss of income opportunities for crew, with increased expenses in operations with additional halibut avoidance measures, and/or more time away from home with time-consuming and/or labor-intensive measures. Although there are theoretically many more alternate employment and income opportunities for workers in a large urban area than in smaller communities or rural settings, there may not be comparable employment and earning potential ashore as is available to workers aboard these vessels, even in an otherwise robust job market, especially for employees who have worked their way up from entry level positions.

5.5.2 Area 4 halibut fishery engagement, dependency, and vulnerability to community-level impacts of the proposed action alternatives

5.5.2.1 Alaska communities

5.5.2.1.1 Overview

The initial screening criteria for the selection of Alaska communities for inclusion in this portion of the analysis were designed to identify those Alaska communities that had at least a minimal, ongoing level of engagement in the relevant BSAI/Area 4 halibut fishery, as measured by an annual average harvest engagement of 2.0 or more catcher vessels with local ownership addresses and/or communities with an annual average BSAI halibut processing engagement of 0.5 or more locally operating shore-based processors that accepted BSAI halibut deliveries over the years 2010-2019, inclusive.

Using these initial screening criteria, 29 Alaska communities, 20 of which are in the BSAI region, were selected for analysis as potentially substantially engaged in, and/or potentially substantially dependent on, the BSAI/Area 4 halibut fishery sectors most likely to be directly affected by one or more of the proposed action alternatives communities. Ultimately, a total of 17 of these Alaska communities were considered halibut-dependent for the purposes of this analysis and are shown graphically in Table 5-18. Of the 17 Alaska communities shown in the table, 16 are home to federally recognized Alaska Native tribes. Not shown in this table is the level of engagement of Alaska communities outside of the BSAI region or Pacific Northwest communities.

Table 5-18 Graphic representation of potentially affected Alaska Area 4 halibut-dependent communities annual average engagement in Area 4 halibut fisheries (table legend is provided in lower panel)

Alaska Community	CDQ Group	Demographic Characteristics				Shore-Based Halibut Processing Location	Catcher Vessel Characteristics		
		Community Size	Proportion of Total Population				Number of Halibut CVs with Local Ownership Addresses	Halibut Ex-Vessel Gross Revenues as Percentage of Total Ex-Vessel Revenues	
			Alaska Native	Minority	Low-Income			Halibut CVs Only	All Local CVs
Adak	(none)						(< 1.0)		
Atka	APICDA								
Akutan	APICDA								
St. George	APICDA					(none)			
Unalaska/Dutch Harbor	(none)								
St. Paul	CBSFA								
Hooper Bay	CVRF					(< 0.5)			confidential
Kipnuk	CVRF					(< 0.5)			
Mekoryuk	CVRF					(< 0.5)			
Toksook Bay	CVRF					(< 0.5)			
Chefornak	CVRF					(< 0.5)			
Newtok	CVRF					(none)			
Nightmute	CVRF					(none)			
Quinhagak	CVRF					(none)			
Tununak	CVRF					(none)			
Nome*	NSEDC								
Savoonga	NSEDC								

*Note: Nome catcher vessel revenues combined with "all other NSEDC" (excluding Savoonga) to protect data confidentiality. Where halibut ex-vessel gross revenues are shown as lumped for more the one community, data confidentiality restrictions preclude showing data for the individual communities

Table Legend

Type/Level of Engagement			
Community Size	2010 Population = less than 1,000	2010 Population = 1,000-9,999	2010 Population = 10,000 or more
Alaska Native and Minority Population Proportion	2010 Population = less than 50%	2010 Population = 50.0-74.9%	2010 Population = 75.0% or more
Low-Income Population Proportion	2014-2019 Population = less than 15%	2014-2019 Population = 15.0-24.9%	2014-2019 Population = 25.0% or more
Area 4 Halibut Catcher Vessel Participation	2010-2019 annual avg = 1.0 -- 4.9 CVs	2010-2019 annual avg = 5.0 -- 9.9 CVs	2010-2019 annual avg = 10.0 or more CVs
Area 4 Halibut Shore-Based Processor Participation	2010-2019 annual avg = 0.5 -- 0.9 SBPRs	2010-2019 annual avg = 1.0 -- 1.9 SBPRs	2010-2019 annual avg = 2.0 or more SBPRs
Area 4 Halibut Ex-Vessel Gross Revenue Proportion	2010-2019 annual avg = less than 25%	2010-2019 annual avg = 25.0 - 49.5%	2010-2019 annual avg = 50.0% or more

The problematic nature of the no-action alternative for directed halibut fishery participants under halibut low abundance conditions is inherently recognized in the Council's purpose and need statement. The potential for Area 4 halibut-related community-level impacts from the proposed action alternatives in any given community is in part a function of present and future dependence of the community on the potentially affected Area 4 halibut fisheries. Like what was described for BSAI Amendment 80 groundfish fisheries, dependency on the Area 4 halibut fishery is influenced by the relative importance of Area 4 halibut fisheries in the larger community fisheries sector(s), as well as the relative importance of the overall community fishery sector(s) within the larger community economic base (both in terms of private sector business activity and public revenues). Also important to community-level impact outcomes is the specific nature of local engagement in the potentially affected Area 4 halibut fisheries and alternative employment, income, business, and public revenue opportunities available within the community because of the location, scale, and relative economic diversity of the community.

It is assumed that the BSAI/Area 4 commercial halibut fishery would potentially benefit in low halibut abundance conditions from implementation of the action alternatives due to what could effectively (if indirectly) be a reallocation of access to halibut between the BSAI groundfish and BSAI/Area 4 directed halibut fisheries that would potentially occur to greater or lesser degrees under the different action alternatives. The beneficial impacts of these incidental allocative effects, were they to occur, would be realized in the near-term following action alternative implementation (assuming low abundance conditions relevant to the design of the alternative were occurring at the time of implementation) and potentially in the long-term, if low abundance conditions were to persist over time. As noted in Section 5.4, given that IPHC catch setting policy removes O26 bycatch by IPHC regulatory area, the spatial distribution of Amendment 80 halibut PSC may impact the distribution of directed halibut fishery catch limits within the BSAI/Area 4. Specifically, while total Amendment 80 halibut PSC mortality has decreased, the distribution of PSC occurrence within Area 4 has stayed fairly consistent, with Area 4CDE accounting for between 83 percent and 90 percent of annual Amendment 80 PSC since 2015 (when spatial resolution of PSC occurrence substantially improved). In other words, the directed halibut fishery in Area 4CDE would have the greatest potential for experiencing whatever incidental reallocative effects may occur under the proposed action alternatives.

The conditions under which the potential for incidental allocative effects beneficial to the directed halibut fishery could occur vary by action alternative. Table 5-19 provides a simplified view of the alternatives showing, by action alternative and without modifying options, the halibut abundance conditions under which the Amendment 80 halibut PSC limits would be lower than, the same as, or higher than status quo/Alternative 1 conditions (highlighted in green, yellow, and orange, respectively).

Table 5-19 Simplified look up table of Alternatives 2, 3, and 4 showing Amendment 80 halibut PSC limits lower, same as, or higher relative to status quo (Alternative 1)

	Alternative 2		Alternative 3		Alternative 4	
	Low Trawl Index	High Trawl Index	Low Trawl Index	High Trawl Index	Low Trawl Index	High Trawl Index
High Setline Index	PSC Limit **LOWER** than Status Quo	PSC Limit **SAME** as Status Quo	PSC Limit **SAME** as Status Quo	PSC Limit **HIGHER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **SAME** as Status Quo
Medium Setline Index	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **SAME** as Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo
Low Setline Index	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo
Very Low Setline Index	*(Note: Alt 2 does not have a separate Very Low category)*		PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo

As shown, under both Alternative 2 and Alternative 4: (1) the alternative PSC limit would not be higher than the status quo PSC limit under any halibut abundance conditions; (2) the PSC limit would remain the same as the status quo PSC limit under combined "high setline index + high trawl index" halibut abundance conditions (only); and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit. The *amount* of PSC limit reductions under all but "high setline index + high trawl index" abundance conditions (and therefore the potential *level* of incidental allocative effects beneficial to the directed halibut fishery) would vary between the two alternatives, as described in DEIS Section 2.2,, but combinations of abundance *conditions* under which at least some level of incidental allocative effects could potentially occur would be the same under Alternative 2 and Alternative 4. (Under "high setline index + high trawl index" abundance conditions, Alternative 2 and Alternative 4 would both be neutral in terms of incidental allocative effects relative to Alternative 1.)

The pattern is different for Alternative 3, as: (1) the alternative PSC limit would be higher than the status quo PSC limit under combined “high setline index + high trawl index” abundance conditions; (2) the alternative PSC limit would remain the same as the status quo PSC limit under “high setline index + low trawl index” and “medium setline index + high trawl index” conditions; and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit (and therefore potential incidental allocative effects beneficial to the directed halibut fishery could occur). All things being equal, the increase in the Amendment 80 PSC limit under “high setline index + high trawl index” halibut abundance conditions would result in fewer opportunities for the directed halibut fishery under these conditions than would be the case under status quo PSC limits (Alternative 1). This could be characterized as a loss to the directed halibut fishery, as the directed fishery not fully realizing otherwise expected gains under high abundance conditions, and/or as Amendment 80 halibut PSC use and directed fishery halibut opportunities both increasing based on high abundance conditions.

The provision of additional opportunities for the directed halibut fishery that may accompany PSC limit reductions would be determined by IPHC management processes and, as described in Section 5.4, would not likely result in those additional directed halibut fishery opportunities occurring on a pound-for-pound basis. Additionally, the potential options that maybe applied to any of the action alternatives would influence the level of additional directed halibut fishery opportunities available in each year. It is also important to note that some communities are substantially engaged in or substantially dependent on both the Amendment 80 fishery and the Area 4 directed halibut fishery to varying degrees and a simple characterization of potential incidental reallocative effects to halibut dependent communities does not capture the complexity of overall impacts to those communities, much less the range of potential impacts to individual harvesters, processors, and/or fishery support businesses in those communities that may ultimately result from changes in Amendment 80 PSC limits.

It is further assumed that directed BSAI/Area 4 commercial halibut fishery could potentially benefit from implementation of the proposed action alternatives relative to the degree that the Pacific halibut stock itself would potentially benefit from the promotion of the conservation of the stock as a result of the implementation of the individual action alternatives. The IPHC’s spawning biomass per recruit-based management approach, however, is expected to conserve spawning biomass across differing patterns in fishery selectivity and/or allocation among different fisheries. As such, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all the alternatives, including the no action alternative. Closed loop model simulations that appeared in previous analyses, described in Section 4.3, are consistent with this expectation. Whatever potential benefits of this nature, were they to occur, would not be immediately apparent in the relevant halibut fisheries and the full extent of their impact would not be realized for several years. In addition to being longer term, these potential impacts, were they to occur, would be of greater spatial extent than would the potential incidental allocative effects previously noted (i.e., they would be experienced within the coast-wide Pacific halibut stock rather than concentrated in the BSAI/Area 4).

5.5.2.1.2 Potential impacts to communities engaged in the commercial halibut fishery

Dependence of the total resident-owned catcher vessel fleet for these communities varied widely, as the fleets of some communities are more exclusively focused on the halibut fishery than are others. St. Paul, the BSAI region community with easily the highest 2010-2019 annual average catcher vessel Area 4 halibut ex-vessel gross revenues, was also one of three communities with virtually complete community fleet dependency on BSAI halibut ex-vessel gross revenues, along with St. George and Savoonga, which have smaller scale community fleets. Among the other communities or small groups of communities for which ex-vessel gross revenue totals can be disclosed, three other communities (Adak/Atka, Akutan, and Mekoryuk) have local ownership address catcher vessels fleets that were 85 percent or more dependent on BSAI halibut ex-vessel gross revenues on an annual average basis for the years 2010-2019, while two others were 25 percent or more dependent (Unalaska/Dutch Harbor and Toksook Bay). In terms of ex-vessel gross revenues to BSAI halibut vessels specifically, among the potentially substantially engaged or substantially dependent halibut communities for which revenues can be disclosed on an individual community or aggregated community basis, nine have dependencies of 90 percent or greater and one is more than 85 percent dependent.

In all but two cases (Adak and Unalaska/Dutch Harbor), potentially substantially engaged or substantially dependent BSAI halibut communities located in the BSAI region itself are member communities of CDQ entities. One of the CDQ entities has partial ownership interest in Amendment 80 vessels and four others routinely lease CDQ quota for harvest to Amendment 80 industry partners. These CDQ entities and their constituent communities would be vulnerable to potential decreases in CDQ groundfish revenues during low abundance halibut conditions under the proposed alternatives being considered. Ultimately, the level of direct impact to an individual CDQ entity and level of direct or indirect impact to its member communities cannot be quantitatively estimated given the role of individual entity business decision making, among myriad other factors.

While each CDQ entity pursues individual strategies, one primary goal of the CDQ program is to encourage individual entities to use the returns from their engagement in commercial fishing to support regional economic growth, including the direct reinvestment in commercial fisheries, the support of community development activities, and the creation/maintenance of commercial fishing support infrastructure in member communities. Different CDQ groups have faced different circumstances and pursued different strategies regarding the establishment or sustainment of an in-region small boat commercial halibut fishery. For those CDQ groups whose experience in, or assessment of, supporting an in-region small boat commercial halibut fishery would indicate that the effort is not or would not be sustainable (or equitable to all of the constituent communities they serve), especially under low abundance conditions, it is unknown whether the beneficial impacts that may accrue from implementation of one or more of the proposed alternatives would be sufficient to pass a threshold whereby in-region CDQ halibut fisheries programs would be considered sustainable (or equitable) even in low abundance conditions. For this reason, it is not possible to predict whether implementation of any one of the proposed alternatives would potentially result in a different pattern of in-region CDQ community commercial small boat direct BSAI/Area 4 halibut fishery engagement than is seen at present.

5.5.2.1.2.1 Potential environmental justice concerns

In terms of minority populations in general, of the 17 Alaska communities considered BSAI halibut-dependent for the purposes of this analysis, in 2010 minority residents (including Alaska Native residents) accounted for more than 90 percent of the population in 13 communities, between 80 and 90 percent of the population in two communities, and more than 65 percent of the population in the remaining two communities. Additionally, of the 17 Alaska potentially BSAI halibut dependent communities, 16 have federally recognized Alaska Native tribes and 15 are members of CDQ groups.

In terms of low-income populations, of the 17 Alaska communities considered BSAI halibut-dependent for the purposes of this analysis, as of the 2015-2019 5-Year American Community Survey: 2 had 40 percent or more of their residents living below the poverty threshold; 5 had between 30 percent and less than 40 percent of their residents living below the poverty threshold; 2 had between 20 percent and less than 30 percent of their residents living below the poverty threshold; and 5 had a higher percentage of their residents living below the poverty threshold than the State of Alaska as a whole (10.7 percent), but less than 20 percent of their residents overall. Given these demographics and the federally recognized tribal status of all but one of the communities involved, if these communities were to experience disproportionate high and adverse impacts under the no-action alternative under halibut low abundance conditions, environmental justice would be a concern. Conversely, if these communities were to experience beneficial impacts under the proposed action alternatives, environmental justice would not be an issue of concern.

5.5.2.1.3 Potential impacts to communities engaged in the subsistence halibut fishery

Subsistence harvest of halibut would not be directly affected by the proposed action alternatives. Further, unlike the commercial halibut fishery, the subsistence halibut fishery would not benefit from potential incidental reallocative effects that may occur under the proposed action alternatives and provide additional opportunities for the directed halibut fishery. The IPHC accounts for incidental halibut removals in the groundfish fisheries, recreational and subsistence catches, and other sources of halibut mortality before setting commercial halibut catch limits each year. While subsistence removals are accounted for in setting the commercial halibut catch limits, subsistence halibut harvests are not constrained by this process. There are no caps on removals from Area 4 in the subsistence halibut fishery analogous to quotas established annually for the commercial halibut fishery, nor are there size limits on halibut harvested for subsistence use.

Subsistence halibut harvests (and harvesters) could indirectly benefit from the implementation of the proposed action alternatives if the proposed action ultimately implemented were to result in changes to the spatial distribution of halibut stock or an overall increase in availability of halibut for subsistence harvest and/or an accompanying decrease in effort and expense in harvesting halibut for subsistence use over the long term. These indirect benefits could occur if the Pacific halibut stock itself benefits from additional promotion of conservation of the halibut under the individual action alternatives (and to the extent that whatever conservation gains that may be realized are not fully redirected into additional opportunities for the commercial halibut fishery, while recognizing that the relationship between the commercial and subsistence fisheries is complex and varies by community). As noted in Section 5.2, however, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative, for multiple reasons.

Beyond direct use of halibut as a subsistence resource, the proposed alternatives could have impacts on other subsistence pursuits. These types of impacts fall into two main categories: impacts to other subsistence pursuits because of loss of revenue from the BSAI groundfish fishery under the action alternatives (or the BSAI halibut fishery under the no-action alternative) and impacts to other subsistence pursuits because of the loss of opportunity to use commercial fishing gear and vessels for subsistence pursuits. In general, while the indirect impact of the proposed action alternatives on subsistence is difficult to assess for multiple reasons, joint production impacts are likely to be concentrated among small halibut catcher vessel owners during low abundance conditions under the no-action alternative.

5.5.2.1.4 Potential impacts to communities engaged in the sport halibut fishery

Sport harvest of halibut would not be directly affected by the proposed action alternatives. Further, unlike the commercial halibut fishery, the sport halibut fishery would not benefit from potential incidental reallocative effects that may occur under the proposed action alternatives and provide additional opportunities for the directed halibut fishery. Due to the relatively small volume of recreational use in Area 4 and the management under a daily bag limit rather than an area/sector allocation, IPHC accounts for recreational removals using a projection. There are no caps on removals from Area 4 in the sport halibut fishery analogous to quotas established annually for the commercial halibut fishery, but sport effort is constrained in Area 4 by a sport fishing season that extends from February 1 to December 31 and a bag limit of two halibut of any size per person per day unless otherwise specified.

Sport halibut harvests (and the guided and unguided sport halibut fisheries) could indirectly benefit from the implementation of the proposed action alternatives if reducing BSAI halibut PSC limits under low abundance conditions were to ultimately result in an overall improvement in availability of halibut for sport harvest, an accompanying decrease in effort and expense in harvesting halibut for sport use, and/or an increase in interest in halibut sport fishing in the region prompted by an increasing abundance of larger halibut. These indirect benefits could occur if the Pacific halibut stock itself benefits from additional promotion of conservation of the stock under the individual action alternatives (and to the extent that those gains are not fully redirected into additional opportunities for the commercial halibut fishery). As noted in Section 5.2, however, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative, for multiple reasons.

5.5.2.1.5 Potential cumulative small/rural community and cultural context issues

The SIA is largely focused on community impacts associated with the implementation of proposed BSAI halibut PSC limit revisions using quantitative fishery information and through characterizations of several Alaskan regions and communities that describe the magnitude of engagement and dependency on those fisheries. This approach provides an analysis of anticipated socioeconomic impacts that may accompany implementation of the proposed action alternatives. It should be noted, however, that fishing regulatory actions can result in a wide range of sociocultural impacts in rural fishing communities. For many residents of these communities, commercial fishing is not seen as a stand-alone socioeconomic activity, but an integral part of self-identity. This relationship is compounded for those residents who come from families with multi-generational experience in commercial and/or subsistence fishing, particularly for those Alaska Native residents for whom fishing is part of a larger, integrated traditional subsistence and economic sustenance practice rooted in thousands of years of history. The cultural importance of halibut (as a species) and halibut fishing (as a traditional activity) is documented in the anthropological literature for Alaska Native tribes and ethnic groups throughout Alaska. In addition to being a primary subsistence resource for many coastal cultures, halibut feature prominently in legends and parables. It is not uncommon to see halibut iconography in carvings, paintings, and textile handicrafts throughout the region, further suggesting its traditional cultural importance. The cultural significance of halibut for fishermen and their associated communities includes but exceeds the economic value of the fishery. Key themes include how halibut fishing provides a local source of employment in a day fishery that allows individuals to remain in their community, spend time with their family and build social networks, and engage in broader, culturally meaningful practices like subsistence. Halibut fishing is also considered a meaningful vocation and way of life.

While sustained participation of fishing communities in the BSAI groundfish or BSAI halibut fisheries would not appear to be directly at risk from implementation of the proposed action alternatives, the available literature and recent NPFMC analyses underline the fact that the proposed action is not taking place in isolation. Existing trends suggest that sustained participation in a range of commercial fisheries by residents of small communities in the region has become more challenging in recent years, with less inherent flexibility to adjust to both short- and long-term fluctuations in resource availability (as well as to changing markets for seafood products).

This flexibility is widely perceived in the communities as a key element in an overall adaptive strategy practiced in subsistence and economic contexts in the region for generations. This strategy involves piecing together individual livings (and often local economies) with an employment and income plurality approach. This plurality approach is particularly important given that the availability of non-fishing alternatives for income and employment are limited and, like the natural resources (and market factors) that underpin commercial fishing opportunities, tend to be subject to both short- and long-term fluctuations. This ongoing fluctuation in non-fishing opportunities further reinforces the importance of flexibility in the pursuit of a range of commercial fishing opportunities to enable individuals and communities the ability to successfully combine fishing and non-fishing as well as commercial and subsistence pursuits considered critical to long-term socioeconomic and sociocultural survival if not stability. To the extent that the proposed action alternatives would serve to provide for more opportunities for the success of small-scale commercial halibut fisheries during periods of low resource abundance, overall sustained participation in a range of local fisheries by residents of the smaller communities would be more secure.

5.5.2.2 Pacific Northwest communities

The Seattle MSA is also substantially engaged in the Area 4 halibut commercial fishery as measured by ownership address of actively participating catcher vessels, among other indicators of engagement. Its engagement in the BSAI halibut fishery is not as dominant relative to that of Alaska communities, compared to its relative engagement in the BSAI groundfish fisheries likely to be most directly affected by the proposed action alternatives. No community level adverse impacts related to the BSAI halibut fishery are anticipated to the Seattle MSA under either the no-action alterative or the proposed action alternatives.

5.6 Net Benefits to the Nation

Net benefits to the Nation are calculated by summing all producer and consumer surplus that occurs in the US economy. Both costs and benefits are defined broadly, from the Nation's perspective, to include all surpluses that accrue to direct and indirect participants in the fishery as well as to other members of society. The groups considered include those persons who harvest or process fish effected by the action, those who provide support services to the harvesting and processing sectors of the fishing industry effected by the action, consumers of the halibut and A80 fishery products (and any other substitute species whose producer or consumer surplus changes as a direct result of the action), and members of society that are non-consumptive users of halibut that value the resource.

A general evaluation of alternative bycatch management measures can be conducted even when accurate estimates and projections of all costs and benefits are not feasible. Such an evaluation considers the expected effects of a management measure on the external benefits and costs that result when fishermen make decisions concerning bycatch that do not reflect society's perspective. Based on this conceptual framework, the following conclusions can be reached: 1) for society, the optimum level of bycatch is not zero unless the benefit of eliminating the last unit of bycatch equals or exceeds the cost, 2) bycatch is a multispecies problem because actions to decrease the bycatch of one species can increase or decrease the bycatch of other species and because the bycatch of one species can affect the status of other species through predator, prey, or other biological interactions, and 3) it is highly unlikely that the use of management measures that limit the choices of fishermen rather than eliminate the externalities will result in cost-effective reductions in bycatch to the optimum levels.[100] Management measures that provide increased incentives for fishermen to use their knowledge and ingenuity to decrease bycatch effectively and efficiently work best to reduce bycatch without unnecessary reductions to net National benefits. These measures tend to encourage technological improvements and were implemented under A80 that placed greater emphasis on the A80 sector to internalize the costs of bycatch by directly impacting their ability to harvest their quota allocations.

It is assumed that the A80 sector fisheries are constrained by halibut mortality limits during some years under the current PSC limit and could be further constrained if the halibut PSC limit is reduced further. The reduction in the PSC limit is expected to have some positive impact on the directed users of the halibut resource. Those impacts are estimated in Section 5.5, but the authors recognize those estimates overstate the actual impact because of the assumption that the A80 sector will use their entire halibut PSC mortality limit every year. This is not an actual expected result of implementing a lower limit because the fleet operates under a hard cap and it will stop fishing before the limit is taken to avoid penalties and it is assumed that, depending on the size of the PSC limit reduction, the conditions in the fishery will result in years when halibut mortality rates in the groundfish fishery are lower because directed fishery species are more aggregated and it is easier to avoid halibut bycatch.

The analysis in this section is qualitative and based on the calculation of net benefits and not welfare economics. As such it is anticipated that depending in the size of the halibut PSC mortality limit reduction to the A80 sector the proposed action is expected to:

- increase costs to the A80 sector in an effort to reduce bycatch mortality;

[100] Gautam, Amy B.; Holliday, M; Lent, R., 1996. Our living oceans: the economic status of U.S. fisheries, 1996. NOAA tech. memo. NMFS-F/SPO; 22. https://repository.library.noaa.gov/view/noaa/3038

- reduce revenue in years when the mortality limit is a constraint;
- have a positive effect on all directed halibut fisheries (commercial, guided sport, unguided sport, and subsistence) resource users when the limit results in the actual halibut mortality used by the A80 fleet being lower than would have been used under the current limit;
- have positive impact on A80 suppliers (fuel, excluder manufactures, etc.) that benefit from the A80 sector's increased costs;
- have a negative impact on A80 suppliers (e.g., suppliers of packaging material) that lose business as a result of the action;
- have a modest positive impact on suppliers to the directed halibut fisheries, if it results in increased the commercial, charter, unguided sport, or subsistence harvests;
- have little impact on halibut consumers;
- impacts on A80 species consumers will depend on if the supply of A80 species' changes and relative cost and value of other substitute commodities.

Given the above list of impacts it is anticipated that, overall, producer surplus is expected to be negatively affected (dependent on the preferred alternative chosen and unknown future conditions) because the expected reductions in the A80 producer surpluses are not offset by increases in producer surpluses generated by harvesters, processors, and sellers of any increased catch in the directed halibut fisheries. Consumer surplus will be little changed and will depend on the relative cost and availability of substitutes in the world whitefish market. Overall, net benefits to the Nation are expected to be negative. The magnitude cannot be quantified and is expected to be more negative as the mortality limit reduces the amount of A80 species catch taken on an annual basis and increases costs associated with the harvest of those species. However, the Council will weigh the potential for actual impacts, versus those estimated here, against the conservation benefits of the abundance based management of halibut PSC when taking final action.

5.7 Cumulative Effects

NEPA requires an analysis of the potential cumulative effects of a proposed federal action and its alternatives. Cumulative effects are those combined effects on the quality of the human environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which federal or non-federal agency or person undertakes such other actions (40 CFR 1508.7, 1508.25(a) and 1508.25(c)). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the Council on Environmental Quality (CEQ) guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are truly meaningful. Based on the preceding analysis, the effects that are meaningful are potential effects on Pacific halibut, if the alternatives result in a change in the spatial or size distribution of halibut removals. The cumulative effects on the other resources have been analyzed in numerous documents and the impacts of this proposed action and alternatives on those resources are minimal; therefore, there is no need to conduct an additional cumulative impacts analysis.

The DEIS is intended to analyze the cumulative effects of each alternative and the effects of past, present, and reasonably foreseeable future actions (RFFAs). The past and present actions are described in the previous sections of this document. This section provides a review of the RFFAs that may result in cumulative effects on Pacific halibut. Actions are understood to be human actions (e.g., a proposed rule to designate northern right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). CEQ regulations require consideration of actions, whether taken by a government or by private persons, which are reasonably foreseeable. This requirement is interpreted to indicate actions that are more than merely possible or speculative. In addition to these actions, this cumulative effects analysis includes climate change.

Actions are considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or NMFS's publication of a proposed rule. Actions only "under consideration" have not generally been included because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen. Identification of actions likely to impact a resource component within this action's area and time frame will allow the public and Council to make a reasoned choice among alternatives.

The following RFFAs are identified as likely to have an impact on a resource component within the action area and timeframe:

- IPHC direct fishery harvests. The catch limit process for the halibut fisheries is under the authority of the IPHC. The IPHC is in the process of reconsidering harvest rates that are part of the harvest policy. Any changes to the IPHC's harvest policy, or its implementation, will have an impact the Pacific halibut stock.

Considering the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the reasonably foreseeable future actions listed above, the cumulative impacts of the proposed action are determined to be not significant.

5.8 Management and Enforcement Considerations

5.8.1 Cost recovery

Halibut PSC management actions recommended by the Council, and implemented by NMFS, could affect the total amount harvested by the Amendment 80 sector. Under Section 304(d) of the MSA, the Amendment 80 sector is subject to cost recovery fees (80 FR 935, January 7, 2015).[101] NMFS is required to recover the actual costs directly related to the management, data collection, and enforcement of any LAPP and the CDQ program. To calculate the cost recovery fee percentage for each fishing year, NMFS divides the direct program costs of an eligible fishery program by the total ex-vessel fishery value, then multiplies by 100 to calculate the fee percentage levied on landings. This action could change halibut PSC limits which could impact the value of fisheries subject to cost recovery by changing the total amount of fish or the amount of each species harvested. Changes to direct program costs, fishery value, or both, could alter the fee percentage due. The potential impact of this action on cost recovery fees billed to the Amendment 80 fleet is uncertain. It is not possible to quantitatively estimate the potential impact of this action on cost recovery fee percentages given the wide variety of factors that affect the direct program costs, and the value of a fishery. These factors can include, among others, TACs, ex-vessel prices, and specific fleet responses to this action which are all variable and can change simultaneously. Generally, it is reasonable to assume that the larger the change in PSC limit from status quo as a result of this action, the greater the potential impact on harvests and subsequently fishery value.

Section 304(d) limits total cost recovery fees to 3 percent of the ex-vessel value for a fishery. In 2020, the cost recovery fee percentage was 1.19 percent of ex-vessel value for the Amendment 80 sector. The potential impact of this action on cost recovery fees will vary based on changes to fishery value and direct program costs but cannot exceed 3 percent of fishery value. A detailed description of the costs and potential fees associated with the Amendment 80 sector is available in the proposed rule (80 FR 935, January 7, 2015) and the analysis to implement cost recovery fees and is incorporated by reference.[102]

[101] See proposed rule published on January 7, 2015, at https://www.federalregister.gov/documents/2015/01/07/2014-30841/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-management-area#p-1.
[102] See analysis at https://www.regulations.gov/document/NOAA-NMFS-2014-0031-0002.

5.8.2 Vessel safety

None of the proposed alternatives or options would change safety requirements for fishing vessels. The proposed action also is not likely to affect safety for vessels that operate in a rationalized fishery (Amendment 80) since these vessels have the ability to coordinate within the sector to respond to variable PSC limits by reducing groundfish harvests or by using other methods to reduce halibut PSC use. The proposed alternatives and subsequent options provide for a gradual increase, decrease, or maintenance of PSC limits, with buffers against dramatic annual variation. In this way, if continual reductions in PSC limits became apparent, there would be time to address new vessel safety concerns before they became significant.

5.8.3 Enforcement Considerations

A reduction in halibut PSC limits may create an incentive to bias an observer's data. The prosecution of two individuals and Unimak Fisheries in 2005 and of the vessel operator and Rebecca Irene Fisheries in 2006 for biasing observer data and underreporting of halibut PSC during groundfish fisheries demonstrates this incentive. Since that time, monitoring requirements implemented with the Amendment 80 sector have reduced the likelihood of an observer's data being biased for Amendment 80 fisheries. These requirements include video and electronic bin monitoring, a prohibition on mixing hauls, a requirement to weigh all catch on an approved flowscale unless halibut decksorting as described at § 679.120, and an increase to 200 percent observer coverage. However, recent reporting trends identified by Alaska Division of NOAA OLE indicate an increase in reports of harassment, intimidation, hostile work environment, and other attempts to bias observer samples of PSC in the Amendment 80 sector (AFSC and AKRO 2020). The Amendment 80 sector has one of the highest rates of interpersonal issues report by observers (0.49 per assignment). A further reduction of the halibut PSC limit for these sectors may result in additional coercive behavior and attempts to bias observer samples. NOAA OLE continues to investigate complaints that include pressuring observers to expedite delivery of haul composition data to the vessel captain more frequently than the data are transmitted to NMFS, intimidating or coercive attempts to influence observer sample collection with the intent to lower PSC estimates, and other attempts to remove prohibited species from an observer's sample. If the proposed action results in a reduction to halibut PSC limits it will likely increase, among some operators, the economic incentives to attempt to bias halibut PSC data through whatever means may be available.

In contrast, if the proposed action results in an increase to halibut PSC limits, it may decrease the incentive to bias an observer's data and reduce reports of harassment, intimidation, and hostile work environments directed at observers.

Regardless of which ever alternative is selected, outreach from NOAA OLE will be important during implementation of this action. Successful outreach from NOAA OLE following the implementation of halibut decksorting, followed by routine boardings, served as a useful way for vessels to report problems they might be having with new regulations. Those efforts appeared to encourage communication and self-reporting by the vessel and the tactic will be continued by NOAA OLE with any new implementation.

5.8.4 Management

The groundfish fisheries in Federal waters off Alaska are managed under the BSAI FMP and the GOA FMP. In the BSAI and GOA, groundfish harvests are managed subject to annual limits on the amounts of each groundfish species or species group that may be taken. The regulations at 50 CFR 679 and the annual harvest specifications also set or apportion the PSC limits. The annual limits are referred to as "harvest specifications," and the process of establishing them is referred to as the "harvest specifications process." The intended effect of these actions is to conserve and manage the groundfish resources in the BSAI in accordance with the MSA. The U.S. Secretary of Commerce approves the harvest specifications based on the recommendations of the Council. The goals of the harvest specifications process are to (1) manage fisheries based on the best scientific information available, (2) provide for adequate prior public review and comment on Council recommendations, (3) provide for additional opportunity for Secretarial review, (4) minimize unnecessary disruption to fisheries and public confusion, and (5) promote administrative efficiency.

Alternatives 2 through 4 would necessitate changing PSC limits annually for the Amendment 80 sector based on the look up table associated with the selected alternative. The look up table would be included in regulation, while each fall the survey state for each of the two survey indices will be determined and will be referenced in the look up table to establish the PSC limit for the following year. This is similar to the Bering Sea Chinook PSC limits that are specified in regulation, with an annual determination of low or high Chinook abundance indicating whether the lower or higher PSC limits are specified for the next year (see regulations at § 679.21(f)(6)). For this proposed halibut abundance-based management action any of the options applied to the alternatives would also be included in regulation. Thus, while information on the PSC limit and annual limit (if Option 3 is selected) would be available to the Council in conjunction with the specifications process, there would be no action required of the Council in October or December to specify the PSC limit for the following year. As shown in Figure 2-5, while information may be insufficient in October of a given year to determine the subsequent year's PSC limit (and annual limit if Option 3 is selected), that information would be available for December and may help inform TAC-setting.

As discussed in Section 1.6.1, **with the exception of 2020,** EBS trawl survey biomass estimates are available annually for the September Groundfish Plan Team meetings. Information to assign the trawl survey state for use in the look up table would be available at that time,[103] which may provide the public some idea of whether the PSC limit is likely to change for the following year (i.e. if the EBS trawl survey has increased or decreased sufficiently from the previous year to shift from a low or high threshold at 150,000 mt). However, IPHC setline survey estimates may not be available until late October or possibly late November, because the survey is typically not completed until early September and time is needed to verify and model the data. If the revised PSC limit in December is considerably lower than the one previously approved for opening the fishery (from the previous year) in January, it may be adjusted in-season as needed by NMFS. To cover the time between the opening of the groundfish fisheries and the publication of the final harvest specifications, the Regional Administrator may use the Inseason Adjustment authority under § 679.25 to adjust a PSC limit based on a determination that such adjustment is necessary to prevent the taking of a prohibited species that, on the basis of the best available scientific information, is found by NMFS to be incorrectly specified.

The use of the Inseason Adjustment authority may be warranted as the PSC limits may change annually based upon survey data and thus may differ substantially from the previous year.

If Option 3 is applied to any of the Alternatives 2, 3, or 4, a determination of Amendment 80 PSC usage would be necessary before establishing whether an annual limit was exceeded. This information is generally available immediately following the close of the fishery and should be available in time for final specifications in December. Regardless, NMFS will provide a notice to the public to designate the proceeding years PSC limit prior to the start of fishing.

If Option 2 is selected, it is only employed in the first year of implementation of this proposed action and is not expected to pose any additional management concerns.

5.9 Policy tradeoff and decision points

In constructing a preferred alternative (PA), there are a number of Alternatives and options to select from as well as policy tradeoffs to be considered. This section describes the decision-tree for the construction of a PA as well as policy-level considerations with respect to the MSA National Standards in doing so.

[103] See section 2.4 for considerations of no new survey data

Up to three steps are necessary to create a PA as shown in Figure 5-16. As described previously, there are three action alternatives in this analysis, in addition to the Status quo (Alternative 1). These action alternatives, if selected, would modify the Amendment 80 PSC limit to establish an annual regulatory process for PSC limit-setting based on a look up tables framed by survey states. Next, the Council may choose to select additional options in addition to the specific action alternative to either smooth the inter-annual variability in the PSC limit (Option 1), limit the variability from Status Quo in the first year of implementation (Option 2) or add additional incentives regarding PSC usage (Option 3). Finally, Options 2 and 3, if selected, require the Council to select a specific suboption.

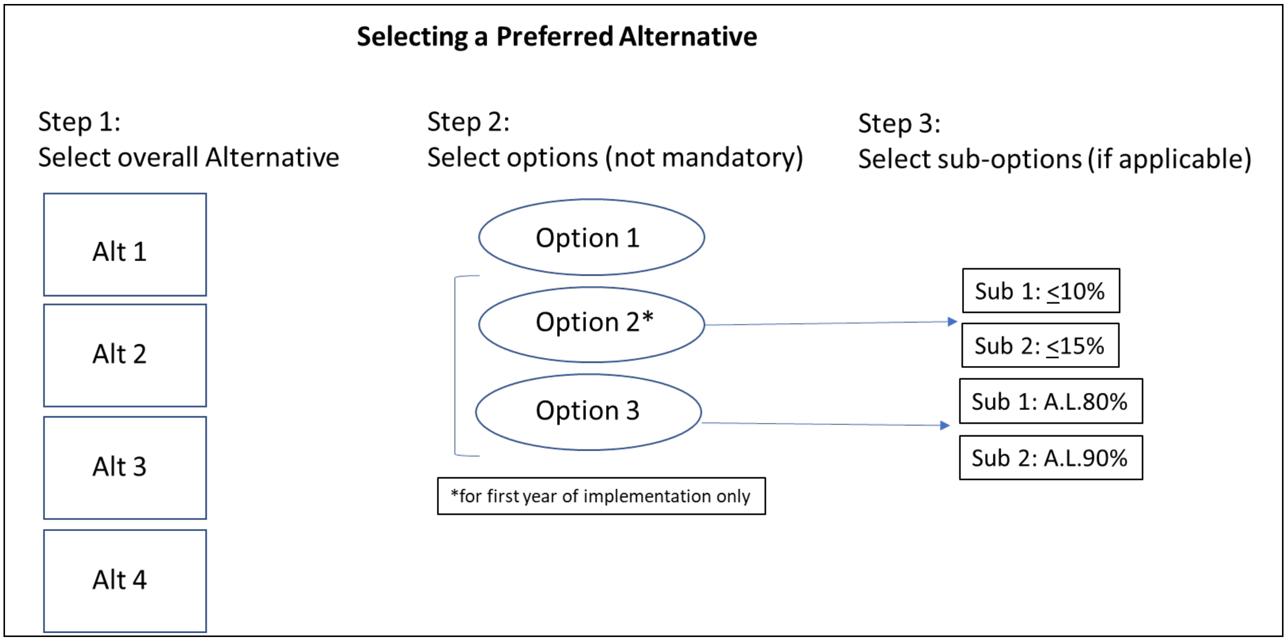

Figure 5-16 Iterative steps in selecting amongst Alternatives and Options for creating a preferred alternative. Note that neither Option 1 nor 4 have additional sub-options associated with them and that the selection of Option 4 is mutually exclusive with the selection of Options 2 and 3.

One of the policy considerations of this management action involves balancing competing interests among the National Standards: minimizing bycatch and assessing the practicablity of doing so under National Standard 9, minimizing costs (where practicable) under National Standard 7, and factoring into account the importance of groundfish and halibut resources to fishing communities under National Standard 8. The practicability of operation under reduced PSC limits has been extensively discussed in Section 5.3.2.3. Given their broader range of possible PSC limits and the indications that the Amendment 80 sector is more likely to be constrained by their TAC than PSC at high levels of PSC limits, Alternatives 2 and 3 provide the most flexibility for fishing operations to achieve their TAC both at lower halibut biomass levels and particularly at higher biomass survey states. Options 1 and 3 provide some mitigation of interannual variability in survey biomass estimates (Option 1) and further incentives to reduce bycatch below the regulatory PSC limit (Option 3). Policy decisions should address the ability of the fleet to catch their quota while minimizing bycatch to the extent practicable.

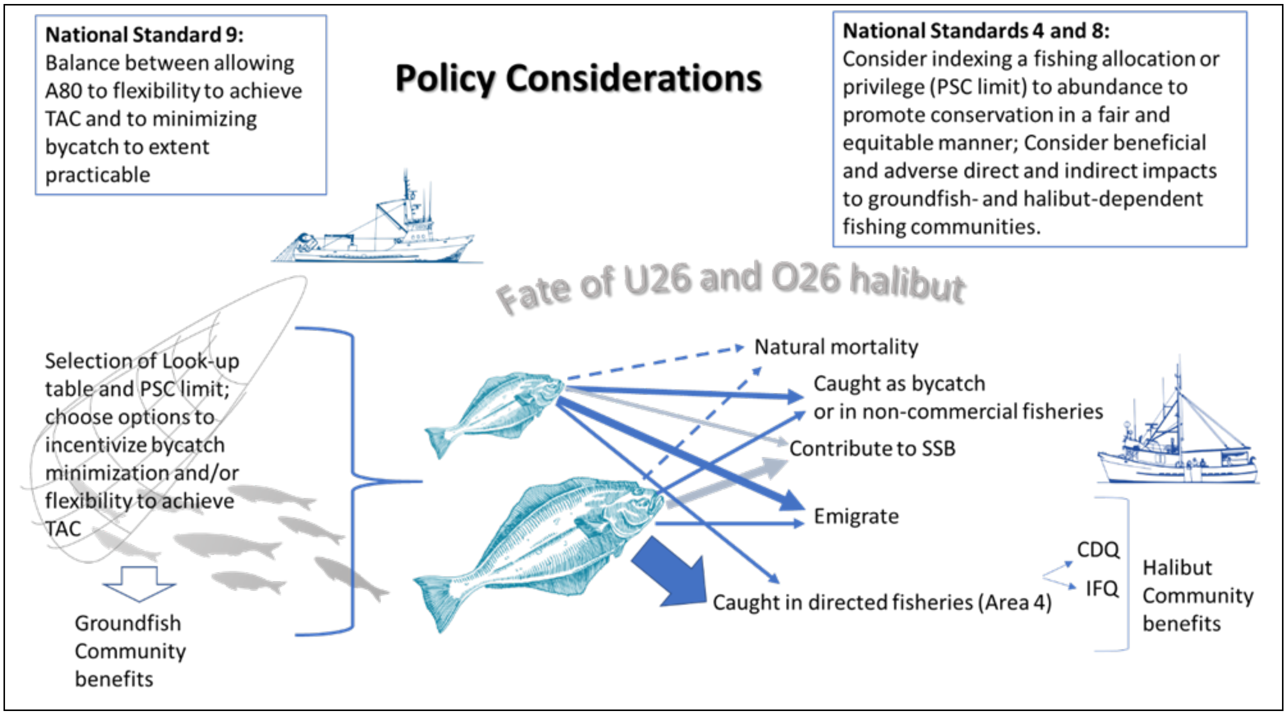

Figure 5-17 Schematic of trade-offs in considerations of some key National Standards based on the relative fate of O26 and U26 halibut. Here the width of the blue arrows represents relative magnitude of removals between O26 and U26 fish. Grey arrows show that contribution to SSB is from both sources but unknown magnitude while dotted lines for natural mortality indicate that it is considered equivalent between older and younger fish but is in fact an unknown quantity.

Another policy tradeoff stemming from the National Standards include consideration of National Standards 4 (allocate fishing privileges (in this case, a halibut PSC limit that varies with abundance) in a manner that is fair and equitable to all U.S. fishermen) (Figure 5-17). Options are provided to incentivize bycatch reduction beyond what is provided by the PSC limit itself. Additional information on how all of the alternatives under consideration address each of the ten National Standards is contained in the analysis in Section 7.1.

6 Other Resource Categories

6.1 Marine Mammals

6.1.1 Status

Alaska supports one of the richest assemblages of marine mammals in the world. Twenty-two species are present from the order Carnivora, superfamilies Pinnipedia (seals, sea lions, and walrus), Ursoidea (polar bears), and Musteloidea (sea otters), and from the order Artiodactyla, infraorder Cetacea (whales, dolphins, and porpoises). Some marine mammal species are resident in waters off Alaska throughout the year, while others migrate into or out of Alaska fisheries management areas. Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf, including inshore waters. The National Marine Fisheries Service (NMFS) maintains management authority for all marine mammal species in Alaska, while the U.S. Fish and Wildlife Service (USFWS) is the designated management authority for northern polar bears, Pacific walrus, and northern sea otter.

The Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), and the Fur Seal Act are the relevant statutes for managing marine mammal interactions with human activities, including commercial fishing operations. The MMPA was enacted in 1972 with the ideal of ensuring that marine mammal populations continue to be functioning elements of the ecosystems of which they are a part. One of the incentives for enacting the MMPA was to reduce take of marine mammals incidental to commercial fishing operations. While marine mammals may be lawfully taken incidentally in the course of commercial fishing operations, the 1994 MMPA Amendments established a requirement for commercial fishing operations to reduce incidental mortalities and serious injuries (M/SI) of marine mammals to insignificant levels approaching a zero rate, commonly referred to as the Zero Mortality Rate Goal (ZMRG). ZMRG is considered to be met for a marine mammal stock when the M/SI level from all commercial fisheries is 10 percent or below the Potential Biological Removal level (PBR) of that marine mammal stock (69 FR 43338, July 20, 2004). Likewise, the ESA was enacted to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve such conservation. In practice, the ESA outlines a program to protect endangered species on the brink of extinction and threatened species that are likely to be on the brink of extinction in the near future and pursue their recovery. The ESA also requires designation of any habitat of endangered or threatened species, which is then considered to have physical or biological features essential to the conservation of the species and which may require special management considerations or protection.

Under the MMPA a “population stock” is the fundamental unit of legally-mandated conservation and is defined as “a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, which interbreed when mature.” Stocks are identified in a manner consistent with the management goals of the MMPA which include 1) preventing stocks from diminishing such that they cease to be a significant functioning element in the ecosystem of which they are a part or below their optimum sustainable population keeping the carrying capacity of the habitat in mind; and 2) maintaining the health and stability of the marine ecosystem. Therefore, a stock is also recognized as being a management unit that identifies a demographically isolated biological population. While many types of information can be used to identify stocks of a species, it is recognized that some identified stocks may fall short of that threshold due to a lack of information.

Marine mammal Stock Assessment Reports (SARs) are published annually under the authority of the MMPA for all stocks that occur in state and federal waters of the Alaska region [NMFS 2016]. Individual SARs provide information on each stock’s geographic distribution, population estimates, population trends, and estimates of the potential biological removal (PBR) levels for each stock. The SARs identify sources of human-caused mortality, including serious injury and mortality in commercial fishery operations, by fishery, and whether the stock has met ZMRG for all fisheries. The SARs also include the stock's ESA listing status and MMPA depleted and strategic designations. Strategic stock SARs are updated annually (Steller sea lions, northern fur seals, bearded seals, ringed seals, Cook Inlet beluga whales, AT1 Transient killer whales, harbor porpoise, sperm whales, humpback whales, fin whales, North Pacific right whales, and bowhead whales). SARs for non-strategic stocks are updated every three years or when significant new information is available.

Under the ESA species, subspecies, and distinct population segments (DPS) are eligible for listing as a threatened or endangered species. The ESA defines a species as ''any subspecies of fish or wildlife or plants, and any DPS of any species of vertebrate fish or wildlife which interbreeds when mature.'' The joint USFWS /NMFS DPS policy (61 FR 4722; February 7, 1996) establishes two criteria that must be met for a population or group of populations to be considered a DPS: (1) The population segment must be discrete in relation to the remainder of the species (or subspecies) to which it belongs; and (2) the population segment must be significant to the remainder of the species (or subspecies) to which it belongs.

A population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions: 1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors; or 2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the ESA. Significance determinations are made using available scientific evidence of the population's biological and ecological importance to the taxon to which it belongs. This may include, but is not limited to, one or more of the following: 1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; 2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon; 3) evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or 4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. It is important to note that the MMPA stock designations and ESA DPS designations for a given species do not necessarily overlap due to differences in the defining criteria for each.

Marine mammals have been given various levels of protection under the current fishery management plans of the Council, and several species are the subjects of continuing research and monitoring to further define the nature and extent of fishery impacts on them. A number of conservation concerns and/or management determinations may be related to marine mammals and the potential impacts of fishing. For individual species, these concerns or determinations may include—

- Protection under the ESA:
  - listed as endangered or threatened
  - placed on NMFS' list of "species of concern" or designated as a "candidate species" for ESA listings;
- Protection under the MMPA:
  - designated as depleted or strategic;
  - focus of a Take Reduction Plan;
- Other:
  - declining or depressed populations in a manner of concern to State or Federal agencies;
  - large bycatch or other mortality related to fishing activities; or
  - vulnerability to direct or indirect adverse effects from some fishing activities.

The Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (PSEIS) (NMFS 2004) provides descriptions of the range, habitat, and diet for marine mammals found in waters off Alaska. The 2015 PSEIS Supplemental Information Report (NMFS 2015) provides updates on changes to marine mammal stock or species-related management and status, as well as new information regarding impacts on marine mammal stocks and new methods to assess impacts. The information from the PSEIS and the SARs is incorporated by reference.

Marine mammal stocks, including those currently listed as endangered or threatened under the ESA or depleted or strategic under the MMPA that may be present in the action area are listed in Table 6-1. ESA Section 7 formal and informal consultations with respect to the actions of the Federal groundfish fisheries have been completed for all of the ESA-listed species, either individually or in groups (NMFS 2010 and NMFS 2014a). Of the species listed under the ESA or stocks designated as depleted or strategic under the MMPA and present in the action area, several species may be more vulnerable than others to being adversely affected by commercial groundfish fishing. These include Steller sea lions, bearded seals, humpback whales, fin whales, and sperm whales. Stocks designated as depleted or strategic under the MMPA, but not listed as threatened or endangered under the ESA, that may be vulnerable to being adversely affected by commercial groundfish fishing include northern fur seals and harbor porpoise.

Table 6-1 Marine mammals known to occur in the Bering Sea and Aleutian Islands.

Infraorder or Superfamily	Species	MMPA Stock	ESA or MMPA Status	ZMRG Status (all fisheries)
Pinnipedia	Steller sea lion *(Eumatopias jubatus)*	Western U.S	Endangered, Depleted, Strategic	Not Met
	Northern fur seal (*Callorhinus ursinus*)	Eastern Pacific	Depleted, Strategic	Met
	Harbor seal *(Phoca vitulina)*	Pribilof Islands	None	Met
		Bristol Bay	None	Met
	Ribbon seal *(Phoca fasciata)*	Alaska	None	Met
	Bearded seal *(Erignathus barbatus nauticus)*	Alaska[a]	Threatened, Depleted, Strategic	Met
	Spotted seal *(Phoca largha)*	Alaska[b]	None	Met
	Ringed seal *(Phoca hispida)*	Alaska[c]	Threatened, Depleted, Strategic	Met
	Pacific Walrus *(Odobenus rosmarus divergens)*	Alaska[d]	Strategic	Met
Cetacea	Killer whale *(Orcinus orca)*	Eastern North Pacific Alaska Resident	None	Met
		Eastern North Pacific GOA, Aleutian Islands, and Bering Sea transient	None	Met
		Offshore***	None	Unknown*
	Pacific White-sided dolphin (*Lagenorhynchus obliquidens*)	North Pacific	None	Met
	Harbor porpoise *(Phocoena phoecena)*	Bering Sea	None	Met
	Dall's porpoise (*Phocoenoides dalli*)	Alaska	None	Met
	Beluga whale *(Delphinapterus leucas)*	Beaufort Sea	None	Met
		Eastern Chukchi Sea	None	Met
		Eastern Bering Sea	None	Unknown*
		Bristol Bay	None	Unknown**
	Baird's beaked whale (*Berardius bairdii*)	Alaska	None	Unknown*
	Cuvier's beaked whale (*Ziphius cavirostris)*	Alaska	None	Unknown*
	Stejneger's beaked whale (*Mesoplodon stejnegeri*)	Alaska	None	Unknown*
	Sperm whale (*Physeter macrocephalus*)	North Pacific	Endangered, Depleted, Strategic	Unknown*

	Bowhead whale *(Balaena mysticetus)*	Western Arctic (Also known as Bering-Chukchi-Beaufort stock)	Endangered, Depleted, Strategic	Met
	Humpback whale *(Megaptera novaeangliae)* †	Western North Pacific‡	WNP DPS-Endangered, Depleted, Strategic	Not Met
		Central North Pacific ‡‡	Mexico DPS-Threatened, Depleted, Strategic Hawaii DPS - None	Not Met
	Fin whale *(Balaenoptera physalus)*	Northeast Pacific	Endangered, Depleted, Strategic	Met
	Minke whale *(Balaenoptera acutorostrata)*	Alaska	None	Unknown*
	North Pacific right whale *(Eubalaena japonica)*	Eastern North Pacific	Endangered, Depleted, Strategic	Unknown*
	Blue whale *(Balaenoptera musculus)*	Eastern North Pacific***	Endangered, Depleted, Strategic	Met
	Sei whale *(Balaenoptera borealis)*	Eastern North Pacific***	Endangered, Depleted, Strategic	Met
Mustelidae	Northern sea otter *(Enhydra lutris)*	Southwest Alaska	Threatened, Depleted, Strategic	Unknown*
Ursoidea	Polar Bear *(Ursus maritimus)*	Chukchi/Bering Sea	Threatened, Depleted, Strategic	Unknown*

Sources: Muto et al 2020; Carretta et al 2019; List of Fisheries for 2020 (April 16, 2020 85 FR 21079)
* Unknown due to unknown abundance estimate and PBR.
** Unknown due to inadequate observer coverage or unreliable SI/M estimate.
*** This stock is found in the Pacific SAR, rather than in the Alaska SAR.
**** The PBR for the North Pacific right whale is calculated, but considered unreliable. However, there are no known fishery-related SI/M.
† On September 8, 2016, NMFS published a final decision revising the status of humpback whales under the ESA (81 FR 62259), effective October 11, 2016. In the 2016 decision, NMFS recognized the existence of 14 DPSs, classified several as endangered and one as threatened, and determined that the remaining DPSs do not warrant protection under the ESA. Three DPSs of humpback whales occur in waters off the coast of Alaska: the Asia/2nd Western North Pacific (WNP) DPS, which is endangered, the Mexico DPS, which is threatened, and the Hawaii DPS, which is not protected under the ESA. Whales from these three DPSs overlap to some extent on feeding grounds off Alaska. As of October 2016, the MMPA stock designations of humpback whales found in Alaska have not been updated to reflect the newly-designated DPSs. Proposed critical habitat was published on October 9, 2019 (84 FR 54354).
‡ Corresponds to the new Asia/ 2nd WDPS (endangered).
‡‡ Includes the new Mexico (threatened) and Hawaii DPSs (not protected under the ESA).
[a] Bearded seals: Two DPSs are identified for this subspecies, but only the Beringia DPS occurs in US waters. Therefore, the Alaska stock identified under the MMPA SAR consists entirely of the Beringia DPS. The Beringia DPS was most recently listed as threatened under the ESA in October 2016. Critical habitat for the Beringia DPS was proposed in January 2021.
[b] Spotted seals: Three DPSs are identified, but only the Bering DPS occurs in US waters. Therefore, the Alaska stock identified under the MMPA SAR consists entirely of the Bering DPS.
[c] Ringed seals were listed as threatened under the ESA in December 2012. In March 2016 the U.S. District Court vacated the listing. In May 2016 NMFS appealed the March 2016 decision. Critical habitat for ringed seals was proposed in January 2021
[d] Walrus – A petition to list walrus under the ESA was determined to be warranted, but precluded by higher priorities (76 FR 7634, February 10, 2011). The USFWS is under court order to make a decision on the listing in 2017. As of October 5, 2017, NMFS determined that listing is no longer warranted for the Pacific walrus.

Table 6-2 Status of Pinnipedia and Carnivora stocks potentially affected by the action.

Pinnipedia and Carnivora species and stock or DPS	Status under the ESA	Status under the MMPA	Population trends	Distribution in action area
Steller sea lion –Western (W) Distinct Population Segment (DPS)	Endangered	Depleted & strategic	Using survey counts from 1987-2018, western Steller sea lion pup and non-pup counts in Alaska in 2018 were modeled to be 53,624. Modeled count data collected from 1978 through 2018 indicates that pup and non-pup counts of western stock Steller sea lions in Alaska were at their lowest levels in 2002 and have increased at 1.52% y-1 and 2.05% y-1, respectively, between 2002 and 2018. However, there are strong regional differences across the range in Alaska, with positive trends in the GOA and the eastern Aleutian Is region and generally negative trends to the west of Samalga Pass. Survey effort was focused in the Aleutian Is in 2018. Non-pup and pup counts in the western Aleutians have been in a steep decline overall. However, modeled realized counts show a period of stability in this region from 2014 to 2016 (and potentially an increase in pup counts), followed by a decline between 2016 and 2018.	WDPS inhabits Alaska waters from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters. EDPS inhabit waters east of Prince William Sound to Dixon Entrance. Occur throughout AK waters, terrestrial haulouts and rookeries on Pribilof Islands, Aleutian Islands, St. Lawrence Island, and off the mainland. Use marine areas for foraging. Critical habitat designated around major rookeries, haulouts, and foraging areas.
Northern fur seal Eastern Pacific	None	Depleted &strategic	Recent pup counts show a continuing decline in the number of pups surviving in the Pribilof Islands. From 1998 to 2016, pup production declined 4.12% per year (SE = 0.40%; P < 0.01) on St. Paul Island and showed no significant trend (SE = 0.57%; P = 0.13) on St. George Island. Between 1997 and 2015, pup production at Bogoslof Is increased 10.1% per year.	Fur seals occur throughout Alaska waters, but their main rookeries are located in the Bering Sea on Bogoslof Isd and the Pribilof Islands. Approximately 55% of the worldwide abundance of fur seals is found on the Pribilof Is . Forages in the pelagic area of the Bering Sea during summer breeding season, but most leave the Bering Sea in the fall to spend winter and spring in the N. Pacific.
Harbor seal – Pribilof Islands, Bristol Bay and Aleutian Islands	None	None	Pribilof Is – trend unknown; Bristol Bay – approx. 2.5 % increase oer year over 8 years; Aleutian Is – approx. 2% per year decrease over eight years;	Pribilof Islands - Saint Paul and Saint George Islands, Otter and Walrus Islands; Bristol Bay– range from Nunivak Island south to the west coast of Unimak Island and extending inland(east) to Kvichak Bay and Lake Iliamna; Aleutian Is - entire Aleutian chain from Attu Island to Ugamak Island;
Ribbon seal Alaska	None	None	Reliable data on population trends are unavailable.	Widely dispersed throughout the Bering Sea and Aleutian Islands in the summer and fall. Associated with ice in spring and winter and may be associated with ice in summer and fall.
Northern sea otters – SW Alaska	Threatened	Depleted & strategic	The overall population trend for the southwest Alaska stock is believed to be increasing, with except for along the western AK Peninsula and the Aleutian Is.	Coastal waters from Central GOA to W Aleutians within the 40 m depth contour. Critical habitat designated in primarily nearshore waters with few locations into federal waters in the GOA.

Sources: Muto et al 2020; List of Fisheries for 2020 (May 16, 2019 84 FR 22052)

Table 6-3 Status of Cetacea stocks potentially affected by the action.

Cetacea species/stock	Status under the ESA	Status under the MMPA	Population trends	Distribution in action area
Killer whale - Eastern North Pacific Alaska resident	None	None	The minimum population estimate (N_{MIN}) for the Alaska Resident stock of killer whales is 2,084 animals.	Alaska resident whales are found from southeastern Alaska to the Aleutian Islands and Bering Sea. Intermixing of Alaska residents have been documented among the three areas, at least as far west as the eastern Aleutian Islands.
Killer whale - Eastern North Pacific Northern resident	None	None	N_{MIN} for the Northern Resident stock is 302 whales, including whales found in Canadian waters. From the mid-1970s to the 1990s, the Northern Resident killer whale population increased at an annual rate of 2.6% (i.e., from 122 whales in 1974 to 218 in 1997). A decline was reported from 1998 to 2001 at a rate of 7% per year. The increased mortality that drove this decline coincided with a period of reduced range-wide Chinook salmon abundance, their primary prey. After 2001 growth was positive with the population increasing at an average rate of 2.9% per year from 2002 to 2014. This represents an average annual increase of 2.2% over the 40-year time series. However, annual Northern Resident killer whale population growth rates have slowed over the past five census years, from 5.1% in 2014 to -0.3% in 2018.	The Eastern North Pacific Northern Resident stock is a transboundary stock and includes killer whales that frequent British Columbia, Canada, and Southeast Alaska. They have been seen infrequently in Washington State waters. Members of the Northern Resident population have been documented in Southeast Alaska; however, they have not been seen to intermix with Alaska Residents.
Dall's porpoise Alaska	None	None	Reliable data on population trends are unavailable.	Dall's porpoise are widely distributed across the entire North Pacific Ocean (Fig. 1). They are found over the continental shelf adjacent to the slope and over deep (2,500+ m) oceanic waters (Hall 1979). They have been sighted throughout the North Pacific as far north as 65°N (Buckland et al. 1993) and as far south as 28°N in the eastern North Pacific (Leatherwood and Fielding 1974). The only apparent distribution gaps in Alaska waters are upper Cook Inlet and the shallow eastern flats of the Bering Sea.
Pacific white-sided dolphin	None	None	Reliable data on population trends are unavailable.	In the eastern North Pacific, the species occurs from the southern Gulf of California, north to the Gulf of Alaska, west to Amchitka in the Aleutian Islands, and is sometimes encountered in the southern Bering Sea.
Harbor porpoise BSAI	None	None	Reliable data on population trends are unavailable.	Primarily in coastal waters in the BSAI, usually less than 100 m.
Humpback whale – Western, Mexico, and Hawaii DPS	WNP DPS-Endangered Mexic DPs-Threatened Hi DPS-None	WNP and Mexico DPS Depleted & strategic	Increasing. The Structure of Populations, Levels of Abundance, and Status of Humpbacks (SPLASH) abundance estimate for the North Pacific represents an annual increase of 4.9% since 1991–1993. SPLASH abundance estimates for Hawaii show annual increases of 5.5% to 6.0% since 1991–1993.	
North Pacific right whale Eastern North Pacific	Endangered	Depleted & strategic	This stock is considered to represent only a small fraction of its pre-commercial whaling abundance and is arguably the most endangered stock of large whales in	Before commercial whaling on right whales, concentrations were found in the GOA, eastern Aleutian Islands, southcentral Bering Sea, Sea of Okhotsk,

			the world. A reliable estimate of trend in abundance is currently not available.	and Sea of Japan. During 1965–1999, following large illegal catches by the U.S.S.R., there were only 82 sightings of right whales in the entire eastern North Pacific, with the majority of these occurring in the Bering Sea and adjacent areas of the Aleutian Islands. Critical habitat near Kodiak Island in the GOA.
Fin whale Northeast Pacific	Endangered	Depleted & strategic	Abundance may be increasing but surveys only provide abundance information for portions of the stock in the Central-eastern and southeastern Bering and coastal waters of the Aleutian Islands and the Alaska Peninsula. Much of the North Pacific range has not been surveyed.	Found in the GOA, Bering Sea and coastal waters of the Aleutian Islands.
Beluga whale- Beaufort Sea, Eastern Chukchi Sea, Eastern Bering Sea, Bristol Bay stocks	None	None	Beaufort Sea – unknown, but possibly stable or increasing, Eastern Chukchi Sea - unknown, Eastern Bering Sea – unknown, Bristol Bay - population increased by 65% from 1993 through 2005.	The Beaufort Sea and Eastern Chukchi Sea stocks migrate between the Bering and Beaufort seas. Beaufort Sea beluga whales depart the Bering Sea in early spring, through the Chukchi Sea and into the Beaufort Sea where they remain in the summer and fall, returning to the Bering Sea in late fall. Eastern Chukchi Sea migrate out of the Bering Sea in late spring and early summer, into the Chukchi Sea and western Beaufort Sea where they remain in the summer, returning to the Bering Sea in the fall. The Eastern Bering Sea stock remains in the Bering Sea but moves south near Bristol Bay in winter and returns north to Norton Sound and the mouth of the Yukon River in summer. Beluga whales found in Bristol Bay remain in that area throughout the year, showing only small seasonal shifts in distribution.
Minke whale Alaska	None	None	There are no data on trends in Minke whale abundance in Alaska waters.	Common in the Bering and Chukchi Seas. Not common in the Aleutian Islands.
Sperm whale North Pacific	Endangered	Depleted & strategic	Abundance and population trends in Alaska waters are unknown.	Inhabit waters 600 m or more depth, south of 62°N lat. Widely distributed in North Pacific. During summer, males are found in the Gulf of Alaska, Bering Sea, and waters around the Aleutian Islands. Females may be found in the western Aleutian Is in summer months.
Baird's, Cuvier's, and Stejneger's beaked whale	None	None	Reliable data on population trends are unavailable.	Baird's beaked whale - Bering Sea north to St. Matthew Island, Pribilof Is, and western Aleutian Is., Cuvier's, beaked whale - Aleutian Is., Stejneger's beaked whale – Aleutian Is., Bering Sea, incl Pribilof Is.

Sources: Muto et al 2020; List of Fisheries for 2020 (April 16, 2019 85 FR 21079)

The Alaska Groundfish Harvest Specifications EIS provides information on the effects of the groundfish fisheries on marine mammals (NMFS 2007), and has been updated with Supplemental Information Reports (SIRs) (NMFS 2015). These documents are also incorporated by reference. Direct and indirect interactions between marine mammals and groundfish fishing vessels may occur due to overlap in the size and species of groundfish harvested in the fisheries that are also important marine mammal prey, and due to temporal and spatial overlap in marine mammal occurrence and commercial fishing activities. This discussion focuses on those marine mammals that may interact with or be affected by the BSAI groundfish fisheries (Table 6-2 and Table 6-3).

6.1.2 Effects on Marine Mammals

Incidental Take

Marine mammals can be taken in groundfish fisheries by entanglement in gear (e.g., trawl, longline, and pot) and, rarely, by ship strikes for some cetaceans. The effects of the status quo fisheries on incidental takes of marine mammals are detailed in the 2007 harvest specifications EIS (NMFS 2007) and Allen et al. (2014). The annual Stock Assessment Report lists the species of marine mammals taken in the BSAI groundfish fisheries using observer data (Allen et al. 2014). In addition, the List of Fisheries for 2020 (85 FR 21079, April 16, 2020), describes known incidental takes of marine mammals in the groundfish fisheries. The BSAI flatfish, pollock, and rockfish trawl fisheries are listed as category II, with occasional interactions with some marine mammals. The BSAI Pacific cod longline fishery is listed as Category II, with a remote likelihood of interaction with Dall's porpoise and northern fur seal. Based on the annual stock assessment reports, the potential take of marine mammals in the BSAI groundfish fisheries is well below the PBRs or a very small portion of the overall human caused mortality for those species for which a PBR has not been determined (Allen and Angliss 2014). Therefore, the incidental takes under Alternative 1 have an insignificant effect on marine mammals in the BSAI.

Some PSC limits as a result of look up tables for Alternatives 2, 3, and 4 may result in no change to the status quo. Some PSC limits as a result of look up tables for Alternatives 2, 3, and 4 may result in constraining PSC limits under which industry may change fishing patterns to maximize species with the greatest economic value. This could result in reduced fishing effort, as the industry chooses not to pursue less valuable fisheries to conserve halibut PSC, or it could result in greater fishing effort at lower catch per unit effort, as vessels change fisheries patterns or seasonal changes in the timing of the fishing, to increase halibut avoidance.

In contrast, PSC limits as a result of look up tables for Alternative 3 could result in increased PSC limits. This could result in a response of increased fishing effort, as industry is less constrained by halibut PSC limits. Any change to fishing effort levels or temporal or spatial shifts in harvest effort resulting from adoption of any of the alternatives and its options would not be expected to impact levels of incidental take of marine mammals, unless such change resulted in the fishery being prosecuted in a way that significantly increased exposure of marine mammals to fishing gear. However, there is already considerable interannual variability in the patterns of fishing across the BSAI groundfish sectors, as environmental conditions and avoidance of PSC species have caused vessels to adjust their fishing patterns. Any spatial or temporal shift in fishing is unlikely to occur outside of the existing spatial or temporal footprint of the groundfish fishery as none of the proposed alternatives alter the number of fishery participants or propose changing the location or timing of the fishery.

The potential for incidental take of marine mammals may change from status quo and will be dependent on the options selected by the Council. However, the fisheries are unlikely to increase their take of marine mammals above the PBR, because they are currently well below that level in BSAI groundfish fisheries, and no proposed PSC limits under Alternative 2, 3 and 4 are expected to result in significant increases in total fishing effort in the BSAI. TAC and other restrictive harvest measures for the Amendment 80 sector will not be changed as a result of this action, and no marine mammal protection measures will change as a result of this proposed action. Therefore, the incidental takes under Alternatives 2, 3, and 4 are not expected to have a significant effect on marine mammals and are not expected to occur beyond the scope analyzed in previous NEPA or ESA documents.

Prey Availability Effects

Harvests of marine mammal prey species in the BSAI groundfish fisheries may limit foraging success through localized depletion, overall reduction in prey biomass, and dispersion of prey, making it more energetically costly for foraging marine mammals to obtain necessary prey. Overall reduction in prey biomass may be caused by removal of prey or disturbance of prey habitat. The timing and location of fisheries relative to foraging patterns of marine mammals and the abundance of prey species may be a more relevant management concern than total prey removals.

The interaction of the BSAI groundfish fisheries with Steller sea lions, which potentially compete for prey, is comprehensively addressed in the Final Environmental Impact Statement for Steller Sea Lion Protection Measures for Groundfish Fisheries in the Bering Sea and Aleutian Islands Management Area (2014 Steller Sea Lion Protection Measures FEIS; NMFS 2014b.). The BSAI groundfish fisheries may impact availability of key prey species of Steller sea lions, harbor seals, northern fur seals, ribbon seals; and fin, minke, humpback, beluga, and resident killer whales. Animals with more varied diets (humpback whales) are less likely to be impacted than those that eat primarily pollock and salmon, such as northern fur seals. Table 6-4 shows the BSAI marine mammal species and their prey species that may be impacted by BSAI groundfish fisheries.

Table 6-4 Prey species used by BSAI marine mammals that may be impacted by the BSAI groundfish fisheries.

Species	Prey
Fin whale	Zooplankton, squid, fish (herring, cod, capelin, and pollock), and cephalopods
Humpback whale	Zooplankton, schooling fish (pollock, herring, capelin, saffron, cod, sand lance, Arctic cod, and salmon)
Beluga whale	Wide variety of invertebrates and fish including salmon and pollock
Killer whale	Marine mammals (transients) and fish (residents) including herring, halibut, salmon, and cod.
Ribbon seal	Cod, pollock, capelin, eelpout, sculpin, flatfish, crustaceans, and cephalopods.
Harbor seal	Crustaceans, squid, fish (including salmon), and mollusks
Steller sea lion	Pollock, Atka mackerel, Pacific herring, Capelin, Pacific sand lance, Pacific cod, and salmon

Several marine mammals may be impacted indirectly by any effects that fishing gear may have on benthic habitat. Table 6-5 lists marine mammals that may depend on benthic prey and known depths of diving. Diving activity may be associated with foraging. The essential fish habitat (EFH) EIS provides a description of the effects of groundfish fishing on benthic habitat (NMFS 2005). In the BSAI, estimated reductions of epifaunal and infaunal prey due to fishing are less than 1 percent for all substrate types. For living structure, overall impacts ranged between 3 percent and 7 percent depending on the substrate. In some local areas where pollock aggregate, effects are greater.

Sperm whales are not likely to be affected by any potential impacts on benthic habitat from fishing because they generally occur in deeper waters than where the groundfish fishery is conducted (Table 6-5). Harbor seals and sea otters are also not likely to have any benthic habitat affected by the groundfish fishery because they occur primarily along the coast where fishing is not conducted. Cook Inlet beluga whales also are not likely to have benthic habitat supporting prey species affected by the groundfish fishery because they do not range outside of Cook Inlet and do not overlap spatially with the trawl fisheries although other beluga whale stocks in the BSAI may have some overlap.

Table 6-5 Benthic dependent BSAI marine mammals, foraging locations, and diving depths

Species	Depth of diving and location
Ribbon seal	Mostly dive < 150 m on shelf, deeper off shore. Primarily in shelf and slope areas.
Harbor seal	Up to 183 m. Generally coastal.
Sperm whale	Up to 1,000 m, but generally in waters > 600 m.
Northern sea otter	Rocky nearshore < 75 m
Gray whale	Benthic invertebrates

Sources: Allen and Angliss 2010; Burns et al. 1981; http://www.adfg.state.ak.us/pubs/notebook/marine/rib-seal.php; http://www.afsc.noaa.gov/nmml/species/species_ribbon.php; http://www.adfg.state.ak.us/pubs/notebook/marine/harseal.php; http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm

The Harvest Specifications EIS determined that competition for key prey species under the status quo fishery is not likely to constrain the foraging success of marine mammals or cause population declines (NMFS 2007). The 2014 Steller Sea Lion Protection Measures FEIS (NMFS 2014b) provided an updated review of BSAI groundfish fishery interactions with respect to prey availability. Based on a review of marine mammal diets, and an evaluation of the status quo harvests of potential prey species in the BSAI groundfish fishery, the effects of Alternative 1 on prey availability for marine mammals are not likely to cause population level effects.

Some PSC limits as a result of look up tables under Alternatives 2, 3 and 4 may result in no change to the status quo or may result in constraining PSC limits under which industry may change fishing patterns to maximize species with the greatest economic value. This could result in a response of reducing fishing effort, as the industry chooses not to pursue less valuable fisheries to conserve halibut PSC, or it could result in greater fishing effort at lower catch per unit effort, as vessels change fisheries patterns or seasonal changes in the timing of the fishing, to increase halibut avoidance.

Shifts in the location or timing of fishing may change the availability of prey species to marine mammals in particular areas. However, there is already considerable interannual variability in the patterns of fishing across the BSAI groundfish sectors, as environmental conditions and avoidance of PSC species have caused vessels to adjust their fishing patterns. Any spatial or temporal shift in fishing is unlikely to occur outside of the existing spatial or temporal footprint of the groundfish fishery as none of the proposed alternatives alter the number of fishery participants or propose changing the location or timing of the fishery. Therefore, it is unlikely that Alternatives 2, 3, or 4 would introduce a shift in fishing patterns to such an extent that it would constrain the availability of prey to marine mammals in such a way as to cause a population-level decline or impede recovery for more vulnerable populations. Therefore, effects on prey availability to marine mammals under Alternatives 2, 3 and 4 are not expected to be significant and are not expected to occur beyond the scope analyzed in previous NEPA or ESA documents.

Disturbance Effects

The Harvest Specifications EIS contains a detailed description of the disturbance of marine mammals by the groundfish fisheries (NMFS 2007). The interaction of the BSAI groundfish fisheries with Steller sea lions, which potentially compete for prey, is comprehensively addressed in the Steller Sea Lion Protection Measures EIS (NMFS 2014b). The EISs concluded that the status quo fishery does not cause disturbance to marine mammals at a level that may cause population level effects. Fishery closures limit the potential interaction between fishing vessels and marine mammals (e.g., 3-nm no groundfish fishing areas around Steller sea lion rookeries and walrus protection areas). Because disturbances to marine mammals under the status quo fishery are not likely to cause population level effects, the impacts of Alternative 1 are not significant.

The effects of the proposed reductions to halibut PSC limits under Alternative 2, 3, and 4 on disturbance of marine mammals would be similar to the effects on incidental takes. If a groundfish fishery reduces fishing effort in specific fisheries to conserve halibut PSC for a more valuable fishery, then less potential exists for disturbance of marine mammals. If a groundfish fishery increases the duration of fishing in areas, there may be more potential for disturbance if this increased fishing activity overlaps with areas used by marine mammals. None of the disturbance effects on other marine mammals under Alternative 2, 3, or 4 are expected to result in population level effects on marine mammals. Disturbance effects are likely to be localized and limited to a small portion of any particular marine mammal population.

Therefore disturbance effects on marine mammals under Alternatives 2, 3 and 4 are not expected to be significant and are not expected to occur beyond the scope analyzed in previous NEPA or ESA documents.

Cumulative Effects on Marine Mammals

Based on the preceding analysis, the impacts of this proposed action and alternatives on marine mammals are either non-existent or *de minimus*; therefore, there is no need to conduct an additional cumulative impact analysis.

6.2 Seabirds

6.2.1 Status

Alaska's waters support extremely large concentrations of seabirds. Over 80 million seabirds are estimated to occur in Alaska annually, including 40 million to 50 million individuals from the numerous species that breed in Alaska (Table 6-6; USFWS 2009). An additional 40 million to 50 million individuals do not breed in Alaska but spend part of their life cycle there. These include short-tailed and sooty shearwaters and three albatross species: the black-footed albatross, the Laysan albatross, and the endangered short-tailed albatross (Table 6-6; USFWS 2009).

As noted in the PSEIS (NMFS 2004 and 2015), seabird life history includes low reproductive rates, low adult mortality rates, long life span, and delayed sexual maturity. These traits make seabird populations extremely sensitive to changes in adult survival and less sensitive to fluctuations in reproductive effort. The problem with attributing population changes to specific impacts is that, because seabirds are long-lived animals, it may take years or decades before relatively small changes in survival rates result in observable impacts on the breeding population.

Table 6-6 Seabird species in Alaska

Type	Common name	Status
Albatrosses	Black-footed	
	Short-tailed	Endangered
	Laysan	
Fulmars	Northern fulmar	
Shearwaters	Short-tailed	
	Sooty	
Storm petrels	Leach's	
	Fork-tailed	
	Pelagic	
	Red-faced	
	Double-crested	
Gulls	Glaucous-winged	
	Glaucous	
	Herring	
	Mew	
	Bonaparte's	
	Slaty-backed	
Murres	Common	
	Thick-billed	
Jaegers	Long-tailed	
	Parasitic	
	Pomarine	

Type	Common name	Status
Guillemots	Black	
	Pigeon	
Eiders	Common	
	King	
	Spectacled	Threatened
	Steller's	Threatened
Murrelets	Marbled	
	Kittlitz's	
	Ancient	
Kittiwakes	Black-legged	
	Red-legged	
Auklets	Cassin's	
	Parakeet	
	Least	
	Whiskered	
	Crested	
Terns	Arctic	
Puffins	Horned	
	Tufted	

More information on seabirds in Alaska's EEZ may be found in several NMFS, Council, and USFWS documents:

- The URL for the USFWS Migratory Bird Management program is at https://www.fws.gov/birds/management.php
- Section 3.7 of the PSEIS (NMFS 2004) provides background on seabirds in the action area and their interactions with the fisheries. This may be accessed at https://alaskafisheries.noaa.gov/sites/default/files/pseis0604-chpt_3_7.pdf.
- Section 6.3 of the PSEIS (NMFS 2015) provides background on seabirds in the action area and their interactions with the fisheries. This may be accessed at https://www.npfmc.org/wp-content/PDFdocuments/fmp/Final_SIR_2015.pdf.
- The annual Ecosystem Status Reports have a chapter on seabird bycatch: https://access.afsc.noaa.gov/reem/ecoweb/index.php.

- The Seabird Fishery Interaction Research webpage of the Alaska Fisheries Science Center: http://www.afsc.noaa.gov/REFM/REEM/Seabirds/Default.php.
- The NMFS Alaska Region's Seabird Bycatch webpage: https://www.fisheries.noaa.gov/alaska/bycatch/seabird-bycatch-alaska.
- The BSAI and GOA groundfish FMPs each contain an "Appendix I" dealing with marine mammal and seabird populations that interact with the fisheries. The FMPs may be accessed from the Council's home page at http://www.alaskafisheries.noaa.gov/npfmc/default.htm.
- Washington Sea Grant has several publications on seabird takes, and technologies and practices for reducing them: https://wsg.washington.edu/seabird-bycatch-prevention-in-fisheries/.
- The seabird component of the environment affected by the groundfish FMPs is described in detail in Section 3.7 of the PSEIS (NMFS 2004), and updated in the PSEIS Supplemental Information Report (NMFS 2015).
- Seabirds and fishery impacts are also described in Chapter 9 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007).
- USFWS. 2015. Biological Opinion for the Effects of the Fishery Management Plans for the Gulf of Alaska and Bering Sea/Aleutian Islands Groundfish Fisheries and the State of Alaska Parallel Groundfish Fisheries. Anchorage, AK: 52 pp. Document available at: https://alaskafisheries.noaa.gov/sites/default/files/analyses/usfws-biop-122315.pdf
- NMFS. 2015. Programmatic Biological Assessment on the Effects of the Fishery Management Plans for the Gulf of Alaska and Bering Sea/Aleutian Islands Groundfish Fisheries and the State of Alaska Parallel Groundfish Fisheries on the Endangered Short-tailed Albatross (*Phoebastria albatrus*) and the Threatened Alaska-breeding Population of the Steller's Eider (*Polysticta stelleri*). Document available at: https://alaskafisheries.noaa.gov/sites/default/files/analyses/seabirdba0815.pdf
- Seabird Bycatch and Mitigation Efforts in Alaska Fisheries Summary Report: 2007 through 2015 (Eich et al. 2016). Document available at: https://repository.library.noaa.gov/view/noaa/12695
- Seabird Bycatch Estimates for Alaska Groundfish Fisheries 2016 through 2017 (Eich et al. 2018). Document available at: https://doi.org/10.25923/vb9g-s503
- Seabird Bycatch Estimates for Alaska Groundfish Fisheries: 2019 (Krieger et al. 2020). Document available at: https://www.fisheries.noaa.gov/national/bycatch/seabirds

6.2.2 Effects on Seabirds

The PSEIS identifies how the BSAI groundfish fisheries activities may directly or indirectly affect seabird populations (NMFS 2004 and 2015). Direct effects may include incidental take (lethal) in fishing gear and vessel strikes. Indirect effects may include reductions in prey (forage fish) abundance and availability, disturbance to benthic habitat, discharge of processing waste and offal, contamination by oil spills, presence of nest predators on islands, and disposal of plastics, which may be ingested by seabirds.

The impacts of the Alaska groundfish fisheries on seabirds were analyzed in the Harvest Specifications EIS (NMFS 2007) which evaluated the impacts of the alternative harvest strategies on seabird takes, prey availability, and seabird ability to exploit benthic habitat. The focus of this analysis is similar, as any changes to the groundfish fisheries in the BSAI could change the potential for direct take (death) of seabirds. Potential changes in prey availability (seabird prey species caught in the fisheries) and disruption of bottom habitat via the intermittent contact with non-pelagic trawl gear under different levels of harvest are examples of indirect effects on seabirds and are discussed in NMFS (2007). However, prey availability changes could also be closely associated with changes in seabird take levels. Therefore, all impacts to seabirds are addressed by focusing on potential changes in seabird takes (direct effects).

Of particular concern is the impact on seabirds listed under the ESA. Three species of seabirds are currently listed as either threatened or endangered; the short-tailed albatross (endangered), Alaska-breeding population of Steller's eider (threatened), and Spectacled eider (threatened). The USFWS consulted with NOAA Fisheries Alaska Region under Section 7 of the ESA on the effects of the groundfish fisheries on these species. In its 2021 biological opinion, the USFWS determined the groundfish fisheries off Alaska are likely to adversely affect short-tailed albatross, spectacled eider, and the Alaska-breeding population of Steller's eider, but they are not likely to jeopardize their continued existence (USFWS 2021). It was also determined that the groundfish fisheries off Alaska are not likely to adversely affect designated critical habitat of the Alaska-breeding population of Steller's eider and Spectacled eider. This 2021 biological opinion included an incidental take limit of six short-tailed albatross every two years, 25 spectacled eider every 4 years, and 3 Steller's eider every 4 years, in the groundfish fisheries off Alaska.

Impact Analysis

Incidental Take of Seabirds in Trawl Fisheries

Seabirds can interact with trawl fishing vessels in several ways. Birds foraging at the water surface or in the water column are sometimes caught in the trawl net as it is brought back on board. These incidental takes of seabirds are recorded by fisheries observers as discussed below. In addition to getting caught in the fishing nets of trawl vessels, some species strike cables attached to the infrastructure of vessels or collide with the infrastructure itself. Large-winged birds such as albatrosses are most susceptible to mortalities from trawl-cable strikes. Third wire cables have been prohibited in some southern hemisphere fisheries since the early 1990s due to substantial albatross mortality from cable strikes. No short-tailed albatross or black-footed albatross have been observed taken with trawl gear in the BSAI, but mortalities to Laysan albatrosses have been observed.

The average annual estimate of incidental take of birds in trawl gear in the BSAI was 697 birds per year from 2010 through 2019 (Krieger et al. 2020). Northern fulmars comprised the majority of this take, with shearwaters and gulls also taken in almost every year. An estimate of 93 Laysan albatross is attributed to the BSAI trawl fisheries in 2018. Storm petrels, murres, auklets, and cormorants were also taken in small number in trawling operations in the BSAI from 2010 through 2019. The estimated takes of gulls, fulmars, and shearwaters in the entire BSAI groundfish fishery are very small percentages of these species' populations, with the exception of a large number of shearwaters incidentally taken in 2019 (1,487 birds; Krieger et al. 2020). The increase in shearwater bycatch was attributed to a shearwater mortality event that occurred throughout Alaska in 2019.

Seabird takes in the BSAI trawl fisheries are relatively low, based on standard observer sampling and NMFS estimation. However, standard species composition sampling of the catch does not account for additional mortality due to gear interactions such as net entanglements or cable strikes. Special data collections of seabird gear interactions have been conducted, and preliminary information indicates that mortalities can be greater than the birds accounted for in the standard species composition sampling (Melvin et al. 2011). The probability of ESA-listed seabird collisions with third wires or other trawl vessel gear in the EEZ off Alaska cannot be assessed; however, given the available observer data and the observed at-sea locations of short-tailed albatrosses relative to trawling effort, the likelihood of ESA-listed seabird collisions are remote, but the possibility of such collisions cannot be completely discounted.

Impacts under the alternatives

Estimated takes in the BSAI trawl groundfish fisheries average 697 birds per year, and in the hook-and-line fishery, 5,000 birds per year; in both, they primarily consist of northern fulmars (Krieger et al. 2020). These seabird take estimates are small in comparison to seabird population estimates, and under the status quo alternative, it is reasonable to conclude that the impacts would continue to be similar. However, observers are not able to monitor all seabird mortality associated with trawl vessels. Several research projects are currently underway to provide more information on these interactions.

Various spatial restrictions on the trawl fisheries in the BSAI have been established as part of the groundfish management program, and these closures decrease the potential for interactions with seabirds in these areas. These restrictions are not anticipated to change, so this protection would continue to be provided under any of the alternatives in this analysis.

For the remainder of this section, the terms trawl and non-trawl will be used to describe gear types and groups of vessels which may impact seabirds under the described alternatives. Trawl includes vessels using both pelagic and non-pelagic trawl gear. Non-trawl includes vessels using demersal hook-and-line, and pot gear. This section does not include discussion of seabird bycatch in fisheries using gillnets, seine, troll, or jig gear because NOAA Fisheries does not have independent observer data from these fisheries.

PSC limits as a result of look up tables for Alternatives 2, 3, and 4 may result in no change to the status quo or may result in constraining PSC limits under which industry may change fishing patterns to maximize species with the greatest economic value. For trawl vessels, this could result in reduced fishing effort as the industry chooses not to pursue less valuable fisheries to conserve halibut PSC, or it could result in greater fishing effort at lower catch per unit effort, as vessels change fishing patterns or seasonal changes in the timing of the fishing, to increase halibut avoidance. If a groundfish fishery reduces fishing effort in specific fisheries to conserve halibut PSC for a more valuable fishery, then less potential exists for incidental take of seabirds. If a groundfish fishery increases the duration of fishing in areas with lower concentrations of halibut, there may be more potential for seabird incidental take, compared to the status quo, if this increased fishing activity overlaps temporally and geographically with areas used by seabirds. In contrast, PSC limits as a result of look up tables for Alternative 3, could result in increased PSC limits. This could result in a response of increased fishing effort, as industry is less constrained by halibut PSC limits.

Shifts in the location or timing of fishing may occur as a result of Alternative 2, 3, or 4. However, there is already considerable interannual variability in the patterns of fishing across the BSAI groundfish sectors, as environmental conditions and avoidance of PSC species have caused vessels to adjust their fishing patterns. Any shift in fishing location or timing is unlikely to occur outside of the existing footprint of the groundfish fisheries. Seabird take estimates in the BSAI groundfish fisheries are already small, compared to seabird population estimates, and are unlikely to increase to a level that would have a population-level effect on seabird species. The exception to this is incidental take of ESA-listed seabirds, but the take of these species in BSAI groundfish fisheries are already closely monitored with respect to the incidental take statements in the 2021 Biological Opinion. Therefore, effects on seabird incidental takes under Alternatives 2, 3 and 4 are not expected to be significant and are not expected to occur beyond the scope analyzed in previous NEPA or ESA documents.

Prey Availability Disturbance of Benthic Habitat

As noted in Table 6-7, prey species of seabirds in the BSAI are not usually fish that are targeted in the groundfish fisheries. However, seabird species may be impacted indirectly by effects of fishing gear on the benthic habitat of seabird prey, such as clams, bottom fish, and crab. The EFH EIS provides a description of the effects of the groundfish fisheries on bottom habitat in the appendix (NMFS 2005), including the effects of the commercial fisheries on the BSAI slope and shelf.

It is not known how much seabird species use benthic habitat directly, although research funded by the North Pacific Research Board has been conducted on foraging behavior of seabirds in the Bering Sea in recent years. Thick-billed murres easily dive to 100 m, and have been documented diving to 200 m; common murres also dive to over 100 m. Since cephalopods and benthic fish compose some of their diet, murres could be foraging on or near the bottom (K. Kuletz, USFWS, personal communication, October 2008).

A description of the effects of prey abundance and availability on seabirds is found in the PSEIS (NMFS 2004 and 2015) and the Harvest Specifications EIS (NMFS 2007). Detailed conclusions or predictions cannot be made regarding the effects of forage fish bycatch on seabird populations or colonies. NMFS

(2007) found that the potential impact of the entire groundfish fisheries on seabird prey availability was limited due to little or no overlap between the fisheries and foraging seabirds based on either prey size, dispersed foraging locations, or different prey. The majority of bird groups feed in vast areas of the oceans, are either plankton feeders or surface or mid-water fish feeders, and are not likely to have their prey availability impacted by the nonpelagic trawl fisheries. There is no directed commercial fishery for those species that compose the forage fish management group, and seabirds typically target juvenile stages rather than adults for commercial target species. Most of the forage fish bycatch is smelt, taken in the pollock fishery, which is not included in this action.

Table 6-7 Seabirds in the Bering Sea: foraging habitats and common prey species.

Species	Foraging habitats	Prey
Short-tailed albatross	Surface seize and scavenge	Squid, shrimp, fish, fish eggs
Black-footed albatross	Surface dip, scavenge	Fish eggs, fish, squid, crustaceans, fish waste
Laysan albatross	Surface dip	Fish, squid, fish eggs and waste
Spectacled eider	Diving	Mollusks and crustaceans
Steller’s eider	Diving	Mollusks and crustaceans
Black-legged kittiwake	Dip, surface seize, plunge dive	Fish, marine invertebrates
Murrelet (Kittlitz’s and marbled)	Surface dives	Fish, invertebrates, macroplankton
Shearwater spp.	Surface dives	Crustaceans, fish, squid
Northern fulmar	Surface fish feeder	Fish, squid, crustaceans
Murres spp.	Diving fish-feeders offshore	Fish, crustaceans, invertebrates
Cormorants spp.	Diving fish-feeders nearshore	Bottom fish, crab, shrimp
Gull spp.	Surface fish feeder	Fish, marine invertebrates, birds
Auklet spp.	Surface dives	Crustaceans, fish, jellyfish
Tern spp.	Plunge, dive	Fish, invertebrates, insects
Petrel spp.	Hover, surface dip	Zooplankton, crustaceans, fish
Jaeger spp.	Hover and pounce	Birds, eggs, fish
Puffin spp.	Surface dives	Fish, squid, other invertebrates

Source: USFWS 2006; Dragoo et al. 2010

Seabirds that feed on benthic habitat, including Steller’s eiders, cormorants, and guillemots, may feed in areas that could be directly impacted by nonpelagic trawl gear (NMFS 2004). A 3-year otter trawling study in sandy bottom of the Grand Banks showed either no effect or increased abundance in mollusk species after trawling (Kenchington et al. 2001), but clam abundance in these studies was depressed for the first 3 years after trawling occurred. McConnaughey et al. (2000) studied trawling effects using the Bristol Bay area Crab and Halibut Protection Zone. They found more abundant infaunal bivalves (not including *Nuculana radiata*) in the highly fished area compared to the unfished area. In addition to abundance, clam size is of huge importance to these birds (Richman and Lovvorn 2003). However, handling time is very important to birds foraging in the benthos, and their caloric needs could change if a stable large clam population is converted to a very dense population of small first year clams. Additional impacts from nonpelagic trawling may occur if sand lance habitat is adversely impacted. This would affect a wider array of piscivorous seabirds that feed on sand lance, particularly during the breeding season, when this forage fish is also used for feeding chicks (Bertram and Kaiser 1993, Golet et al. 2000). Therefore, effects on seabirds under Alternatives 2, 3 and 4 are not expected to be significant and are not expected to occur beyond the scope analyzed in previous NEPA or ESA documents.

Cumulative Effects on Seabirds

Reasonably foreseeable future actions for seabirds include ecosystem-sensitive management; rationalization; traditional management tools; actions by other federal, state, and international agencies; and private actions, as described in Sections 8.4 and 9.3 of the Harvest Specifications EIS (NMFS 2007). Ecosystem-sensitive management, rationalization, and traditional management tools are likely to increase protection to seabirds by considering these species more in management decisions, and by improving the management of fisheries through the restructured Observer Program, catch accounting, seabird avoidance measures, and vessel monitoring systems. Changes in the status of species listed under the ESA, the addition of new listed species or critical habitat, and results of future ESA Section 7 consultations may require modifications to groundfish fishing practices to reduce the impacts of these fisheries on ESA-listed species and critical habitat. Additionally, since future TACs will be set with existing or enhanced protection measures, we expect that the effects of the fishery on the harvest of prey species and disturbance will not increase in future years.

Any action by other entities that may impact seabirds will, if determined to be necessary through ESA Section 7 consultation, be offset by additional protective measures for the federal fisheries to ensure ESA-listed seabirds are not likely to experience jeopardy or adverse modification of critical habitat. Direct mortality by subsistence harvest is likely to continue, but these harvests are tracked and considered in the assessment of seabirds.

6.3 Habitat

6.3.1 Status

Fishing operations may change the abundance or availability of certain habitat features used by managed fish species to spawn, breed, feed, and grow to maturity. These changes may reduce or alter the abundance, distribution, or productivity of species. The effects of fishing on habitat depend on the intensity of fishing, the distribution of fishing with different gears across habitats, and the sensitivity and recovery rates of specific habitat features.

In 2005, NMFS and the Council completed the EIS for EFH Identification and Conservation in Alaska (NMFS 2005). The EFH EIS evaluates the long-term effects of fishing on benthic habitat features, as well as the likely consequences of those habitat changes for each managed stock, based on the best available scientific information. The EFH EIS also describes the importance of benthic habitat to different groundfish species and the past and present effects of different types of fishing gear on EFH. Based on the best available scientific information, the EIS analysis concludes that despite persistent disturbance to certain habitats, the effects on EFH are minimal because the analysis finds no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The EIS concludes that no Council managed fishing activities have more than minimal and temporary adverse effects on EFH for any FMP species, which is the regulatory standard requiring action to minimize adverse effects under the Magnuson-Stevens Act (50 CFR 600.815(a)(2)(ii)). Additionally, the analysis indicates that all fishing activities combined have minimal, but not necessarily temporary, effects on EFH.

The Council and NMFS have updated available habitat information, and their understanding of the impacts of fishing on habitat, in periodic 5-year reviews of the EFH components in the Council fishery management plans (NPFMC and NMFS 2012) and (Simpson et al. 2017). These 5-year reviews have not indicated findings different from those in the 2005 EFH EIS with respect to fishing effects on habitat, although new and more recent information has led to the refinement of EFH for a subset of Council-managed species (Simpson et al. 2017). Maps and descriptions of EFH for groundfish species are available at: https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-efh-alaska

6.3.2 Effects on Habitat

The 2005 EFH EIS (NMFS 2010), 2010 EFH Review (NMFS 2011) , and 2015 EFH Review (Simpson et al. 2017) concluded that fisheries do have long term effects on habitat, but these impacts were determined to be minimal and not detrimental to fish populations or their habitats. Similarly, the 2005 EFH EIS, 2010 EFH Review, and 2015 EFH Review (NMFS 2005) found no substantial adverse effects to habitat in the BSAI caused by fishing activities. The analysis in the EFH EIS concludes that current fishing practices in the BSAI groundfish fisheries have minimal or temporary effects on benthic habitat and essential fish habitat. These effects are likely to continue under Alternative 1.

Alternatives 2 and 4 may result in no change to the status quo, or may result in constraining PSC limits under which industry may change fishing patterns to maximize species with the greatest economic value. This could result in a response of reducing fishing effort, as the industry chooses not to pursue less valuable fisheries to conserve halibut PSC, or it could result in greater fishing effort at lower catch per unit effort, as vessels change fisheries patterns or seasonal changes in the timing of the fishing, to increase halibut avoidance. In contrast, Alternative 3 could result in increased PSC limits. This could result in a response of increased fishing effort, as industry is less constrained by halibut PSC limits.

Shifts in the location or timing of fishing may occur as a result of Alternatives 2, 3, and 4. However, there is already considerable interannual variability in the patterns of fishing across the BSAI groundfish sectors, as environmental conditions and avoidance of PSC species have caused vessels to adjust their fishing patterns. Any shift in fishing is unlikely to occur outside of the existing footprint of the groundfish fishery in the BSAI, and therefore these impacts are not likely to be substantial. To the extent that Alternatives 2, 3, and 4 change effort in the BSAI groundfish fishery, those alternatives would change impacts on habitat relative to the status quo. However, effects on habitat under Alternatives 2, 3 and 4 are not expected to be significant and are not expected to occur beyond the scope analyzed in previous NEPA or ESA documents.

6.4 Ecosystem

6.4.1 Status

Ecosystems consist of communities of organisms interacting with their physical environment. Within marine ecosystems, competition, predation, and environmental disturbance cause natural variation in recruitment, survivorship, and growth of fish stocks. Human activities, including commercial fishing, can also influence the structure and function of marine ecosystems. Fishing may change predator-prey relationships and community structure, introduce foreign species, affect trophic diversity, alter genetic diversity, alter habitat, and damage benthic habitats.

The BSAI groundfish fisheries potentially impact the BSAI ecosystem by relieving predation pressure on shared prey species (i.e., species that are prey for both target groundfish and other species), reducing prey availability for predators of the target groundfish, altering habitat, imposing PSC and bycatch mortality, or by ghost fishing caused by lost fishing gear. Ecosystem considerations for the groundfish fisheries are summarized annually in the SAFE report (available from: https://www.fisheries.noaa.gov/alaska/population-assessments/north-pacific-groundfish-stock-assessments-and-fishery-evaluation). These considerations are summarized according to the ecosystem effects on the groundfish fisheries, as well as the potential fishery effects on the ecosystem.

6.4.2 Effects on Ecosystem

As explained in Chapter 3, Section 3.3.1 of the Harvest Specifications EIS (NMFS 2007), NMFS and the Council continue to develop their ecosystem management measures for groundfish fisheries. The Council has created a committee to inform the Council of ecosystem developments and to assist in formulating positions with respect to ecosystem-based management. The Council's Scientific and Statistical Committee holds regular ecosystem scientific meetings, and the Council has recently reviewed and approved a Bering Sea Fishery Ecosystem Plan (available at: https://www.npfmc.org/bsfep/). In addition to these efforts to explore how to develop its ecosystem management efforts, the Council and NMFS continue to initiate efforts to take account of ecosystem impacts of fishing activity by designating EFH protection areas and habitat areas of particular concern. Ecosystem protection is supported by an extensive program of research into ecosystem components and the integrated functioning of ecosystems, carried out at the AFSC.

Under the status quo, the BSAI groundfish fleet is constrained in the location and timing of the fishery by directed fishing allowances, PSC and bycatch limits, and Steller sea lion protection measures. PSC limits as a result of look up tables for Alternatives 2, 3, and 4 may result in no change to the status quo, or may result in constraining PSC limits under which industry may change fishing patterns to maximize species with the greatest economic value. This could result in a response of reducing fishing effort, as the industry chooses not to pursue less valuable fisheries to conserve halibut PSC, or it could result in greater fishing effort at lower catch per unit effort, as vessels change fishing patterns or seasonal changes in the timing of the fishing, to increase halibut avoidance. In contrast, PSC limits as a result of look up tables for Alternative 3 could result in increased PSC limits. This could result in a response of increased fishing effort, as industry is less constrained by halibut PSC limits.

Shifts in the location or timing of fishing may occur as a result of Alternatives 2, 3, and 4. However, there is already considerable interannual variability in the patterns of fishing across the BSAI groundfish sectors, as environmental conditions and avoidance of PSC species have caused vessels to adjust their fishing patterns. To the extent that Alternative 2 through 4 change effort in the BSAI groundfish fisheries, those changes are not likely to have impacts on ecosystem components and considerations beyond those summarized in the annual Stock Assessment and Fishery Evaluation report for the BSAI groundfish fisheries (NPFMC 2020).

7 Magnuson-Stevens Act and Northern Pacific Halibut Act Considerations

Note that draft responses are provided in this section based upon the analysis to date and will be updated in the final EIS following the identification of a Preferred Alternative at final action.

7.1 Magnuson-Stevens Act National Standards

Below are the 10 National Standards as contained in the MSA. In recommending a preferred alternative, the Council must consider how to balance the national standards. For each of the national standards, a reference is provided to areas in the analysis that are particularly relevant to the consideration of the national standard, although they may not be the only information that is relevant to the issue.

National Standard 1 — Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery.

The proposed action indexes Amendment 80 halibut PSC limits annually to fluctuating levels of halibut abundance in the BSAI as estimated by the EBS trawl survey and IPHC setline survey. The BSAI groundfish stocks are generally considered stable and are not at a level that would correspond to being overfished and harvest is not at a level that would correspond to overfishing under the status determination criteria used for BSAI groundfish fisheries. The halibut PSC limits identified in the Alternative look up tables may prevent Amendment 80 from fully harvesting TACs under conditions of extremely low PSC limits, unless fishermen can utilize available tools to minimize halibut PSC beyond what is currently being achieved (see Section 5.3.2.3 on practicability of further bycatch reduction efforts). The intent of indexing the Amendment 80 sector's PSC limit to levels of abundance is: 1) when estimated halibut abundance (and therefore PSC limits) decline to very low levels, encounter rates amongst the A80 sector may also be low. If that is the case, then the fleet may still be able to catch their full TACs and thus achieve their proportion of OY even under low PSC limits; 2) when BSAI halibut abundance declines, PSC in Amendment 80 fisheries can become a larger proportion of total halibut removals in the BSAI, particularly in Area 4CDE, and can reduce the proportion of halibut available for harvest in directed halibut; 3) a program that links the Amendment 80 sector PSC limit to halibut abundance may provide incentives for the fleet to minimize halibut mortality at all times; and 4) this action could also promote conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery.

This action is not expected to interfere with the achievement of optimum yield (defined as 1.4 million mt to 2.0 million mt of groundfish in the BSAI FMP) on a continuing basis. As noted in Section 5.3.2.3, OY in the BSAI FMP is defined as a range over all target species. Given that in 2021 the A80 sector's apportionment of all BSAI groundfish species is about 12% of the 2 million mt limit, it would be possible to achieve OY as defined in the FMP without harvesting any of the A80 allocation, based on current groundfish stock conditions. However, annual groundfish harvest can be highly variable across years for a variety of reasons (e.g. changing ocean conditions, variability in recruitment or prey field, fisheries interactions, etc.), which may result in years where achieving OY is difficult. For example, mostly due to decrease in Pollock TACs, BSAI groundfish harvest was below 1.4 million mt in 2009 and 2010 (1.34 million mt, and 1.35 million mt, respectively). In years such as these when low overall groundfish harvest levels are low, further reductions to the A80 sector's PSC limit, and possible reductions in the sectors groundfish harvest, could further limit groundfish harvest in the BSAI.

However, the cooperative structure of Amendment 80 provides tools for vessels to control their PSC. The analysis suggests there is considerable variability among the vessels and companies of the sector with respect to PSC rates. This variability, along with other flexible tools offered by the cooperative structure, may provide an opportunity for Amendment 80 vessels to maximize the groundfish harvest to the extent practicable under potentially reduced halibut PSC limits.

Additionally, the "optimum yield" from the fishery reflects ecological, social, and economic considerations. Ecological impacts of the proposed action are discussed in the DEIS in conjunction with ecological conditions in the Bering Sea among other factors in estimating halibut abundance. As noted in Section 5.3.2.3.1, the BSAI FMP also states that OY may need to be respecified in the future if major changes occur in the estimate of MSY for the groundfish complex. Likewise, OY may need to be respecified if major changes occur in the ecological, social, or economic factors governing the relationship between OY and MSY. The MSA requires Councils to "review on a continuing basis, and revise as appropriate, the assessments and specifications made ... with respect to the optimum yield."

Impacts to Pacific halibut are covered in Section 5.2 and impacts to groundfish species are covered in Section 5.3. With information that is currently available, neither the total "cost" of halibut PSC taken in the Amendment 80 sector nor the total "value" of halibut savings can be precisely quantified for the various user groups. Further, as discussed in the analysis, there is not a direct pound to pound (i.e. 1:1) linkage between Amendment 80 PSC reduction and increased Area 4 commercial halibut harvest opportunities. Rather a range over the probable ratios between 0 and 1 is presented in Section 5.4 as well as context for what conditions would likely lean toward lower versus higher values within that range in the BSAI. The estimated annual savings of halibut may represent a cost to groundfish harvesters, processors, and consumers that is realized either as a reduction in the amount of groundfish harvested, or in the increased cost in the harvest of groundfish resulting from methods to avoid halibut and/or minimize halibut mortality. Halibut that might be taken as PSC in the groundfish fisheries has value to the commercial, sport, and subsistence harvesters of halibut, as well as being prey for other species. A general description of each of these user groups was also provided in Chapters 3 and 4. The SPR based harvest strategy employed by the IPHC indicate that overall fishing mortality levels (including O26 and U26) on halibut are not likely to affect the spawning biomass. Closed loop simulation modeling investigations (Section 5.2) are consistent with this conclusion. Many groups utilize the halibut resource, demonstrating the breadth and variety of values associated with this species (see Appendix 1). There are additional benefits to these user groups beyond the value of the direct market transaction. The lack of a market price for non-commercial use makes comparing the value derived from various users more difficult, but it is nonetheless important.

National Standard 2 — Conservation and management measures shall be based upon the best scientific information available.

Information in this analysis represents the most current, comprehensive set of information available to the Council. This analysis also recognizes that some information (such as operational costs) is unavailable. The SSC has reviewed this analysis iteratively over the course of their scientific peer review process and recommended that it be forwarded to the Council for decision-making as it includes the relevant information necessary to inform the Council's management action. Further and in concordance with the National Standard 2 guidelines, the analysis provides a listing of relative uncertainties in population modeling of the halibut stock (Section 4.2), the methodology used to estimate impacts to groundfish fisheries and the uncertainties in estimating future PSC usage (Section 5.3.2.1), and the uncertainty in estimating relative impacts to the directed halibut fishery (Section 5.4). This document represents the best scientific information available.

National Standard 3 — To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

Section 4.1 describes the range of the Pacific halibut stock, which extends coastwide, and the analysis considers effects throughout the range. Except for sablefish, which is not subject to this action, all groundfish species are assessed at the scale of the BSAI FMP (Section 3.1), which is the geographic scope of the proposed action (Chapter 1 Section 1.5). The groundfish stocks will continue to be managed as single stocks throughout their range under the proposed action.

National Standard 4 — Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

Nothing in the proposed alternatives considers residency as a criterion for the Council's decision. Residents of various states, including Alaska and the states of the Pacific Northwest, participate in the sectors that are directly and indirectly affected by the proposed action, including both groundfish and halibut fisheries. A description of participants in each fishery and sector, including vessel and LLP license ownership address by community for the Amendment 80 sector is presented in Appendix 1 to the extent feasible within confidentiality constraints. Similar information on community and state of ownership for Area 4 halibut vessels and halibut quota is provided in that same appendix.

While the Council does not have direct authority over setting halibut catch limits, the proposed action may provide additional opportunities for directed halibut fishing if the IPHC increases the commercial catch limit for the directed halibut fishery in response to this action. However, under the current set of alternatives considered, no direct allocation or assignment of fishing privileges to the directed halibut participants is considered. Thus, considerations under National Standard 4 pertain to the Amendment 80 fleet as directly affected by the proposed action. The proposed action may, however, have incidental allocative effects. Appendix 1 contains detailed information for both the Amendment 80 and directed halibut fisheries on community engagement, dependency, and federally recognized tribal status and encompasses all states in which those communities are located, as well as an analysis of potential incidental allocative effects of the proposed action. This information and analysis are summarized in Section 5.5.

The Council could examine how management measures that provide additional access to halibut catch may be considered with the understanding that such an action is not presently being managed by the Council. If the Council intends to directly provide additional opportunities to participants in Area 4CDE, the Council is authorized to develop limited access regulations under the Halibut Act as long as all applicable requirements in the Halibut Act are met.

National Standard 5 — Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

Efficiency in the context of the proposed action refers to economic efficiency. The analysis presents information on the relative importance of economic efficiency versus other considerations and provides information on the economic risks associated with the proposed PSC measures.

National Standard 6 — Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The analysis for the proposed action is consistent with this standard. Interannual variability in catch is described in Section 3.3.

National Standard 7 — Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication. The analysis should demonstrate that the benefits of fishery regulations are real and substantial relative to the added research, administrative, and enforcement costs, as well as costs to the industry of compliance.

The proposed action is consistent with this standard. Chapter 5 describes the potential impacts from the Alternatives and options, including costs of PSC limits as a management measure.

National Standard 8 — Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

These alternatives and options analyzed are designed to minimize halibut PSC in the Amendment 80 fleet to the extent practicable. Many of the coastal communities in the BSAI, as well as coastal communities elsewhere in Alaska and the Pacific Northwest, participate in the BSAI groundfish fisheries in one way or another, such as homeport to participating vessels, the location of processing activities, the location of support businesses, the home of employees in the various sectors, or as the base of ownership or operations of various participating entities. An analysis of community engagement in and dependency on the Amendment 80 fishery is provided in Appendix 1.

Under different halibut abundance conditions (and different alternatives), Amendment 80 halibut PSC limits could be reduced or remain the same (Alternatives 2 and 4), or could be reduced, remain the same, or be increased (Alternative 3). An analysis of the alternatives suggests that reductions in PSC limits could constrain the Amendment 80 fleet under some conditions and consequently may impact the communities that depend on those fisheries.

While the Council does not currently set halibut catch limits, the benefit to Alaska communities that may result from incidental allocative effects of halibut PSC reductions is discussed in Chapter 5 section 5.5.3. These alternatives and options have been developed to balance the need to minimize halibut PSC in the Amendment 80 fleet, consistent with National Standard 9, with the requirements of National Standards 1 and 8. To this end, options are provided to further incentivize bycatch reduction beyond what is provided by the PSC limit itself in order for the Amendment 80 fleet to mitigate their halibut PSC such that they may avoid forgone harvest opportunities throughout the sector's multispecies fishing year. As described in Section 5.5, reduced halibut PSC mortality, relative to status quo, might benefit fishing communities that depend on commercial and noncommercial halibut harvest, though the magnitude of that effect is likely attenuated by the several biological and policy steps that separate bycatch mortality savings from directed harvest opportunities. Communities that are engaged in the groundfish fisheries could be adversely impacted on a more direct basis. In selecting a Preferred Alternative, the Council must consider minimizing the risk of adverse impacts to fishing communities, while balancing the requirements of National Standards 9 and 1.

National Standard 9 — Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

The proposed action is specifically intended to minimize halibut PSC in the Amendment 80 sector to the extent practicable. The necessary context for considering the practicability of PSC reduction relative to status quo is provided in Sections 3.4.5 and 5.3.2.3. The range of PSC limits under each of the Alternatives are presented to provide a choice to the Council to balance among the competing requirements of the National Standards and, in particular, standards 1, 8, and 9. Some of the PSC limits represent levels much lower than what has been achieved by the Amendment 80 fleet to date, despite concerted efforts since the latest PSC limit reduction was implemented in 2016. The precise extent to which these limits would constrain BSAI groundfish fisheries is unknown, though the general direction of the impact is well-understood, as is the fact that impacts on stakeholders within the Amendment 80 sector are likely to be uneven given the diversity of company holdings of different target stocks (See Section 3.3). In general, the intention of indexing the Amendment 80 PSC limit to fluctuations in halibut biomass should more closely link PSC limits with mortality of halibut and to some extent encounters on the fishing grounds especially at extremely low levels of biomass (and resulting PSC limits). A program that links the Amendment 80 sector PSC limit to halibut abundance may provide incentives for the fleet to minimize halibut mortality at all times. Section 3.4.4 discusses the relative correlations among halibut encounters, mortality, and abundance. Options that may be applied to these Alternatives would further incentivize the fleet to avoid halibut at all levels of abundance.

National Standard 10 — Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The proposed action appears to be consistent with this standard. Section 5.8.2 discusses issues associated with vessel safety in conjunction with this action. None of the alternatives or options would change safety requirements for fishing vessels. No safety issues have been identified for Amendment 80.

7.2 Section 303(a)(9) Fisheries Impact Statement

Section 303(a)(9) of the MSA requires that a fishery impact statement be prepared for each FMP amendment. A fishery impact statement is required to assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for (a) participants in the fisheries and fishing communities affected by the plan amendment; (b) participants in the fisheries conducted in adjacent areas under the authority of another Council; and (c) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery.

The DEIS prepared for this plan amendment constitutes the fishery impact statement. The likely effects of the proposed action are analyzed and described throughout the DEIS. The effects on participants in the fisheries and fishing communities are analyzed in the following sections of the analysis (Sections 5 and Appendix 1). The effects of the proposed action on safety of human life at sea are evaluated in Section 5. Based on the information reported in this section, there is no need to update the Fishery Impact Statement included in the FMP.

The proposed action directly regulates the Amendment 80 sector in the EEZ off Alaska, which are under the jurisdiction of the North Pacific Fishery Management Council. The proposed action may also affect participants in halibut fisheries, conducted both under the North Pacific Council jurisdiction, and in adjacent areas under the jurisdiction of the Pacific Fishery Management Council.

7.3 Pacific Halibut Act

The fisheries for Pacific halibut are governed under the authority of the Northern Pacific Halibut Act of 1982 (Halibut Act, 16 U.S.C. 773-773k). For the United States, the Halibut Act gives effect to the Convention between the United States and Canada for the Preservation of the Halibut Fishery of the North Pacific Ocean and Bering Sea. The Halibut Act also provides authority to the Regional Fishery Management Councils, as described in § 773c:

> *(c) Regional Fishery Management Council involvement*
>
> *The Regional Fishery Management Council having authority for the geographic area concerned may develop regulations governing the United States portion of Convention waters, including limited access regulations, applicable to nationals or vessels of the United States, or both, which are in addition to, and not in conflict with regulations adopted by the [International Pacific Halibut Commission]. Such regulations shall only be implemented with the approval of the Secretary, shall not discriminate between residents of different States, and shall be consistent with the limited entry criteria set forth in section 1853(b)(6) of this title. If it becomes necessary to allocate or assign halibut fishing privileges among various United States fishermen, such allocation shall be fair and equitable to all such fishermen, based upon the rights and obligations in existing Federal law, reasonably calculated to promote conservation, and carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of the halibut fishing privileges.*

While the modification of PSC limits as proposed in this analysis does not directly regulate halibut fishermen, there is nonetheless an indirect effect on halibut fisheries as a result of this action, and therefore it is prudent for the Council to consider the directions in the Halibut Act about the regulations that may result from this action. Much of the direction listed in § 773c(c) is duplicative with the MSA's National Standard 4, requiring that regulations not discriminate between residents of different States, and directing that if halibut fishing privileges are allocated or assigned among fishermen, such allocation shall be fair and equitable. The relationship between this analysis and National Standard 4 is discussed above in Section 7.1. The Halibut Act also directs regulations to be consistent with the limited entry criteria set forth in the MSA. These are criteria that the Council and the Secretary must take into account when establishing a limited access system for an MSA fishery. The criteria are listed below. For each of the criteria, a reference is provided to areas in the analysis that are particularly relevant to the consideration of that criterion, although they may not be the only information that is relevant to the issue.

(A) present participation in the fishery

- Section 4.5, Section 4, and the SIA (Appendix 1)

(B) historical fishing practices in, and dependence on, the fishery

- Section 4.5.1, Section 4, and the SIA (Appendix 1)

(C) the economics of the fishery

- Section 4.5, Section 4, and the SIA (Appendix 1)

(D) the capability of fishing vessels used in the fishery to engage in other fisheries

- Section 4.5and the SIA (Appendix 1)

(E) the cultural and social framework relevant to the fishery and any affected fishing communities

- Section 4.5.4 and the attached SIA (Appendix 1)

(F) the fair and equitable distribution of access privileges in the fishery

- Section 4.5, and the attached SIA (Appendix 1), incorporating by reference the analyses that were considered when implementing BSAI Groundfish FMP Amendment 80 and the Halibut/Sablefish IFQ Program. The Amendment 80 LAPP most recently underwent a 5-year review that was published in October 2014; the IFQ Program underwent a 20-year review published in April 2017.

(G) any other relevant considered actions (to be considered at the time of final Council review).

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[104] Contributing does not imply endorsement by the contributor's associated agency

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10 Appendix 1: Social Impact Assessment

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Appendix 1:
Draft Social Impact Assessment

Draft Environmental Impact Statement (DEIS) for the Bering Sea and Aleutian Islands (BSAI) Halibut Abundance-Based Management (ABM) of Amendment 80 Prohibited Species Catch (PSC) Limit

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Acronyms and Abbreviations

ACDC	Adak Community Development Corporation
ADFG	Alaska Department of Fish and Game
AEB	Aleutians East Borough
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AKFIN	Alaska Fisheries Information Network
ANCSA	Alaska Native Claims Settlement Act
APIA	Aleutian Pribilof Islands Association
APICDA	Aleutian Pribilof Islands Community Development Association
BBEDC	Bristol Bay Economic Development Corporation
BIA	Bureau of Indian Affairs
BSAI	Bering Sea/Aleutian Islands
BSIA	best scientific information available
CAS	Catch Accounting System
CBSFA	Central Bering Sea Fishermen's Association
CDQ	Community Development Quota
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFEC	Alaska Commercial Fisheries Entry Commission
COAR	Commercial Operator Annual Report
CP	catcher/processor
CQE	Community Quota Entity
CQN	Chaninik Qaluyat Nunivak
CSIS	Community Subsistence Information System (Alaska Department of Fish and Game)
CV	catcher vessel
CVRF	Coastal Villages Region Fund
DCCED	Alaska Department of Commerce, Community, and Economic Development
DEIS	Draft Environmental Impact Statement
DOR	Alaska Department of Revenue
EBS	Eastern Bering Sea
EDR	Economic Data Report
EIS	Environmental Impact Statement
EO	Executive Order
FCEY	Fishery Constant Exploitable Yield
FLPR	floating processor
FMP	Fishery Management Plan
FR	Federal Register
GOA	Gulf of Alaska
IFQ	individual fishing quota
IPHC	International Pacific Halibut Commission
LLP	License Limitation Program
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NSEDC	Norton Sound Economic Development Corporation
PCFA	principal components factor analysis

PSC	Prohibited Species Catch
RAM	Restricted Access Management
RIR	Regulatory Impact Review
SBPR	shore-based processor
Seattle MSA	Seattle Metropolitan Statistical Area
SHARC	Subsistence Halibut Registration Certificate
SIA	Social Impact Assessment
SWHS	Statewide Harvest Survey
TAC	total allowable catch
TCEY	Total Constant Exploitable Yield
U32	under 32 inches
USFWS	United States Fish and Wildlife Service
VPSO	Village Public Safety Officer
YDFDA	Yukon Delta Fisheries Development Association

1 Executive Summary

This social impact assessment (SIA) evaluates community and regional participation patterns in the Bering Sea/Aleutian Islands (BSAI) Amendment 80 groundfish fishery and the BSAI/Area 4 halibut commercial fishery as well as potential community level impacts from (1) the no-action alternative (Alternative 1) and (2) the three action alternatives as a group (Alternatives 2-4). Potential impacts to regional subsistence and sport halibut fisheries are also evaluated.

1.1 BSAI Groundfish Fishery Engagement, Dependency, and Vulnerability to Community-Level Impacts of the Proposed Action Alternatives

1.1.1 Alaska Communities

The screening criteria for the selection of Alaska communities for inclusion in the BSAI groundfish component of this SIA were designed to identify Alaska communities that had at least a minimal, ongoing level of engagement in the relevant BSAI groundfish fisheries, as measured by an annual average of one or more active Amendment 80 sector groundfish trawl catcher/processor(s) with a local ownership address that participated in the BSAI groundfish fisheries 2010-2019 inclusive and/or being the location of catcher/processor product transfers. The latter criterion selected for those BSAI communities where, on an annual average basis 2010-2019, 5.0 percent or more of combined state shared fisheries tax revenue (i.e., Fisheries Business Tax revenue [associated with landings at shore-based or stationary floating processing operations] and Fisheries Resource Landing Tax Revenue [associated with product transfers by catcher/processors]) was attributable to Fisheries Resource Landing Tax revenue.

Using these screening criteria, five Alaska communities have been selected for analysis as potentially substantially engaged in, and/or potentially substantially dependent on, the BSAI groundfish Amendment 80 sector that would be directly affected by one or more of the proposed action alternatives. These Alaska communities are shown graphically in Table 1. Also shown in this table for reference is the level of engagement of these same five communities in the BSAI/Area 4 halibut catcher vessel and shore-based processing sectors. Not shown in this table is the level of engagement of Pacific Northwest communities, including the greater Seattle area, which has the highest level of engagement among all communities in all categories (except being the location of BSAI/Area 4 halibut shore-based processing).

Vulnerability of communities to adverse community-level impacts from the proposed action alternatives is in part a function of dependence of the community on the potentially affected BSAI groundfish Amendment 80 sector fisheries and the economic resiliency and diversity of the community. Dependency is influenced by the relative importance of the relevant BSAI groundfish Amendment 80 fisheries to vessels participating directly in the fisheries in comparison to all area, species, and gear fisheries in which those same vessels participate (community Amendment 80 sector vessel diversity); the relative importance of the relevant BSAI groundfish fisheries to all local ownership address catcher/processor vessels participating in all area, species, and gear fisheries combined (community catcher/processor fleet diversity); and the relative importance of the overall community fishery sector(s) within the larger community economic base both in terms of private sector business activity and public revenues (community economic diversity). Also important to adverse community-level impact outcomes and community resilience is the specific nature of local engagement in the potentially affected BSAI groundfish Amendment 80 fishery sector and alternative employment, income, business, and public revenue opportunities available within the community because of the location, scale, and relative economic diversity of the community.

Table 1. Graphic Representation of Potentially Affected Alaska BSAI Groundfish Communities Relative Annual Average Engagement in BSAI Groundfish and Halibut Fisheries, 2010-2019

Alaska Community	Relative Community Size	BSAI Groundfish Engagement		BSAI/Area 4 Halibut Engagement	
		Local Ownership Address Amendment 80 CPs	CP Product Transfer Location Tax Revenues	Local Ownership Address CVs	Shore-Based Processing Location
Adak	•	(none)	○	(< 0.5)	○
Atka	•	(none)	○	•	•
Sand Point	•	(none)	•	(none)	○
Togiak	•	(none)	○	⬤	(< 0.5)
Unalaska/ Dutch Harbor	○	(none)	⬤	○	⬤

Key for Table 1

Type/Level of Engagement	•	○	⬤
Community Size	2010 population = less than 1,000	2010 population = 1,000 – 9,999	2010 population = 10,000 or more
BSAI Groundfish Catcher/ Processor Participation	2010-2019 annual avg. = 0.5 – 0.9 vessels	2010-2019 annual avg. = 1.0 – 2.9 vessels	2010-2019 annual avg. = 3.0 or more vessels
BSAI Product Transfer Location Tax Revenues	2010-2019 annual avg. FRLT = 5.0 - 24.9% of FBT+FRLT Total	2010-2019 annual avg. FRLT = 25.0 - 49.9% of FBT+FRLT Total	2010-2019 annual avg. FRLT = 50.0% or more of FBT+FRLT Total
BSAI/Area 4 Halibut Catcher Vessel Participation	2010-2019 annual avg. = 1.0 – 4.9 vessels	2010-2019 annual avg. = 5.0 – 9.9 vessels	2010-2019 annual avg. = 10.0 or more vessels
BSAI/Area 4 Halibut Shore-Based Processing Participation	2010-2019 annual avg. = 0.5 – 0.9 plants	2010-2019 annual avg. = 1.0 – 1.9 plants	2010-2019 annual avg. = 2.0 or more plants

The relative importance of the BSAI Amendment 80 groundfish fisheries likely to be affected by the proposed alternatives within the larger local fisheries sector and within the larger local economic base varies widely among the engaged Alaska communities. Similarly, the socioeconomic structure of the engaged communities varies widely along with the relative diversity of their respective local economies. These conditions over the period 2010-2019 are summarized by region and community in the following sections, along with potential community level impacts associated with the proposed action alternatives and associated environmental justice concerns, as relevant.

1.1.1.1 Unalaska/Dutch Harbor

Unalaska/Dutch Harbor, with its relatively well-developed fishery support service sector and its role as the major shipping port of the BSAI area, could experience indirect impacts from the proposed alternatives through a decline in economic activity related to the Amendment 80 catcher/processor fleet if port calls were to decline because of the proposed action. Unalaska/Dutch Harbor, unique among Alaska communities, also derives substantial public revenues from BSAI groundfish catcher/processors offloading/transferring processed product in the port. Unalaska/Dutch Harbor accounted for two-thirds of all Amendment 80 Alaska port calls during the years 2010-2019. Unalaska/Dutch Harbor could experience indirect impacts from the proposed action alternatives through a decline in economic activity related to the Amendment 80 catcher/processor fleet if product transfers and/or other port calls were to decline because of the proposed action; however, there is no straightforward way to quantitatively estimate these impacts.

While Unalaska/Dutch Harbor is clearly the Alaska community most closely associated with activity of the Amendment 80 fleet and therefore potentially the most vulnerable to adverse impacts under the proposed action alternatives, it is also substantially engaged in the commercial directed BSAI/Area 4 halibut fishery, both in terms of its local catcher vessel fleet and local shore-based processing operations and therefore potentially vulnerable to adverse impacts during halibut low abundance conditions under the no-action alternative. Although it is an Alaska Native Claims Settlement Act (ANCSA) village and is home to a federally recognized tribe, Unalaska did not qualify as a Community Development Quota (CDQ) community and its local small boat fleet does have access to CDQ halibut as an underpinning of local operations, unlike most halibut-dependent local fleets in the BSAI region.

1.1.1.1.1 Potential Environmental Justice Concerns

The demographics of the owners and crew of the specific halibut vessels that would potentially be most likely to experience adverse impacts under the no-action alternative in halibut low abundance conditions are unknown, but a general knowledge of the fleet would suggest that its demographics are largely reflective of the general/residential population of the community. In contrast, processing workers in Unalaska/Dutch Harbor have tended to be relatively demographically distinct from the rest of the local population. Processing workers are overwhelmingly recruited from outside the community and have tended to include a high proportion of minority workers. Impacts to processing workers could occur as the result of implementation of the no-action alternative during halibut low abundance conditions in the form of reduced income or employment opportunities, depending on how specific plants and, importantly, their delivering fleets, adapt to changing conditions. It is not likely, however, that implementation of the no-action alternative would result high and adverse impacts to processing workers in the form of substantial processor workforce reductions, given the relatively modest level of dependency of the shore-based processing plants in Unalaska/Dutch Harbor on BSAI/Area 4 halibut deliveries compared to those from other BSAI fisheries in which these plants are engaged.

1.1.1.2 Atka and Adak

Direct engagement of both Atka and Adak in the Amendment 80 fishery is limited to locally occurring product transfers, which contribute to local public revenues, and port calls of Amendment 80 vessels that generate local economic activity among support service suppliers, at least in Adak. Like Unalaska/Dutch Harbor, Atka and Adak could experience indirect impacts from the proposed action alternatives if Amendment 80 product transfers were to decline in either community and/or other port calls were to decline in Adak because of the proposed action; however, there is no straightforward way to quantitatively estimate these impacts, which could be locally important, if modest in scale in comparison to Unalaska/Dutch Harbor. Atka, as a member of the Aleutian Pribilof Islands Development Association CDQ group, benefits indirectly from the leasing of CDQ quota to the Amendment 80 sector for harvesting. Adak, in contrast, is not a CDQ community.

Both Atka and Adak were the site of locally operating shore-based processors that accepted deliveries of BSAI/Area 4 halibut in most years 2010-2019. While Adak has had challenges in recruiting and retaining a local residential fleet, Atka has historically had a local halibut fleet. However, both communities have had challenges in the processing sector in recent years, with the plant in Adak closing intermittently (most recently in June 2020) and the plant in Atka not having operated since 2017. Under the no-action alternative, adverse impacts to the BSAI/Area 4 directed halibut fishery under low abundance conditions could make the restart of the Atka and Adak plants and the reestablishment of active local fleets more challenging than would otherwise be the case. Adak shore-based processing has also faced, from the local perspective, several fishery management related challenges over the years, compounded by the basic logistical and economic challenges of operating in a local economy that remains in transition from that of relatively large military community to a small civilian community.

Both communities are particularly vulnerable at present to cumulative impacts related to losing working age residents as the local halibut fishery represented, especially in Atka, one of the few private sector income and employment opportunities in the community. The schools in both communities are near minimum enrollment levels needed to qualify for state funding, which complicates residential retention and increases the consequences of not being able to do so.

1.1.1.2.1 Potential Environmental Justice Concerns

According to the 2010 census, Atka and Adak have populations that are 95 and 82 percent minority, respectively, and both have populations that, as of 2019, had 14.0 and 16.4 percent of their respective populations living below the poverty threshold, which are both considerably higher figure than the Alaska state-wide figure (10.7 percent). Additionally, Atka is also the location of a federally recognized Alaska Native tribe. While Adak is not home to a federally recognized tribe and is not an ANCSA village, it does have multiple ties to the Aleut Corporation, the ANCSA regional corporation for the Aleutian Pribilof region, and a number its subsidiaries. Given the nature of potential impacts to both communities summarized above, disproportionate high and adverse impacts to minority and/or low-income populations in both communities are theoretically possible, under both the action alternatives and, under halibut low abundance conditions, the no-action alternative.

Most of Adak's minority residents at the time of the census, however, were processing workers living in group housing and it is likely that processing workers accounted for most of the community's low-income population as well. With the processing plant currently shuttered, those individuals are no longer present in the community. If that situation continues to the time of the ultimate implementation of a selected alternative, both the minority population and the low-income population of Adak may more closely resemble that of the general population of Alaska, meaning that environmental justice may be less of an issue of a concern.

1.1.1.3 Togiak

Direct engagement of Togiak in the Amendment 80 fishery is limited to locally occurring product transfers, which contribute to local public revenues, and port calls of Amendment 80 vessels. The contribution to public revenues is relatively modest compared to other sources of general fund revenue and port calls reportedly generate little in the way of support service economic activities as, like Atka, Togiak does not have facilities of the size and scale to regularly support larger vessel operations. Togiak could experience indirect impacts from the proposed action alternatives if Amendment 80 product transfers and/or other port calls were to decline because of the proposed action; however, it is assumed that any such impacts would be minor. Togiak is the home of a federally recognized tribe and, as a member of the Bristol Bay Economic Development CDQ group, benefits indirectly from the leasing of CDQ quota to the Amendment 80 sector for harvesting.

With respect to engagement in and dependency on the BSAI/Area 4 commercial halibut fishery, catcher vessels with Togiak ownership addresses active in the BSAI/Area 4 halibut fishery derived about 83 percent of their total ex-vessel gross revenues 2010-2019 from fisheries other than the BSAI/Area 4 halibut fishery; all commercial fishing vessels with Togiak ownership addresses derived approximately 93 percent of their total ex-vessel gross revenues from fisheries other than the BSAI halibut fishery during this same time period. Given this lack of dependence, Togiak as not as acutely vulnerable in economic terms to community level adverse impacts under the no-action alternative during periods of low halibut abundance as are several other halibut communities. This is not to say that the BSAI/Area 4 halibut fishery is unimportant to Togiak harvesters and/or the shore-based processors in Togiak (and nearby Twin Hills) as resource that is available during an otherwise slow time and a diversification opportunity in an area that has otherwise been largely dependent on the herring and salmon fisheries.

1.1.1.4 Other CDQ Communities

CDQ entities and their constituent communities could be impacted by potential changes to the BSAI groundfish Amendment 80 sector fisheries related to the proposed action alternatives in multiple ways, two of the most direct of which are (1) through revenues generated by leasing the harvest of their BSAI multispecies groundfish CDQ quota holdings to potentially affected Amendment 80 industry partners and (2) through CDQ group investments in direct participation in the potentially affected Amendment 80 sector.

Four of the six CDQ groups routinely have their BSAI multispecies groundfish CDQ quota harvested in whole or in part by industry partners in the Amendment 80 sector. These groups vary in the number of communities and residents represent, the composition of the CDQ fishery portfolios they hold, and the relative scale of the fishery and non-fishery portions of their local economies, among other attributes. To the extent that the proposed action alternatives have the potential to reduce royalty payments by Amendment 80 entities to CDQ groups due to increased harvest expenses and/or leaving CDQ fish in the water, the harvest of which has been contracted to Amendment 80 entities, CDQ groups, and their constituent communities are at potential risk of adverse impacts under these alternatives. How effectively these risks would be mitigated by adaptive fishing behaviors on the part of the Amendment 80 partners is unknown and it is otherwise not possible to quantify these risks with available data. Amendment 80 entities have varying fishing portfolios in which leasing CDQ groundfish quota plays a part in an overall operational strategy in combination with their own cooperative quota and other CDQ fisheries quota. Given that the CDQ halibut PSC limit (315 t) would not change under any of the proposed action alternatives (unlike Amendment 80 halibut PSC limits that would vary with halibut abundance under the proposed action alternatives), it is assumed adverse (or beneficial) impacts, if any, to CDQ quota leasing practices and leasing revenues accruing to CDQ groups resulting from implementation of any of the action alternatives would be indirect and would vary by contracted entity, based on multiple factors. These would include circumstances unique to individual Amendment 80 entities including cooperative quota portfolio holdings, CDQ fishery leasing agreement portfolios, in-season operational decision making, and strategic partnering considerations, among other factors. If, however, there were to be a reduction revenues to CDQ entities as the result of the implementation of a proposed action alternative, the level of impact experienced by any specific CDQ group would vary based on a range of factors specific to that group, including the scale of Amendment 80 revenues relative to other CDQ fishery revenue streams, the viability of alternative revenue generation options for all or some portion of CDQ fishery portfolio leased by current Amendment 80 sector partners, either within or outside of the Amendment 80 sector, and the socioeconomic/demographic context of the communities represented by the CDQ group itself.

A fifth CDQ group holds partial ownership interest in multiple vessels in the Amendment 80 sector and thus is at some financial risk under the proposed action alternatives (similar to any other entity with Amendment 80 ownership interests), but again this risk is not quantifiable with available data. This CDQ group, as well as the sixth CDQ group, does not routinely use Amendment 80 entities to harvest their BSAI multispecies groundfish CDQ quota. While potential adverse impacts resulting from the amounts of quota at potential risk are not quantifiable with available data, they are understood to be minimal.

St. Paul has averaged the fourth highest number of port calls of Amendment 80 vessels among Alaska communities on an annual average basis 2010-2019. Available data suggest, however, that these port calls do not involve an amount of revenue from taxable product transfers that is substantial compared to other fishery tax revenue sources. St. Paul also does not appear to experience substantial private sector economic benefits from these port calls, based on a lack of port facilities and support service businesses of a scale capable of supporting relatively large vessels on a routine basis. As a result, no substantial adverse impacts to St. Paul related to any changes to patterns of Amendment 80 port calls resulting from implementation of any of the action alternatives are anticipated.

1.1.1.4.1 Potential Environmental Justice Concerns

Amendment 80-derived revenues are an important source of income for multiple CDQ groups and are used to fund to greater or lesser degrees a range of benefits programs that, among others, include helping to address basic health, safety, and infrastructure needs in communities with limited alternative revenue sources and funding opportunities. Given that CDQ groups overwhelmingly represent communities with high proportions of Alaska Native residents and low-income residents and communities that are home to one or more federally recognized tribal entities, adverse impacts to these CDQ entities would be of potential environmental justice concern.

1.1.2 Pacific Northwest Communities

Given the degree of centralization of ownership of the BSAI groundfish Amendment 80 sector in the Seattle Metropolitan Statistical Area (Seattle MSA), the centralization of the support services provided by Seattle-based firms, and the concentration of Amendment 80 crew member residence in the state of Washington, potential adverse economic impacts associated with proposed action alternatives described in DEIS Section 5.3.2 would largely accrue to the Seattle MSA in particular and the Pacific Northwest in general, with the limited exceptions described above.

As noted in DEIS Section 2, under both Alternative 2 and Alternative 4: the PSC limit would: (1) remain the same as the status quo PSC limit under combined “high setline index + high trawl index” halibut abundance conditions (only) and (2) under all other combinations of abundance conditions PSC limit reductions would occur. In contrast, under Alternative 3: (1) the alternative PSC limit would be higher than the status quo PSC limit under combined “high setline index + high trawl index” abundance conditions (the only circumstance under any alternative not modified by an option that this would occur); (2) the alternative PSC limit would remain the same as the status quo PSC limit under “high setline index + low trawl index” and “medium setline index + high trawl index” conditions; and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit. When reductions in PSC limits would occur, the amounts of those reductions for any combination of conditions would vary by alternative, as detailed in DEIS Section 2.

As noted in DEIS Section 5.3.2, numerous variables would influence the impacts of PSC limit reduction on the Amendment 80 sector, including environmental, regulatory, and behavioral variables. While sector participants cannot directly modify environmental or regulatory variables, they can alter behavioral variables through halibut avoidance strategies, all of which come with avoidance costs. These costs are incurred regardless of whether the PSC limit becomes a constraint and cannot be quantified with available data. Other costs associated with PSC reduction include foregone groundfish revenues if halibut becomes constraining. These costs impact gross revenues but quantifying costs of foregone groundfish revenue resulting from PSC limit reductions is not straightforward. Estimates of revenue impacts within the constraints of available data are provided in DEIS Section 5.3.2.

Finally, as noted in the DEIS Section 5.3.2.3 practicability of bycatch avoidance discussion, if halibut PSC limits become sufficiently constraining under an ultimately implemented proposed action alternative, additional consolidation of the Amendment 80 sector could occur. Consolidation could result as firms that are less efficient at addressing halibut bycatch constraints experience less profitability and sell to firms that are more efficient. In terms of the maximum level of consolidation that could occur under existing Amendment 80 ownership and control limits (and given current participation levels), only one firm could exit the fishery (because a person may not individually or collectively hold or use more than 30 percent of the aggregate Amendment 80 quota share units initially assigned to the Amendment 80 sector and resulting cooperative quota). Current vessel caps are set so that an Amendment 80 vessel may not be used to catch an amount of a species greater than 20 percent of the aggregate Amendment 80 sector's species ITACs, meaning the number of vessels in the fishery could theoretically consolidate to a minimum of five under the current caps. However, that degree of consolidation is not considered a realistic possibility, as the fleet would still need sufficient capacity to harvest the cooperative quota that can be supported by the available halibut PSC mortality limit.

1.1.2.1.1 Potential Environmental Justice Concerns

While no recent information from secondary sources on sector-wide catcher/processor crew demographics is readily available, for this analysis five firms representing a total of 19 Amendment 80 BSAI groundfish catcher/processors provided employee demographic data for 2019. As shown in the supplied data, 68 percent of all employees working on the catcher/processors represented in these data are minority employees. Minority representation is substantially higher for two of the job categories (factory foreman/quality control and processing labor/galley crew/cleaning, both over 75 percent), and in all but two job categories (captains and engineers) minority employees represented greater than 50 percent of all employees in that category. Asian Americans, Native Hawaiians, and Pacific Islanders as a group accounted for over 25 percent of all employees. Given these data, if disproportionate high and adverse impacts were to accrue to the BSAI Amendment 80 catcher/processor workforce due to implementation of a proposed action alternative, environmental justice would potentially be an issue of concern.

Of potential concern would be loss of income opportunities for crew, with increased expenses in operations with additional halibut avoidance measures, and/or more time away from home with time-consuming and/or labor-intensive measures. Although there are theoretically many more alternate employment and income opportunities for workers in a large urban area than in smaller communities or rural settings, there may not be comparable employment and earning potential ashore as is available to workers aboard these vessels, even in an otherwise robust job market, especially for employees who have worked their way up from entry level positions.

1.2 BSAI/Area 4 Halibut Fishery Engagement, Dependency, and Vulnerability to Community-Level Impacts of the Proposed Action Alternatives

1.2.1 Alaska Communities

1.2.1.1 Overview

The initial screening criteria for the selection of Alaska communities for inclusion in this portion of the social impact assessment were designed to identify those Alaska communities that had at least a minimal, ongoing level of engagement in the relevant BSAI/Area 4 halibut fishery, as measured by an annual average harvest engagement of 2.0 or more catcher vessels with local ownership addresses and/or communities with an annual average BSAI halibut processing engagement of 0.5 or more locally operating shore-based processors that accepted BSAI halibut deliveries over the years 2010-2019, inclusive.

Using these initial screening criteria, 29 Alaska communities, 20 of which are in the BSAI region, were selected for analysis as potentially substantially engaged in, and/or potentially substantially dependent on, the BSAI/Area 4 halibut fishery sectors most likely to be directly affected by one or more of the proposed action alternatives communities. Ultimately, a total of 17 of these Alaska communities were considered

BSAI halibut-dependent for the purposes of this analysis and are shown graphically in Table 2. Of the 17 Alaska communities shown in the table, 16 are home to federally recognized Alaska Native tribes. Not shown in this table is the level of engagement of Alaska communities outside of the BSAI region or Pacific Northwest communities.

Table 2.
Graphic Representation of Potentially Affected Alaska BSAI/Area 4 Halibut-Dependent Communities Annual Average Engagement in BSAI/Area 4 Halibut Fisheries

<table>
<tr><th rowspan="3">Community</th><th rowspan="3">CDQ Group</th><th colspan="4">Demographic Characteristics</th><th rowspan="3">Shore-Based Halibut Processing Location</th><th colspan="3">Catcher Vessel Characteristics</th></tr>
<tr><th rowspan="2">Community Size</th><th colspan="3">Proportion of Total Community Population</th><th rowspan="2">Number of Halibut CVs with Local Ownership Addresses</th><th colspan="2">Halibut Ex-Vessel Gross Revenues as Percentage of Total Ex-Vessel Gross Revenues</th></tr>
<tr><th>Alaska Native</th><th>Total Minority</th><th>Low-Income</th><th>Halibut CVs Only</th><th>All Community CVs</th></tr>
<tr><td>Adak</td><td>(none)</td><td>•</td><td>•</td><td>●</td><td>○</td><td>○</td><td>(< 1.0)</td><td rowspan="2">●</td><td rowspan="2">●</td></tr>
<tr><td>Atka</td><td>APICDA</td><td>•</td><td>●</td><td>●</td><td>•</td><td>•</td><td>•</td></tr>
<tr><td>Akutan</td><td>APICDA</td><td>○</td><td>•</td><td>●</td><td>○</td><td>○</td><td>•</td><td>●</td><td>●</td></tr>
<tr><td>St. George</td><td>APICDA</td><td>•</td><td>●</td><td>●</td><td>•</td><td>(none)</td><td>•</td><td>●</td><td>●</td></tr>
<tr><td>Unalaska/ Dutch Harbor</td><td>(none)</td><td>○</td><td>•</td><td>○</td><td>•</td><td>●</td><td>○</td><td>●</td><td>○</td></tr>
<tr><td>St. Paul</td><td>CBSFA</td><td>•</td><td>●</td><td>●</td><td>○</td><td>○</td><td>●</td><td>●</td><td>●</td></tr>
<tr><td>Hooper Bay</td><td>CVRF</td><td>○</td><td>●</td><td>●</td><td>●</td><td>(< 0.5)</td><td>•</td><td>●</td><td>Confidential</td></tr>
<tr><td>Kipnuk</td><td>CVRF</td><td>•</td><td>●</td><td>●</td><td>●</td><td>(< 0.5)</td><td>○</td><td>●</td><td>•</td></tr>
<tr><td>Mekoryuk</td><td>CVRF</td><td>•</td><td>●</td><td>●</td><td>●</td><td>(< 0.5)</td><td>●</td><td>●</td><td>●</td></tr>
<tr><td>Toksook Bay</td><td>CVRF</td><td>•</td><td>●</td><td>●</td><td>●</td><td>(< 0.5)</td><td>●</td><td>●</td><td>○</td></tr>
</table>

<table>
<tr><th rowspan="3">Community</th><th rowspan="3">CDQ Group</th><th colspan="4">Demographic Characteristics</th><th rowspan="3">Shore-Based Halibut Processing Location</th><th colspan="3">Catcher Vessel Characteristics</th></tr>
<tr><th rowspan="2">Community Size</th><th colspan="3">Proportion of Total Community Population</th><th rowspan="2">Number of Halibut CVs with Local Ownership Addresses</th><th colspan="2">Halibut Ex-Vessel Gross Revenues as Percentage of Total Ex-Vessel Gross Revenues</th></tr>
<tr><th>Alaska Native</th><th>Total Minority</th><th>Low-Income</th><th>Halibut CVs Only</th><th>All Community CVs</th></tr>
<tr><td>Chefornak</td><td>CVRF</td><td>•</td><td>⬤</td><td>⬤</td><td>○</td><td>(< 0.5)</td><td>○</td><td rowspan="5">⬤</td><td rowspan="5">•</td></tr>
<tr><td>Newtok</td><td>CVRF</td><td>•</td><td>⬤</td><td>⬤</td><td>⬤</td><td>(none)</td><td>•</td></tr>
<tr><td>Nightmute</td><td>CVRF</td><td>•</td><td>⬤</td><td>⬤</td><td>○</td><td>(none)</td><td>•</td></tr>
<tr><td>Quinhagak</td><td>CVRF</td><td>•</td><td>⬤</td><td>⬤</td><td>⬤</td><td>(none)</td><td>•</td></tr>
<tr><td>Tununak</td><td>CVRF</td><td>•</td><td>⬤</td><td>⬤</td><td>⬤</td><td>(none)</td><td>⬤</td></tr>
<tr><td>Nome</td><td>NSEDC</td><td>○</td><td>○</td><td>○</td><td>•</td><td>○</td><td>○</td><td>○*</td><td>•*</td></tr>
<tr><td>Savoonga</td><td>NSEDC</td><td>•</td><td>⬤</td><td>⬤</td><td>⬤</td><td>○</td><td>⬤</td><td>⬤</td><td>⬤</td></tr>
</table>

**Note: Nome catcher vessel revenues combined with "all other NSEDC" (excluding Savoonga) to protect data confidentiality. Where halibut ex-vessel gross revenues are shown as lumped for more the one community, data confidentiality restrictions preclude showing data for the individual communities.*

Key for Table 2

Type/Level of Engagement	•	○	⬤
Community Size	2010 population = less than 1,000	2010 population = 1,000 – 9,999	2010 population = 10,000 or more
Alaska Native and Total Minority Population Proportion	2010 population = less than 50 percent	2010 population = 50.0 – 74.9 percent	2010 population = 75.0 or more percent
Low-Income Population Proportion	2015-2019 population = less than 15 percent	2015-2019 population = 15.0 – 24.9 percent	2015-2019 population = 25.0 or more percent
BSAI/Area 4 Halibut Shore-Based Processing Participation	2010-2019 annual avg. = 0.5 – 0.9 plants	2010-2019 annual avg. = 1.0 – 1.9 plants	2010-2019 annual avg. = 2.0 or more plants
BSAI/Area 4 Halibut Catcher Vessel Participation	2010-2019 annual avg. = 1.0 – 4.9 vessels	2010-2019 annual avg. = 5.0 – 9.9 vessels	2010-2019 annual avg. = 10.0 or more vessels
BSAI/Area 4 Halibut Ex-Vessel Gross Revenue Proportion	2010-2019 annual avg. = less than 25 percent	2010-2019 annual avg. = 25.0 – 49.9 percent	2010-2019 annual avg. = 50.0 or more percent

The problematic nature of the no-action alternative for directed halibut fishery participants under halibut low abundance conditions is inherently recognized in the Council's purpose and need statement. The potential for BSAI/Area 4 halibut-related community-level impacts from the proposed action alternatives in any given community is in part a function of present and future dependence of the community on the potentially affected BSAI/Area 4 halibut fisheries. Like what was described for BSAI Amendment 80 groundfish fisheries, dependency on the BSAI/Area 4 halibut fishery is influenced by the relative importance of BSAI/Area 4 halibut fisheries in the larger community fisheries sector(s), as well as the relative importance of the overall community fishery sector(s) within the larger community economic base (both in terms of private sector business activity and public revenues). Also important to community-level impact outcomes is the specific nature of local engagement in the potentially affected BSAI/Area 4 halibut fisheries and alternative employment, income, business, and public revenue opportunities available within the community because of the location, scale, and relative economic diversity of the community.

It is assumed that the BSAI/Area 4 commercial halibut fishery would potentially benefit in low halibut abundance conditions from implementation of the action alternatives due to what could effectively (if indirectly) be a reallocation of access to halibut between the BSAI groundfish and BSAI/Area 4 directed halibut fisheries that would potentially occur to greater or lesser degrees under the different action alternatives. The beneficial impacts of these incidental allocative effects, were they to occur, would be realized in the near-term following action alternative implementation (assuming low abundance conditions relevant to the design of the alternative were occurring at the time of implementation) and potentially in the long-term, if low abundance conditions were to persist over time. As noted in DEIS Section 5.4, given that International Pacific Halibut Commission (IPHC) catch setting policy removes O26 bycatch by IPHC regulatory area, the spatial distribution of Amendment 80 halibut PSC may impact the distribution of directed halibut fishery catch limits within the BSAI/Area 4. Specifically, while total Amendment 80 halibut PSC mortality has decreased, the distribution of PSC occurrence within Area 4 has stayed fairly consistent, with Area 4CDE accounting for between 83 percent and 90 percent of annual Amendment 80 PSC since 2015 (when spatial resolution of PSC occurrence substantially improved). In other words, the directed halibut fishery in Area 4CDE would have the greatest potential for experiencing whatever incidental reallocative effects may occur under the proposed action alternatives.

The conditions under which the potential for incidental allocative effects beneficial to the directed halibut fishery could occur vary by action alternative. under both Alternative 2 and Alternative 4: (1) the alternative PSC limit would not be higher than the status quo PSC limit under any halibut abundance conditions; (2) the PSC limit would remain the same as the status quo PSC limit under combined "high setline index + high trawl index" halibut abundance conditions (only); and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit. The *amount* of PSC limit reductions under all but "high setline index + high trawl index" abundance conditions (and therefore the potential *level* of incidental allocative effects beneficial to the directed halibut fishery) would vary between the two alternatives, as described in DEIS Section 2, but combinations of abundance *conditions* under which at least some level of incidental allocative effects could potentially occur would be the same under Alternative 2 and Alternative 4. (Under "high setline index + high trawl index" abundance conditions, Alternative 2 and Alternative 4 would both be neutral in terms of incidental allocative effects relative to Alternative 1.)

The pattern is different for Alternative 3, as: (1) the alternative PSC limit would be higher than the status quo PSC limit under combined "high setline index + high trawl index" abundance conditions; (2) the alternative PSC limit would remain the same as the status quo PSC limit under "high setline index + low trawl index" and "medium setline index + high trawl index" conditions; and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit (and therefore potential incidental allocative effects beneficial to the directed halibut fishery could occur). All things being equal, the increase in the Amendment 80 PSC limit under "high setline index + high trawl index" halibut abundance conditions would result in fewer opportunities for the directed halibut fishery under these conditions than would be the case under status quo PSC limits (Alternative 1). This could be characterized as a loss to the directed halibut fishery, as the directed fishery not fully realizing otherwise expected gains under high abundance conditions, and/or as Amendment 80 halibut PSC use and directed fishery halibut opportunities both increasing based on high abundance conditions.

The provision of additional opportunities for the directed halibut fishery that may accompany PSC limit reductions would be determined by IPHC management processes and, as described in DEIS Section 5.4, would not likely result in those additional directed halibut fishery opportunities occurring on a pound-for-pound basis. Additionally, the potential options that maybe applied to any of the action alternatives would influence the level of additional directed halibut fishery opportunities available in a given year. It is also important to note that some communities are substantially engaged in or substantially dependent on both the Amendment 80 fishery and the Area 4 directed halibut fishery to varying degrees and a simple characterization of potential incidental reallocative effects to halibut dependent communities does not capture the complexity of overall impacts to those communities, much less the range of potential impacts to individual harvesters, processors, and/or fishery support businesses in those communities that may ultimately result from changes in Amendment 80 PSC limits.

It is further assumed that directed BSAI/Area 4 commercial halibut fishery could potentially benefit from implementation of the proposed action alternatives relative to the degree that the Pacific halibut stock itself would potentially benefit from the promotion of the conservation of the stock as a result of the implementation of the individual action alternatives. The IPHC's spawning biomass per recruit-based management approach, however, is expected to conserve spawning biomass across differing patterns in fishery selectivity and/or allocation among different fisheries. As such, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative. Closed-loop model simulations that appeared in previous analyses, described in DEIS Section 4.3, are consistent with this expectation. Whatever potential benefits of this nature, were they to occur, would not be immediately apparent in the relevant halibut fisheries and the full extent of their impact would not be realized for several years. In addition to being longer term, these potential impacts, were they to occur, would be of greater spatial extent than would the potential incidental allocative effects previously noted (i.e., they would be experienced within the coast-wide Pacific halibut stock rather than concentrated in the BSAI/Area 4).

1.2.1.2 Potential Impacts to Communities Engaged in the Commercial Halibut Fishery

Dependence of the total resident-owned catcher vessel fleet for these communities varied widely, as the fleets of some communities are more exclusively focused on the halibut fishery than are others. St. Paul, the BSAI region community with easily the highest 2010-2019 annual average catcher vessel Area 4 halibut ex-vessel gross revenues, was also one of three communities with virtually complete community fleet dependency on BSAI halibut ex-vessel gross revenues, along with St. George and Savoonga, which have smaller scale community fleets. Among the other communities or small groups of communities for which ex-vessel gross revenue totals can be disclosed, three other communities (Adak/Atka, Akutan, and Mekoryuk) have local ownership address catcher vessels fleets that were 85 percent or more dependent on BSAI halibut ex-vessel gross revenues on an annual average basis for the years 2010-2019, while two others were 25 percent or more dependent (Unalaska/Dutch Harbor and Toksook Bay). In terms of ex-vessel gross revenues to BSAI halibut vessels specifically, among the potentially substantially engaged or substantially dependent halibut communities for which revenues can be disclosed on an individual community or aggregated community basis, nine have dependencies of 90 percent or greater and one is more than 85 percent dependent.

In all but two cases (Adak and Unalaska/Dutch Harbor), potentially substantially engaged or substantially dependent BSAI halibut communities located in the BSAI region itself are member communities of CDQ entities. One of the CDQ entities has partial ownership interest in Amendment 80 vessels and four others routinely lease CDQ quota for harvest to Amendment 80 industry partners. These CDQ entities and their constituent communities would be vulnerable to potential decreases in CDQ groundfish revenues during low abundance halibut conditions under the proposed alternatives being considered. Ultimately, the level of direct impact to an individual CDQ entity and level of direct or indirect impact to its member communities cannot be quantitatively estimated given the role of individual entity business decision making, among myriad other factors.

While each CDQ entity pursues individual strategies, one primary goal of the CDQ program is to encourage individual entities to use the returns from their engagement in commercial fishing to support regional economic growth, including the direct reinvestment in commercial fisheries, the support of community development activities, and the creation/maintenance of commercial fishing support infrastructure in member communities. Different CDQ groups have faced different circumstances and pursued different strategies regarding the establishment or sustainment of an in-region small boat commercial halibut fishery. For those CDQ groups whose experience in, or assessment of, supporting an in-region small boat commercial halibut fishery would indicate that the effort is not or would not be sustainable (or equitable to all of the constituent communities they serve), especially under low abundance conditions, it is unknown whether the beneficial impacts that may accrue from implementation of one or more of the proposed alternatives would be sufficient to pass a threshold whereby in-region CDQ halibut fisheries programs would be considered sustainable (or equitable) even in low abundance conditions. For this reason, it is not possible to predict whether implementation of any one of the proposed alternatives would potentially result in a different pattern of in-region CDQ community commercial small boat direct BSAI/Area 4 halibut fishery engagement than is seen at present.

1.2.1.2.1 Potential Environmental Justice Concerns

In terms of minority populations in general, of the 17 Alaska communities considered BSAI halibut-dependent for the purposes of this analysis, in 2010 minority residents (including Alaska Native residents) accounted for more than 90 percent of the population in 13 communities, between 80 and 90 percent of the population in two communities, and more than 65 percent of the population in the remaining two communities. Additionally, of the 17 Alaska potentially BSAI halibut dependent communities, 16 have federally recognized Alaska Native tribes and 15 are members of CDQ groups.

In terms of low-income populations, of the 17 Alaska communities considered BSAI halibut-dependent for the purposes of this analysis, as of the 2015-2019 5-Year American Community Survey: 2 had 40 percent or more of their residents living below the poverty threshold; 5 had between 30 percent and less than 40 percent of their residents living below the poverty threshold; 2 had between 20 percent and less than 30 percent of their residents living below the poverty threshold; and 5 had a higher percentage of their residents living below the poverty threshold than the State of Alaska as a whole (10.7 percent), but less than 20 percent of their residents overall. Given these demographics and the federally recognized tribal status of all but one of the communities involved, if these communities were to experience disproportionate high and adverse impacts under the no-action alternative under halibut low abundance conditions, environmental justice would be a concern. Conversely, if these communities were to experience beneficial impacts under the proposed action alternatives, environmental justice would not be an issue of concern.

1.2.1.3 Potential Impacts to Communities Engaged in the Subsistence Halibut Fishery

Subsistence harvest of halibut would not be directly affected by the proposed action alternatives. Further, unlike the commercial halibut fishery, the subsistence halibut fishery would not benefit from potential incidental reallocative effects that may occur under the proposed action alternatives and provide additional opportunities for the directed halibut fishery. The IPHC accounts for incidental halibut removals in the groundfish fisheries, recreational and subsistence catches, and other sources of halibut mortality before setting commercial halibut catch limits each year. While subsistence removals are accounted for in setting the commercial halibut catch limits, subsistence halibut harvests are not constrained by this process. There are no caps on removals from Area 4 in the subsistence halibut fishery analogous to quotas established annually for the commercial halibut fishery, nor are there size limits on halibut harvested for subsistence use.

Subsistence halibut harvests (and harvesters) could indirectly benefit from the implementation of the proposed action alternatives if the proposed action ultimately implemented were to result in changes to the spatial distribution of halibut stock or an overall increase in availability of halibut for subsistence harvest and/or an accompanying decrease in effort and expense in harvesting halibut for subsistence use over the long term. These indirect benefits could occur if the Pacific halibut stock itself benefits from additional promotion of conservation of the halibut under the individual action alternatives (and to the extent that whatever conservation gains that may be realized are not fully redirected into additional opportunities for the commercial halibut fishery, while recognizing that the relationship between the commercial and subsistence fisheries is complex and varies by community). As noted in Section 1.2.1.1, however, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative, for multiple reasons.

Beyond direct use of halibut as a subsistence resource, the proposed alternatives could have impacts on other subsistence pursuits. These types of impacts fall into two main categories: impacts to other subsistence pursuits because of loss of revenue from the BSAI groundfish fishery under the action alternatives (or the BSAI halibut fishery under the no-action alternative) and impacts to other subsistence pursuits because of the loss of opportunity to use commercial fishing gear and vessels for subsistence pursuits. In general, however, while the indirect impact of the proposed action alternatives on subsistence is difficult to assess for multiple reasons, joint production impacts are likely to be concentrated among small halibut catcher vessel owners during low abundance conditions under the no-action alternative.

1.2.1.4 Potential Impacts to Communities Engaged in the Sport Halibut Fishery

Sport harvest of halibut would not be directly affected by the proposed action alternatives. Further, unlike the commercial halibut fishery, the sport halibut fishery would not benefit from potential incidental reallocative effects that may occur under the proposed action alternatives and provide additional opportunities for the directed halibut fishery. Due to the relatively small volume of recreational use in Area 4 and the management under a daily bag limit rather than an area/sector allocation, IPHC accounts for recreational removals using a projection. There are no caps on removals from Area 4 in the sport halibut fishery analogous to quotas established annually for the commercial halibut fishery, but sport effort is constrained in Area 4 by a sport fishing season that extends from February 1 to December 31 and a bag limit of two halibut of any size per person per day unless otherwise specified.

Sport halibut harvests (and the guided and unguided sport halibut fisheries) could indirectly benefit from the implementation of the proposed action alternatives if reducing BSAI halibut PSC limits under low abundance conditions were to ultimately result in an overall improvement in availability of halibut for sport harvest, an accompanying decrease in effort and expense in harvesting halibut for sport use, and/or an increase in interest in halibut sport fishing in the region prompted by an increasing abundance of larger halibut. These indirect benefits could occur if the Pacific halibut stock itself benefits from additional promotion of conservation of the stock under the individual action alternatives (and to the extent that those gains are not fully redirected into additional opportunities for the commercial halibut fishery). As noted in Section 1.2.1.1, however, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative, for multiple reasons.

1.2.1.5 Potential Cumulative Small/Rural Community and Cultural Context Issues

This SIA is largely focused on community impacts associated with the implementation of proposed BSAI halibut PSC limit revisions using quantitative fishery information and through characterizations of several Alaskan regions and communities that describe the magnitude of engagement and dependency on those fisheries. This approach provides an analysis of anticipated socioeconomic impacts that may accompany implementation of the proposed action alternatives. It should be noted, however, that fishing regulatory actions can result in a wide range of sociocultural impacts in rural fishing communities. For many residents of these communities, commercial fishing is not seen as a stand-alone socioeconomic activity, but an integral part of self-identity. This relationship is compounded for those residents who come from families with multi-generational experience in commercial and/or subsistence fishing, particularly for those Alaska Native residents for whom fishing is part of a larger, integrated traditional subsistence and economic sustenance practice rooted in thousands of years of history. The cultural importance of halibut (as a species) and halibut fishing (as a traditional activity) is documented in the anthropological literature for Alaska Native tribes and ethnic groups throughout Alaska. In addition to being a primary subsistence resource for many coastal cultures, halibut feature prominently in legends and parables. It is not uncommon to see halibut iconography in carvings, paintings, and textile handicrafts throughout the region, further suggesting its traditional cultural importance. The cultural significance of halibut for fishermen and their associated communities includes but exceeds the economic value of the fishery. Key themes include how halibut fishing provides a local source of employment in a day fishery that allows individuals to remain in their community, spend time with their family and build social networks, and engage in broader, culturally meaningful practices like subsistence. Halibut fishing is also considered a meaningful vocation and way of life.

While sustained participation of fishing communities in the BSAI groundfish or BSAI halibut fisheries would not appear to be directly at risk from implementation of the proposed action alternatives, the available literature and recent NPFMC analyses underline the fact that the proposed action is not taking place in isolation. Existing trends suggest that sustained participation in a range of commercial fisheries by residents of small communities in the region has become more challenging in recent years, with less inherent flexibility to adjust to both short- and long-term fluctuations in resource availability (as well as to changing markets for seafood products).

This flexibility is widely perceived in the communities as a key element in an overall adaptive strategy practiced in subsistence and economic contexts in the region for generations. This strategy involves piecing together individual livings (and often local economies) with an employment and income plurality approach. This plurality approach is particularly important given that the availability of non-fishing alternatives for income and employment are limited and, like the natural resources (and market factors) that underpin commercial fishing opportunities, tend to be subject to both short- and long-term fluctuations. This ongoing fluctuation in non-fishing opportunities further reinforces the importance of flexibility in the pursuit of a range of commercial fishing opportunities to enable individuals and communities the ability to successfully combine fishing and non-fishing as well as commercial and subsistence pursuits considered critical to long-term socioeconomic and sociocultural survival if not stability. To the extent that the proposed action alternatives would serve to provide for more opportunities for the success of small-scale commercial halibut fisheries during periods of low resource abundance, overall sustained participation in a range of local fisheries by residents of the smaller communities would be more secure.

1.2.2 Pacific Northwest Communities

The Seattle MSA is also substantially engaged in the BSAI/Area 4 halibut fishery as measured by ownership address of actively participating catcher vessels, among other indicators of engagement. Its engagement in the BSAI halibut fishery is not as dominant relative to that of Alaska communities, however, compared to its relative engagement in the BSAI groundfish fisheries likely to be most directly affected by the proposed action alternatives. No community level adverse impacts related to the BSAI halibut fishery are anticipated to the Seattle MSA under either the no-action alterative or the proposed action alternatives.

2 Overview

This document, a social impact assessment (SIA), is organized as an appendix to a Draft Environmental Impact Statement (DEIS) that analyzes proposed management measures to link Pacific halibut prohibited species catch (PSC) limits in the Bering Sea and Aleutian Islands (BSAI) groundfish Amendment 80[1] sector fisheries to halibut abundance.

The Council's purpose and need statement[2] for this action is:

> *Halibut is an important resource in the Bering Sea and Aleutian Islands (BSAI), supporting commercial halibut fisheries, recreational fisheries, subsistence fisheries, and groundfish fisheries. The International Pacific Halibut Commission (IPHC) is responsible for assessing the Pacific halibut stock and establishing total annual catch limits for directed fisheries and the North Pacific Fishery Management Council (Council) is responsible for managing prohibited species catch (PSC) in U.S. commercial groundfish fisheries managed by the Council. The Amendment 80 sector is accountable for the majority of the annual halibut PSC mortality in the BSAI groundfish fisheries. While the Amendment 80 fleet has reduced halibut mortality in recent years, continued decline in the halibut stock requires consideration of additional measures for management of halibut PSC in the Amendment 80 fisheries.*
>
> *When BSAI halibut abundance declines, PSC in Amendment 80 fisheries can become a larger proportion of total halibut removals in the BSAI, particularly in Area 4CDE, and can reduce the proportion of halibut available for harvest in directed halibut fisheries. The Council intends to establish an abundance-based halibut PSC management program in the BSAI for the Amendment 80 sector that meets the requirements of the Magnuson-Stevens Act, particularly to minimize halibut PSC to the extent practicable under National Standard 9 and to achieve optimum yield in the BSAI groundfish fisheries on a continuing basis under National Standard 1. The Council is considering a program that links the Amendment 80 sector PSC limit to halibut abundance and provides incentives for the fleet to minimize halibut mortality at all times. This action could also promote conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery.*

As described in Chapter 2 of the DEIS to which this SIA is appended (hereafter referred to as "the DEIS"), there are four overarching alternatives under consideration by the Council. These alternatives range from status quo with fixed Amendment 80 halibut PSC limits (the no action alternative or Alternative 1) to three different action alternatives (Alternatives 2, 3, and 4) that feature varying ranges of Amendment 80 halibut PSC limits linked to varying ranges of BSAI halibut abundance. There are also three different options that may be applied to any of the action alternatives.

This SIA is organized into seven primary sections. Following the Executive Summary (Section 1) and this Overview, these are as follows:

- Section 3 provides the regulatory context of the SIA.
- Section 4 provides introduction and methodology discussions.
- Section 5 provides quantitative indicators of community fishery engagement and dependency for the fisheries most directly relevant to the analysis.

[1] Amendment 80, implemented in 2008, allocates BSAI yellowfin sole, flathead sole, rock sole, Atka mackerel, and Aleutian Islands Pacific ocean perch to the head and gut trawl catcher/processor sector, and allows qualified vessels to form cooperatives.

[2] The Council revised the purpose and need statement and the alternatives for an initial review analysis in the Final Council motion, C-6 Halibut ABM, October 13, 2020 (available at https://meetings.npfmc.org/CommentReview/DownloadFile?p=7fa53e8a-3a03-40c8-a2af-a7d75b134bb2.pdf&fileName=C6%20Council%20Motion.pdf

- Section 6 provides information on the regional and community context of the relevant fisheries.
- Section 7 provides an analysis of regional and community level social impacts by alternative, focusing on (1) the no-action alternative and (2) the action alternatives as a group.

Following these sections, lists of references cited and persons consulted are provided (Sections 8 and 9, respectively), along with four attachments referenced in the body of the document (Sections 10.1 through 10.3).

The information contained in this SIA, with a focus on the analysis and conclusions presented in Sections 5, 6, and 7, is summarized in the "Social and Environmental Justice" section of the DEIS.

3 Regulatory Context

This community-level social impact assessment of the proposed action is guided largely by National Standard 8 – Communities under the provisions of the Magnuson-Stevens Act; the National Environmental Policy Act (NEPA); and Executive Order (EO) 12898, Federal Action to Address Environmental Justice in Minority Population and Low-Income Populations. Assuming their availability prior to final action, results of Tribal consultation and collaboration processes relevant to the social impact analysis of the proposed action alternatives, as guided or informed by EO 13175, a recent Presidential Memorandum, and/or a recent Council action as described below and will be incorporated into the final version of this SIA. Additionally, potentially relevant sections of new (2021) Executive Orders on (1) advancing racial equity and support for underserved communities, (2) tackling the climate crisis, and (3) advancing equity, justice, and opportunity for Asian Americans, Native Hawaiians, and Pacific Islanders contain embedded direction on economic and environmental justice and serving disadvantaged and underserved communities are noted below.

3.1 Magnuson-Stevens Act National Standard 8

National Standard 8 (50 CFR [Code of Federal Regulations] 600.345) specifies that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act, take into account the importance of fishery resources to fishing communities by utilizing economic and social data that are based on the best scientific information available in order to (1) provide for the sustained participation of such communities, and (2) to the extent practicable, minimize adverse economic impacts to such communities.

Per National Standard 8, the term "fishing community" means a community that is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew, and fish processors that are based in such communities. A fishing community is a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops).

Also, per National Standard 8, the term "sustained participation" means continued access to the fishery within the constraints of the condition of the resource. Per the guidelines for National Standard 8:

> *FMPs [Fishery Management Plans] must examine the social and economic importance of fisheries to communities potentially affected by management measures. For example, severe reductions of harvests for conservation purposes may decrease employment opportunities for fishermen and processing plant workers, thereby adversely affecting their families and communities. Similarly, a management measure that results in the allocation of fishery resources among competing sectors of a fishery may benefit some communities at the expense of others* (50 CFR 600.345[3]).

[3]The National Standard 8 guidelines referenced in this SIA, current as of February 12, 2021, are from the Electronic Code of Federal Regulations (CFR) Title 50, Chapter VI, Part 600, Subpart D, Section 600.345 (cited as 50 CFR 600.345) are available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=6b0acea089174af8594db02314f26914&mc=true&r=SECTION&n=se50.12.600_1345 accessed 2/17/2021.

3.2 Magnuson-Stevens Act National Standard 4

Under National Standard 4 (50 CFR 600.325), conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such an allocation shall be: (1) fair and equitable to all such fishermen; (2) reasonably calculated to promote conservation; and (3) carried out in such a matter that no particular individual, corporation, or other entity acquires and excessive share of such privileges. Among other National Standard 4 guidelines:

> *Definition. An "allocation" or "assignment" of fishing privileges is a direct and deliberate distribution of the opportunity to participate in a fishery among identifiable, discrete user groups or individuals. Any management measure (or lack of management) has incidental allocative effects, but only those measures that result in direct distributions of fishing privileges will be judged against the allocation requirements of Standard 4.*
>
> *An allocation of fishing privileges may impose a hardship on one group if it is outweighed by the total benefits received by another group or groups. An allocation need not preserve the status quo in the fishery to qualify as "fair and equitable," if a restructuring of fishing privileges would maximize overall benefits. The Council should make an initial estimate of the relative benefits and hardships imposed by the allocation, and compare its consequences with those of alternative allocation schemes, including the status quo. Where relevant, judicial guidance and government policy concerning the rights of treaty Indians and aboriginal Americans must be considered in determining whether an allocation is fair and equitable* (50 CFR 600.325[4]).

The considerations that the Council will take into account in its policy-level decision making relative to National Standard 4 (and the other National Standards) are discussed in the "Magnuson-Stevens Act and Pacific Halibut Act Considerations" portion of DEIS Section 7. As noted in that section the proposed action alternatives do not include an allocation or assignment of fishing privileges as defined in National Standard 4. The proposed action alternatives may, however, have incidental allocative effects. This SIA contains information on community engagement, dependency, and federally recognized tribal status,[5] where relevant, encompassing all states in which those communities are located, to support the National Standard 4 DEIS analysis as well as the analysis of potential incidental allocative effects of the proposed action alternatives.

3.3 Social and Economic Analysis Under NEPA

Under NEPA, "economic" and "social" effects are specific environmental consequences to be examined (40 CFR 1502.16 and 1508.8). Economic effects are examined primarily in the Environmental Impact Statement (EIS), the main document to which this community analysis document is appended, while social effects (and community-level economic effects) are examined primarily in this SIA.

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[4] The National Standard 4 guidelines referenced in this SIA, current as of February 12, 2021, are from the Electronic Code of Federal Regulations (CFR) Title 50, Chapter VI, Part 600, Subpart D, Section 600.325 (cited as 50 CFR 600.325) are available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=6b0acea089174af8594db02314f26914&mc=true&r=SECTION&n=se50.12.600_1325 accessed 2/17/2021.

[5] Tribal federal recognition status categorization used in this document is taken from the Department of Interior, Bureau of Indian Affairs, *Indian Entities Recognized by and Eligible to Receive Services From the United States Bureau of Indian Affairs*, 85 FR 5462, January 30, 2020, available at: https://www.govinfo.gov/content/pkg/FR-2020-01-30/pdf/2020-01707.pdf accessed 2/21/2021.

3.4 EO 12898 Environmental Justice

EO 12898 of February 11, 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Federal Register [FR] 7629; February 16, 1994), directs Federal agencies "to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

The EO directs the development of agency strategies to include identification of differential patterns of consumption of natural resources among minority populations and low-income populations; Council on Environmental Quality (CEQ) environmental justice guidance under NEPA also specifically calls for consideration of potential disproportionately high and adverse impacts to Indian tribes[6] beyond a more general consideration of potential disproportionately high and adverse impacts to minority populations (Council on Environmental Quality 1997).[7]

3.5 Tribal Consultation and Collaboration

EO 13175 of November 6, 2000, Consultation and Coordination with Indian Tribal Governments (65 FR 67249; November 9, 2000), was promulgated:

> "*…in order to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes*."

The Presidential Memorandum of January 26, 2021, Tribal Consultation and Strengthening Nation-to-Nation Relationships (86 FR 7491, January 29, 2021) affirms that the current Administration:

> "*…is committed to honoring Tribal sovereignty and including Tribal voices in policy deliberation that affects Tribal communities. The Federal Government has much to learn from Tribal Nations and strong communication is fundamental to a constructive relationship*."

The Presidential Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships does not change the definition of a Federal agency as specified under EO 13175, and as such, the National Marine Fisheries Service (NMFS) is the agency responsible for carrying out Tribal Consultations.

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[6] The term "Indian tribe" is retained due to its use in both the EO and CEQ guidance; the provisions of the EO and CEQ guidance are understood to apply to federally recognized Alaska Native tribes in the region potentially affected by the proposed action alternatives. The ANCSA status, ANCSA regional corporation, ANCSA village corporation, federal tribal recognition status, and CDQ membership status of each potentially substantially engaged and/or substantially dependent Amendment 80 and/or BSAI/Area 4 halibut fishing community is noted in the community institutional summary table(s) in each CDQ region's "Historical Overview" section (Sections 6.1.2 [APICDA], 6.2.2 [CBSFA], 6.3.2 [CVRF], and 6.4.2 [NSEDC]).

[7] Per CEQ guidance on environmental justice, under NEPA, the identification of a disproportionately high and adverse human health or environmental effect (including interrelated social, cultural, and economic effects) on a low-income population, minority population, or Indian tribe does not preclude a proposed agency action from going forward, nor does it necessarily compel a conclusion that a proposed action is environmentally unsatisfactory. Rather, the identification of such an effect should heighten agency attention to alternatives, mitigation strategies, monitoring needs, and preferences expressed by the affected community or population. Further, per CEQ guidance, agencies should recognize the interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed agency action. The factors should include the physical sensitivity of the community or population to particular impacts; the effect of any disruption on the community structure associated with the proposed action; and the nature and degree of impact on the physical and social structure of the community (Council on Environmental Quality 1997).

Additionally, on February 8, 2021, the NPFMC unanimously adopted a motion[8] relative to the Community Engagement Committee that recommended, among other actions, that the Council work "*with NMFS to receive and understand results of Tribal Consultation meetings as early in the process as possible, preferably prior to Council final action*." The Council's February 8, 2021 motion also recommended that the Executive Director assign responsibilities of a Rural Fisheries Community/Tribal Liaison position to staff. It is possible that the addition of these responsibilities will help facilitate more information related to Tribal Consultation and engagement at the regional level in a timely manner into the Council's process. If, and as results from Tribal consultation and collaboration processes relevant to the social impact analysis of the proposed action alternatives become available prior to final action, they will be incorporated into the final version of this SIA.

3.6 Other Recent Executive Orders

Three other Executive Orders, each signed in 2021, EO 13985, EO 14008, and EO 14031, address issues of equity as well as economic and environmental justice, as described below. These Executive Orders are recent enough that guidance for their implementation and application is not yet available. However, if and as guidance is developed and information relevant to the social impact analysis of the proposed action alternatives related to these Executive Orders does become available prior to final action, it will be incorporated into the final version of this SIA.

3.6.1 EO 13985 Advancing Racial Equity and Support for Underserved Communities Through the Federal Government

EO 13985 of January 20, 2021, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (86 FR 7009; January 25, 2021), addresses issues of equity for Indigenous and Native American persons, persons who live in rural areas, and persons otherwise adversely affected by persistent poverty or inequality, among other groups, as well as underserved communities in general. Specifically, under Section 2, Definitions:

> *For purposes of this order: (a) The term ''equity'' means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.*
>
> *(b) The term ''underserved communities'' refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list in the preceding definition of ''equity.''*

Section 8, Engagement with Members of Underserved Communities, specifies that:

> *In carrying out this order, agencies shall consult with members of communities that have been historically underrepresented in the Federal Government and underserved by, or subject to discrimination in, Federal policies and programs*.

[8] https://meetings.npfmc.org/CommentReview/DownloadFile?p=2c4a513f-889d-4647-9bea-29ed4bde660f.pdf&fileName=D1%20Motion.pdf

3.6.2 EO 14008 Tackling the Climate Crisis at Home and Abroad

EO 14008 of January 27, 2021, Tackling the Climate Crisis at Home and Abroad (86 FR 7619; February 1, 2021), under Part II, Taking a Government-Wide Approach to the Climate Crisis, includes language on securing environmental justice and spurring economic opportunity. Specifically, Section 219 states:

> *To secure an equitable economic future, the United States must ensure that environmental and economic justice are key considerations in how we govern. That means investing and building a clean energy economy that creates well-paying union jobs, turning disadvantaged communities—historically marginalized and overburdened—into healthy, thriving communities, and undertaking robust actions to mitigate climate change while preparing for the impacts of climate change across rural, urban, and Tribal areas.*
>
> *Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.*

As noted in Section 220, EO 14008 also amends Section 1-102 of EO 12898 Environmental Justice (Creation of an Interagency Working Group on Environmental Justice), replacing it with the creation, within the Executive Office of the President, a White House Environmental Justice Interagency Council.

3.6.3 EO 14031 Advancing Equity, Justice, and Opportunity for Asian-Americans, Native Hawaiians, and Pacific Islanders

EO 14031 of May 28, 2021, Advancing Equity, Justice, and Opportunity for Asian-Americans, Native Hawaiians, and Pacific Islanders (86 FR 29675; June 3, 2021), builds upon EO 13985 to advance equity and racial justice for underserved communities, which include Asian American, Native Hawaiian, and Pacific Islander communities, and the Presidential Memorandum of January 26, 2021 (Condemning and Combating Racism, Xenophobia, and Intolerance Against Asian Americans and Pacific Islanders in the United States [86 FR 7485; January 29, 2021]), which articulates the policy of the current administration to address and confront racism, xenophobia, and intolerance. Specifically, under Section 1, Policy:

> *The purpose of this order is to build upon those policies by establishing the President's Advisory Commission on Asian Americans, Native Hawaiians, and Pacific Islanders and the White House Initiative on Asian Americans, Native Hawaiians, and Pacific Islanders. Both will work to advance equity, justice, and opportunity for AA and NHPI communities in the United States.*

Under Section 2, the EO establishes in the Department of Health and Human Services the President's Advisory Commission on Asian Americans, Native Hawaiians, and Pacific Islanders (Commission). Under Section 3, the EO establishes a White House Initiative on Asian Americans, Native Hawaiians, and Pacific Islanders (Initiative), a federal Interagency working group.

4 Introduction and Methodology

4.1 General Approach

For the purposes of this community assessment, a two-pronged approach to analyzing the community or regional components of changes associated with the implementation of BSAI halibut abundance-based management (ABM) of PSC limits was utilized. First, tables based on existing quantitative fishery information were developed to identify patterns of participation in the relevant sectors of the groundfish and/or halibut fisheries, i.e., the sectors most likely to be directly affected by one or more of the proposed action alternatives. This is consistent with the portion of the National Standard 8 guidelines that state:

> *To address the sustained participation of fishing communities that will be affected by management measures, the analysis should first identify affected fishing communities and then assess their differing levels of dependence on and engagement in the fishery being regulated* (50 CFR 600.345[9]).

The second approach to producing this community analysis involved selecting a subset of Alaska communities engaged in the relevant BSAI groundfish and/or halibut fisheries for characterization of the community context of the relevant fisheries to describe the range, direction, and order of magnitude of social- and community-level engagement and dependency on those fisheries. The approach of using a subset of communities rather than attempting characterization of all the communities in the region(s) involved was chosen due to the practicalities of time and resource constraints. This is consistent with the portion of the National Standard 8 guidelines that state:

> *The best available data on the history, extent, and type of participation in these fishing communities in the fishery should be incorporated into the social and economic information presented in the FMP. The analysis does not have to contain an exhaustive listing of all communities that might fit the definition; a judgment can be made as to which are primarily affected* (50 CFR 600.345).

This characterization has been largely undertaken with existing information (as supplemented with phone and email contact with a limited number of individuals). The analysis was also informed by data gathered during limited fieldwork in Unalaska/Dutch Harbor[10] and Akutan that was undertaken in conjunction with updates of the Council's baseline fishing community profiles of those two communities.

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[9]The National Standard 8 guidelines referenced in this SIA, current as of February 12, 2021, are from the Electronic Code of Federal Regulations (CFR) Title 50, Chapter VI, Part 600, Subpart D, Section 600.345 (cited as 50 CFR 600.345) are available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=6b0acea089174af8594db02314f26914&mc=true&r=SECTION&n=se50.12.600_1345 accessed 2/17/2021.

[10] In most Council SIAs, the term "Unalaska" is typically used to refer to the City of Unalaska including its port of Dutch Harbor, which is fully encompassed within the municipal boundaries of the City of Unalaska. Within some fishery data sources, however, Unalaska and Dutch Harbor fishery statistics are reported separately, as there are separate Unalaska and Dutch Harbor mailing addresses and zip codes. In this SIA, those statistics are combined for reporting as they represent two components of the same community and the term "Unalaska/Dutch Harbor" is consistently used for the community to clearly signify that those separate data values have been combined. It is understood that use of the name "Unalaska" for the community is more technically accurate and otherwise preferred, especially by long-term residents of the community, and no disrespect or discounting of those preferences is implied by the use of the term Unalaska/Dutch Harbor in this document.

4.2 Quantitative Measures of Fishing Community Engagement and Dependency

Summary tables, typically including time series data indicative of fishery engagement and/or fishery dependence[11] from 2010 through 2019 are presented in Section 5, along with accompanying narrative. This analysis focuses on the distribution of relevant fishery sectors (primarily catcher vessels and associated ex-vessel gross revenues, catcher/processors and associated first wholesale gross revenues, and/or shore-based processors and associated first wholesale gross revenues) across regions and communities and follows annual and average participation indicators.

Within this quantitative characterization of fishery participation, several simplifying assumptions were made. For the purposes of this analysis, assignment of catcher vessels (and catcher/processors) to a region or community has been made based upon ownership address information as listed in the Alaska Commercial Fisheries Entry Commission (CFEC) vessel registration files. Thus, some caution in the interpretation of this information is warranted. It is not unusual for vessels to have complex ownership structures involving more than one entity in more than one region.[12] Further, the community of ownership address does not directly indicate where a vessel spends most of its time, purchases services, or hires its crew as, for example, some of the vessels with ownership addresses in the Pacific Northwest spend a great deal of time in Alaska ports and hire at least some crew members from these ports. The region or community of ownership address, however, does provide a rough indicator of the direction or nature of ownership ties (and a proxy for associated economic activity, as no existing datasets provide information on where catcher vessel earnings are spent), especially when patterns are viewed at the sector or vessel class level. Ownership location has further been chosen for this analysis as the link of vessels to communities rather than other indicators, such as vessel homeport information, based on previous NPFMC FMP social impact assessment experience (e.g., AECOM 2010) that has indicated the problematic nature of existing homeport data. Similarly, License Limitation Program (LLP) licenses have been assigned to communities based on license ownership address as it appears in the Alaska Regional Office Restricted Access Management (RAM) Program LLP license database used for this analysis.[13]

For shore-based processors, regional or community designation was based on the operating location of the plant (rather than ownership address) to provide a relative indicator of the local volume of fishery-related economic activity, which can also serve as a rough proxy for the relative level of associated employment and local government revenues. This is also consistent with established NPFMC FMP social impact assessment practice.

There are, however, considerable limitations on the data that can be utilized for these purposes, based on confidentiality restrictions. A prime example of this is where a community is the site of one or two shore-

[11] Dependence on a fishery can be measured in multiple ways and is a complex concept with economic, social, and other dimensions. In the case of the referenced summary tables, the economic dimension of dependence is characterized simply as the proportional contribution of ex-vessel gross revenues or first wholesale gross revenues resulting from engagement in the given fishery relative to the overall ex-vessel gross revenues or first wholesale gross revenues generated by the catcher vessels, catcher/processors, or shore-based processors from their engagement in all species, gear, and area fisheries.

[12] Importantly, for the purposes of this analysis, vessels may be owned in whole or in part by CDQ groups, but have ownership addresses outside of the involved CDQ regions. Where CDQ ownership of relevant catcher vessels and/or catcher/processors is known, it is specifically referenced in the appropriate regional discussion(s) in Section 6 and cross-referenced in the sector-specific discussions in Section 5.

[13] A later section of the document (Section 6.8) provides a set of "cross-walk" tables showing the degree of correspondence of community of vessel ownership address to community of vessel homeport as well as community of vessel ownership address to community of LLP license ownership address for Amendment 80 sector for the most recent year for which data are available. Also presented in that section is information on community of crew residence, based on crew license address.

based processors active in a community in a given year. No information can be disclosed about the volume and/or value of landings in those communities. This, obviously, severely limits quantitative discussions of the potential impacts of the management alternatives being analyzed. In short, the frame of reference or unit of analysis for the discussion in this section is the individual sector, and the analysis looks at how engagement in the fishery most likely to be directly affected by the proposed management actions has been differentially distributed across communities and regions within this framework. The practicalities of data limitations, however, serve to restrict this discussion.

4.3 The Community Context of Fishery Engagement and Dependency

The communities engaged in the relevant fisheries are numerous and far-flung. Communities (and types of potential impacts) vary based upon the type of engagement of the individual community in the fishery, whether it is through being a community of ownership address of a portion of the catcher vessel fleet; being the location of shore-based processing; being the base of catcher/processor ownership or activity; or being the location of fishery support sector businesses. In short, the second approach employed in this analysis uses the community or region as the frame of reference or unit of analysis (as opposed to the fishery sector as in the first approach). This approach examines, within the community or region, the local nature of engagement or dependence on the fishery in terms of the various sectors present in the community and the relationship of those sectors (in terms of size and composition, among other factors) to the rest of the local social and economic context. This approach then qualitatively provides a context for potential community impacts that may occur because of fishery management-associated changes to the locally present sectors in combination with other community-specific attributes and socioeconomic characteristics.

Simplifying assumptions also needed to be made as to which communities to select for characterization, given the large number of communities participating in the fisheries (especially the BSAI halibut[14] fishery), the desire to focus on the communities most clearly substantially engaged in and/or substantially dependent on the fishery (and therefore most likely to be directly affected by proposed management actions), a recognition that communities with multi-sector activity may be more or less vulnerable to potential adverse impacts related to the proposed fishery management changes based on the particular

[14] In this document, “BSAI halibut fishery” and “BSAI/Area 4 halibut fishery” are used interchangeably as shorthand for directed (commercial) halibut fisheries in IPHC Area 4 (which includes IPHC Areas 4A, 4B, 4C, 4D, and 4E). The boundaries of IPHC Area 4 are largely consistent with the boundaries of the federal BSAI North Pacific management area, except IPHC Area 4A includes the far western portion of the federal Gulf of Alaska North Pacific management area south of the Aleutian Chain in the general vicinity of Akutan and Unalaska Islands (the sites of their namesake communities, which are labeled in Figure 1), as well as Umnak Island (the large unlabeled island in Figure 1 shown to the west of Unalaska Island). For the practical purposes of this SIA, however, over the period 2010-2019, the universe of communities of ownership of the vessels that confined their fishing effort to the portion of Area 4A south of the Aleutian Chain is relatively small, especially for Alaska communities. Among communities in the BSAI region, Unalaska/Dutch Harbor alone was a community of ownership address for vessels active in the directed Area 4 halibut fishery that confined their effort to the portion of Area 4A south of the Chain (i.e., in the GOA management area and outside of the BSAI management area). There was one Unalaska/Dutch Harbor ownership address vessel in this category in each year 2011-2013 and in 2015, two such vessels in 2010 and 2014, and none in any year 2016-2019. Two communities in the GOA region had one local ownership address vessel whose Area 4 directed halibut fishery effort was confined to the portion of Area 4A south of the Aleutian Chain in one year during the period 2010-2019 (Sitka 2010 and Wasilla 2013); a third GOA region community (Kodiak) had one such vessel active in three years (2010, 2017, and 2019) and two vessels active in one year (2016); and a fourth GOA region community (Homer) had one such vessel active in seven years (2010, 2012, 2014-2015, and 2017-2019), two active in one year (2013) and four active in one year (2016). The portion of Area 4B south of the Aleutian Chain is outside of the geographic boundaries of Bering Sea, like the situation with Area 4A, however the area south of the Chain in Area 4B is in the Aleutian Islands portion of the BSAI management area, not in the GOA management area.

sectors present specific communities[15] and, most importantly based on the purpose and need statement, those communities most likely to directly benefit from intended potential beneficial impacts of the action alternatives.

4.3.1 Alaska BSAI Groundfish Communities

The initial screening criteria for selection of Alaska communities as potentially substantially engaged in and/or potentially substantially dependent on the relevant BSAI groundfish fisheries for characterization in Section 6 originally included those Alaska communities that had at least a minimal, ongoing level of engagement in the relevant fisheries, as measured by one or more of the following indicators in the primary dataset used for analysis (2010-2019):

- An annual average of one or more Amendment 80 sector groundfish trawl catcher/processor(s) with a local ownership address that participated in the BSAI groundfish fisheries over the years 2010-2019 inclusive.

Following SSC, AP, and Council initial review of a preliminary version of this SIA in October 2019, an additional initial screening criterion was added to capture communities potentially substantially engaged in and/or potentially substantially dependent on the relevant BSAI groundfish fisheries based on the community being the location of catcher/processor product transfers. Specifically, the communities screened for were those BSAI communities where, as measured by the following indicator based on Alaska Department of Revenue data:

- An annual average of 5.0 percent or more of combined state shared fisheries tax revenue (i.e., Fisheries Business Tax revenue [associated with landings at shore-based or stationary floating processing operations] and Fisheries Resource Landing Tax Revenue [associated with product transfers by catcher/processors]) was attributable to Fisheries Resource Landing Tax revenue over the years 2010-2019 inclusive.[16] [17]

Using these (revised) initial screening criteria, five communities were provisionally selected for characterization as the Alaska communities potentially substantially engaged in, and/or potentially substantially dependent on, the BSAI groundfish Amendment 80 fisheries and therefore those with the most potential to be directly affected by one or more of the various proposed management alternatives. These communities are shown in Table 3.

[15] For example, if multiple fishery sectors present in a community were all adversely affected by a proposed management action, then those combined impacts, at the community level, may be greater than the sum of individual sector impacts as, for example, direct fishery support sector businesses or municipal services are, in turn, adversely affected. Alternatively, if some locally present fishery sectors were adversely affected and some locally present fishery sectors were beneficially affected, then those combined impacts, when aggregated at the community level, may in whole or in part cancel one another out, with the beneficial impacts to some sector or sectors effectively minimizing or offsetting the adverse impacts to another sector or sectors.

[16] As noted in Section 4.5.1, Product Transfer Report data were initially examined for potential use as a dataset to determine patterns of catcher/processors offloads and the relative importance of those offloads across and within port communities, but the utility of these data proved problematic.

[17] See Table 36 for detailed information on annual average percentages 2010-2019 for all BSAI communities receiving shared Fishery Resource Landing Tax revenue from the Alaska Department of Revenue.

Table 3. Alaska Communities Potentially Substantially Engaged in BSAI Groundfish Amendment 80 Sectors, 2010-2019, as Selected by Initial Screening Criteria

Alaska Community	Amendment 80 CP Ownership Address	CP Product Transfer Location (BSAI Ports Only)
Adak	--	X
Atka	--	X
Sand Point	--	X*
Togiak	--	X
Unalaska/Dutch Harbor	--	X

*Sand Point is included as "BSAI" community for this indicator due to its location within the Aleutians East Borough.

Of these five communities, four (Adak, Atka, Togiak, and Unalaska/Dutch Harbor) were separately selected for characterization as communities potentially substantially engaged in or substantially dependent upon the BSAI/Area 4 halibut fishery, based on initial screening criteria thresholds of participation in the fishery.[18] As such, they could be affected in several different ways by any of the alternatives.[19]

4.3.2 Alaska BSAI/Area 4 Halibut Communities

The community analysis of potential impacts of the proposed action on Alaska communities engaged in and dependent upon the BSAI halibut fishery focuses on communities in the BSAI region itself (and, to a more limited extent, communities outside of the region that are nonetheless engaged in the BSAI/Area 4 halibut fishery) for two reasons.

- First, a portion of the Council's purpose and need statement for the proposed action notes that "*When BSAI halibut abundance declines, PSC in Amendment 80 fisheries can become a larger proportion of total halibut removals in the BSAI, particularly in Area 4CDE, and can reduce the proportion of halibut available for harvest in directed halibut fisheries.*" As this action is focused on the BSAI, it assumed that whatever adverse impacts to the directed halibut fishery that would potentially occur under the no-action alternative in periods of halibut abundance decline (or ongoing low abundance conditions) would be most directly experienced in the Area 4 directed halibut fisheries and the communities substantially engaged in or dependent upon those fisheries.

[18] The initial screening criteria for communities potentially substantially engaged in and/or substantially dependent on the BSAI halibut fishery included all communities with a 2010-2019 annual average harvest engagement of 2.0 or more catcher vessels with local ownership addresses active in the BSAI halibut fishery and/or communities with an annual average BSAI halibut processing engagement of 0.5 or more locally operating shore-based processors that accepted BSAI halibut deliveries. A total of 20 communities in the BSAI region itself met one or both of these criteria. Ultimately, a total of 17 of these Alaska communities were considered halibut-dependent for the purposes of this analysis and are shown graphically in Table 2 (with Dillingham, Togiak, and Twin Hills being the communities considered potentially substantially engaged in but not substantially dependent on the commercial halibut fishery and therefore excluded from the table).

[19] Three of the five communities were characterized in a separate principal components factor analysis (PCFA) exercise as having been highly engaged in the BSAI/Area 4 halibut fishery through harvesting engagement (Togiak), processing engagement (Adak), and/or both (Unalaska/Dutch Harbor) at least one year 2010-2018 (see Section 4.3.2). One other of the five communities was characterized has having either medium or medium-high engagement in BSAI/Area 4 halibut harvesting and/or processing at least one year 2010-2018 as well (Atka, medium harvesting and medium high processing) (see Table 6).

- Second, the purpose and need statement also reads in part: "*This action could also promote conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery*." It is assumed that whatever beneficial impacts to the directed halibut fishery that would potentially occur under the action alternatives during halibut low abundance conditions would be first and most directly experienced in the Area 4 directed halibut fisheries and the communities substantially engaged in or dependent upon those fisheries.[20]

To determine the communities most engaged in the BSAI halibut fishery (that would then be used to determine in part the focus of the impact analysis in Section 7), staff of the Alaska Fisheries Science Center's (AFSC) Economic and Social Sciences Research Program utilized a set of fisheries involvement indices earlier developed using secondary data to explore the degree to which communities are involved in the BSAI/Area 4 commercial halibut fishery. Section 10.1 (Attachment A) provides complete documentation of the process, but in short, NMFS has developed a framework to create quantitative indices to help understand community well-being and participation in marine fisheries. AFSC staff have adapted this framework to develop a set of performance metrics to track fisheries participation over time using pre-existing data for all communities participating in commercial fisheries. These performance metrics provide information to examine the degree to which Alaska communities participate in different aspects of commercial, recreational, and subsistence fisheries. The analysis presented in Section 10.1 focuses specifically on those communities engaged in BSAI/Area 4 halibut harvesting and processing activities. The purpose of this analysis is to explore the degree to which communities are engaged in BSAI/Area 4 halibut harvesting and processing in Alaska fisheries and how their participation has changed over time. These indices can be used to provide information about the degree to which communities have sustained participation in this fishery over time.

Performance metrics of community participation in Alaska fisheries from 2010-2018[21] are reported. Data were collected for 59 communities or community groupings throughout the U.S. that had either some commercial Area 4 halibut fisheries landings or residents who owned vessels that were used in commercial Area 4 halibut fishing during this period. There were 27 communities that had some Area 4 halibut landings occurring in their community and were included in the commercial processing engagement analysis. In contrast, 54 of the 59 communities had a resident who owned a vessel that participated in commercial Area 4 halibut fishing and therefore were included in the commercial harvesting engagement analysis. To examine the relative harvesting and processing engagement of each community, a separate principal components factor analysis (PCFA) was conducted each year for each category to determine a community's engagement relative to all other Alaska communities. There are nine years in the study and two PCFAs are conducted each year (processing engagement and harvesting engagement) for a total of 18 different PCFAs.

A unique processing index and harvesting index value for each community in each year. These indices are relative scores in that they represent each community's engagement in commercial fisheries within a single year relative to all other communities in that year. Indices are then appended across all years to create a time series of relative engagement in these two aspects of commercial fisheries over time. Communities that scored above one (above one standard deviation from the mean of zero) for any year

[20] If beneficial impacts to the directed halibut fishery were to occur due to the Pacific halibut stock itself potentially benefitting from the promotion of the conservation of the stock under the individual action alternatives, presumably these benefits could potentially be realized in part in directed halibut fisheries outside of the BSAI region to the extent that halibut in the BSAI region subsequently migrate out of the area and recruit into directed halibut fisheries in other regions, as discussed in the EIS to which this SIA is appended. Given the multiple biological, spatial, and temporal uncertainties involved in attempting to link these impacts to specific regions and communities, these types of potential impacts are not further considered in this SIA.

[21] While other indicators presented in this SIA typically span the 2010-2019 era, some of the 2019 data that feed into the performance metrics in this component of the analysis are not yet available. As a result, in this component of the analysis 2018 represents the best/most complete full-year data available.

are classified as highly engaged for that particular year. It is important to note that since these are relative indices, a large change in the total number of active vessels over time will only cause a change in an index if one community loses a larger share of their vessels (or other commercial fisheries activities) than another community. If the change in number of active vessels (or other commercial fishing activities) are directly proportional to the existing number of vessels across communities, there will not be a change in the indices over time.

Table 4 shows the 13 communities that were determined to be highly engaged in BSAI/Area 4 commercial halibut harvesting in one or more years, by year, over the period 2010-2018. Table 5 provides similar information for the six communities that were highly engaged in BSAI/Area 4 commercial halibut processing for at least one year 2010-2018. Three of the six communities that appear in Table 5 also appear in Table 4, for a total of 16 unique communities falling into either category.

Table 4. Communities Highly Engaged in BSAI/Area 4 Commercial Halibut Harvesting for One or More Years, 2010-2018

Community/Area	2010	2011	2012	2013	2014	2015	2016	2017	2018
Seattle MSA	4.59	4.55	4.70	4.61	4.67	5.11	4.96	4.86	4.31
Saint Paul Island	1.91	1.81	1.95	2.13	2.71	2.04	1.76	2.37	2.59
Homer	1.22	1.63	2.03	1.55	1.90	2.10	2.40	2.74	3.00
Kodiak	2.30	1.67	1.56	1.79	1.82	1.85	2.33	1.58	1.57
Togiak	-0.05	0.17	0.64	0.15	1.04	1.16	1.22	1.25	1.12
Unalaska/Dutch Harbor	0.97	0.71	0.81	0.84	0.96	1.38	1.14	0.96	1.49
Other Washington	0.67	0.52	0.21	0.30	0.94	0.89	1.02	1.02	1.40
Other States (not AK/WA/OR)	-0.24	-0.26	-0.20	0.08	0.46	0.26	0.47	0.54	1.02
Toksook Bay	1.82	2.13	1.92	1.94	0.49	-0.54	-0.53	-0.53	-0.54
Mekoryuk	1.48	1.44	1.34	1.30	0.90	-0.54	-0.53	-0.53	-0.54
Tununak	1.23	1.28	1.26	1.40	-0.35	-0.54	-0.53	-0.53	-0.54
Savoonga	0.21	0.02	0.54	0.39	1.08	1.02	0.74	0.81	0.42
Juneau	0.28	0.44	0.27	0.25	1.11	0.76	0.63	-0.13	-0.10

Note: Orange shaded cells are index scores above one (highly engaged).
Source: Adapted from Table 77 in Section 10.1.2 (Attachment A)

Table 5. Communities Highly Engaged in BSAI/Area 4 Commercial Halibut Processing for One or More Years, 2010-2018

Community	2010	2011	2012	2013	2014	2015	2016	2017	2018
Unalaska/Dutch Harbor	3.58	3.33	3.80	3.93	4.35	4.39	4.21	4.34	3.93
Akutan	1.42	1.34	1.09	1.32	1.06	0.83	1.39	1.46	1.60
Adak	-0.75	0.14	0.86	0.20	0.22	0.29	0.34	0.34	1.52
Kodiak	0.59	0.35	0.28	0.55	0.75	1.27	1.31	0.66	0.08
Anchorage	-0.50	1.51	1.48	1.03	0.78	-0.20	-0.60	-0.56	-0.29
Saint Paul Island	2.40	2.24	0.81	0.74	0.09	0.40	0.40	0.61	0.50

Note: Orange shaded cells are index scores above one (highly engaged).
Source: Adapted from Table 75 in Section 10.1.2 (Attachment A)

Based on the community engagement index scores for both BSAI/Area 4 commercial halibut harvesting and processing engagement, communities were categorized into low (index scores below the mean of 0), medium (index scores between 0 and 0.5), medium-high (index scores between 0.50001 and 1), and high engagement (index scores above 1) for each year. The number of years a community is in each category for the processing and harvesting engagement indices is presented in Table 6 for all communities that had at least one year 2010-2018 with a medium, medium-high, or high level of engagement in either the harvesting or processing category. There are 31 communities or community groupings shown that had medium, medium-high, or high engagement in either harvesting or processing engagement.

Table 6. **BSAI/Area 4 Commercial Halibut Harvesting and Commercial Halibut Processing Level of Engagement by Community and Region, 2010-2018 (Number of Years)**

Community*	Region	Group (BSAI Only)	Harvesting Engagement				Processing Engagement			
			Low	Medium	Medium-High	High	Low	Medium	Medium-High	High
Adak	BSAI	APICDA	9	0	0	0	1	6	1	1
Akutan	BSAI	APICDA	9	0	0	0	0	0	1	8
Atka	BSAI	APICDA	7	2	0	0	3	5	1	0
Saint George Island	BSAI	APICDA	4	5	0	0	0	0	0	0
Unalaska/Dutch Harbor	BSAI	APICDA	0	0	6	3	0	0	0	9
Saint Paul Island	BSAI	CBSFA	0	0	0	9	0	3	4	2
Chefornak	BSAI	CVRF	6	0	3	0	9	0	0	0
Hooper Bay	BSAI	CVRF	7	2	0	0	9	0	0	0
Kipnuk	BSAI	CVRF	5	0	4	0	9	0	0	0
Mekoryuk	BSAI	CVRF	4	0	1	4	9	0	0	0
Newtok	BSAI	CVRF	8	1	0	0	0	0	0	0
Quinhagak	BSAI	CVRF	7	1	1	0	0	0	0	0
Toksook Bay	BSAI	CVRF	4	1	0	4	5	1	3	0
Tununak	BSAI	CVRF	5	0	0	4	6	3	0	0
Nome	BSAI	NSEDC	4	4	1	0	8	1	0	0
Savoonga	BSAI	NSEDC	0	4	3	2	7	2	0	0
Togiak	BSAI	BBEDC	1	2	1	5	9	0	0	0
Twin Hills	BSAI	BBEDC	0	0	0	0	8	1	0	0
Anchorage	GOA		4	5	0	0	5	0	1	3
Homer	GOA		0	0	0	9	8	1	0	0
Juneau	GOA		2	4	2	1	0	0	0	0
King Cove	GOA		0	0	0	0	8	1	0	0
Kodiak	GOA		0	0	0	9	0	3	4	2
Seward	GOA		9	0	0	0	7	1	1	0
Sitka	GOA		2	5	2	0	9	0	0	0
Wasilla	GOA		2	7	0	0	0	0	0	0
Delta Junction	Interior Alaska		5	4	0	0	0	0	0	0
Seattle MSA	Pacific Northwest		0	0	0	9	9	0	0	0
Other Washington	Pacific Northwest		0	2	4	3	8	1	0	0
Oregon	Pacific Northwest		6	3	0	0	0	0	0	0
All Other States	Other		3	4	1	1	0	0	0	0

*Communities not listed had low or no BSAI/Area 4 commercial halibut harvesting and processing engagement in all years, 2010-2018.

Source: Adapted from Table 78 in Section 10.1.3 (Attachment A)

Another component of the community analysis, however, looks at annual halibut harvest engagement for the years 2010-2019 for all communities with an annual average engagement of 2.0 or more catcher vessels with local ownership addresses, which illustrates trend information (see Table 13 in Section 5.2 below). This section also independently evaluates community fleet dependency on halibut on an annual average basis 2010-2019 to the extent data confidentiality constraints allow. This component of the community analysis also looks at annual halibut processing engagement for the years 2010-2019 for all communities with an annual average engagement of 0.5 or more locally operating shore-based processors that accepted BSAI/Area 4 halibut deliveries, which illustrates trend information (see Table 18 in Section 5.3 below). This section also independently evaluates processor dependency on halibut on an annual average basis 2010-2019 to the extent data confidentiality constraints allow. However, given the fewer number of relevant processors, confidentiality restrictions do not permit community-by-community disclosure of processor first wholesale gross revenue information; this section does, however, present aggregated data by year, so overall regional dependency trends are apparent.

It is assumed that Alaska directed commercial halibut fishery dependent communities identified would be those communities that would potentially benefit the most from the proposed management actions relative to the extent of what could effectively (if indirectly) be a reallocation of access to halibut between the BSAI groundfish fishery and the BSAI commercial halibut fishery were to occur under the various action alternatives. In addition to these potential incidental allocative effects, directed commercial halibut fishery dependent communities could potentially benefit to the degree that the Pacific halibut stock itself may benefit from the promotion of the conservation of the stock under the proposed action alternatives, creating additional opportunities for the directed halibut fishery, although as noted in Section 7.2.1, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative, for multiple reasons. Conversely, the BSAI halibut communities identified for characterization are potentially those Alaska communities that would potentially be the most adversely impacted by the no-action alternative under low abundance conditions.

In both the quantitative indicators and regional/community summaries, information is presented on community engagement in the BSAI groundfish and the BSAI commercial and subsistence[22] halibut fisheries, and, to the limited extent data are available, sport halibut fisheries. Among Alaska communities, the patterns of engagement and the nature of engagement in the BSAI groundfish and halibut fisheries are quite different, with the communities engaged in the relevant BSAI groundfish fishery sectors are mostly a subset of a much larger set of communities engaged in the relevant halibut fisheries. Within this general pattern, there is considerable variation by region and, thus, different patterns of the likely distribution of potential beneficial or adverse impacts that may be expected to result from the proposed action alternatives.

4.3.3 The Geography of Community Engagement and Dependency

The location of the Alaska communities listed Table 3 and/or Table 6 and their proximity to the BSAI management areas and the halibut regulatory areas in the BSAI may be seen in Figure 1. This figure also includes:

- Alaska communities mentioned in Section 6.8 as being designated as the homeport of BSAI groundfish Amendment 80 catcher/processors (Table 65) and/or the Alaska communities of ownership address for the LLP licenses used on those vessels in 2019 (Table 66), the most recent year for which data are available.
- Alaska communities shown in the tables of Section 5.2 of this SIA as engaged in the BSAI/Area 4 commercial halibut fishery through being the community of ownership address of an annual average of 2.0 or more catcher vessels active in the fishery for the period 2010-2019 (Table 13) and/or noted in Section 5.3 as the location of one or more shore-based processors that accepted deliveries of BSAI halibut in any year during the period 2010-2019 (Table 18). Additionally, the four Alaska communities noted in the text of Section 5.2 as being engaged in the BSAI/Area 4 commercial halibut fishery through being the community of ownership address of an annual average of 1.0 or more but less than 2.0 catcher vessels active in the fishery for the period 2010-2019 are also shown on the figure.

[22] In federally managed waters within and offshore of Alaska, residents of communities in areas of Alaska determined as rural by the Federal Subsistence Board have preferential subsistence-use access to a range of resources, including halibut, over Alaska residents of areas determined as non-rural. Communities or areas of Alaska determined as non-rural include: Anchorage; the Fairbanks North Star Borough; the Homer, Kenai, and Seward Areas within the Kenai Peninsula Borough; Valdez; the Wasilla/Palmer Area within the Matanuska/Susitna Borough; the Juneau Area, and the Ketchikan Area (see https://www.doi.gov/sites/doi.gov/files/uploads/non_rural_areas_statewide.pdf, accessed 2/17/2021).

- Alaska communities noted in the CDQ regional discussions in Section 6 of this SIA as being the address of halibut individual quota shareholders as of 2020, the most recent year for which data are available (see Sections 6.1.5.2, 6.2.5.2, 6.3.5.2, 6.4.5.2, and 6.5.2.1).

Figure 1 does not include additional Alaska communities of residence of crew members aboard Amendment 80 catcher/processors noted Section 10.2 (Attachment B).

The location of the Seattle Metropolitan Statistical Area (Seattle MSA) may be seen in Figure 2. This figure also includes:

- Washington communities mentioned in the text and tables of Section 5.1 of this SIA as having at least minimal direct involvement in the BSAI groundfish Amendment 80 sector through being the community of ownership address of relevant catcher/processors active in the fishery in one or more years 2010-2019 (Table 9).
- Washington communities mentioned in Section 6.8 of this SIA as being designated as the homeport of relevant BSAI groundfish Amendment 80 catcher/processors (Table 65) and/or the communities of ownership address for the LLP licenses used on those vessels in 2019 (Table 66), the most recent year for which data are available.
- Washington communities noted in the tables and/or text in Section 5.2 of this SIA as engaged in the BSAI/Area 4 commercial halibut fishery through being the community of ownership address of an annual average of 2.0 or more catcher vessels active in the fishery for the period 2010-2019 (the Seattle MSA [Table 14] and the cities of Seattle and Everett, both of which are within the Seattle MSA). Additionally, the five Washington communities noted in the text of Section 5.2 as being engaged in the BSAI/Area 4 commercial halibut fishery through being the community of ownership address of an annual average of 1.0 or more but less than 2.0 catcher vessels active in the fishery for the period 2010-2019 are also shown on the figure.

Figure 2 does not include additional Washington communities of residence of crew members aboard Amendment 80 catcher/processors noted in Section 10.2 (Attachment B).

Figure 1. Map of Selected Alaska Communities, Federal Fishery Management Areas, and International Pacific Halibut Commission Regulatory Areas

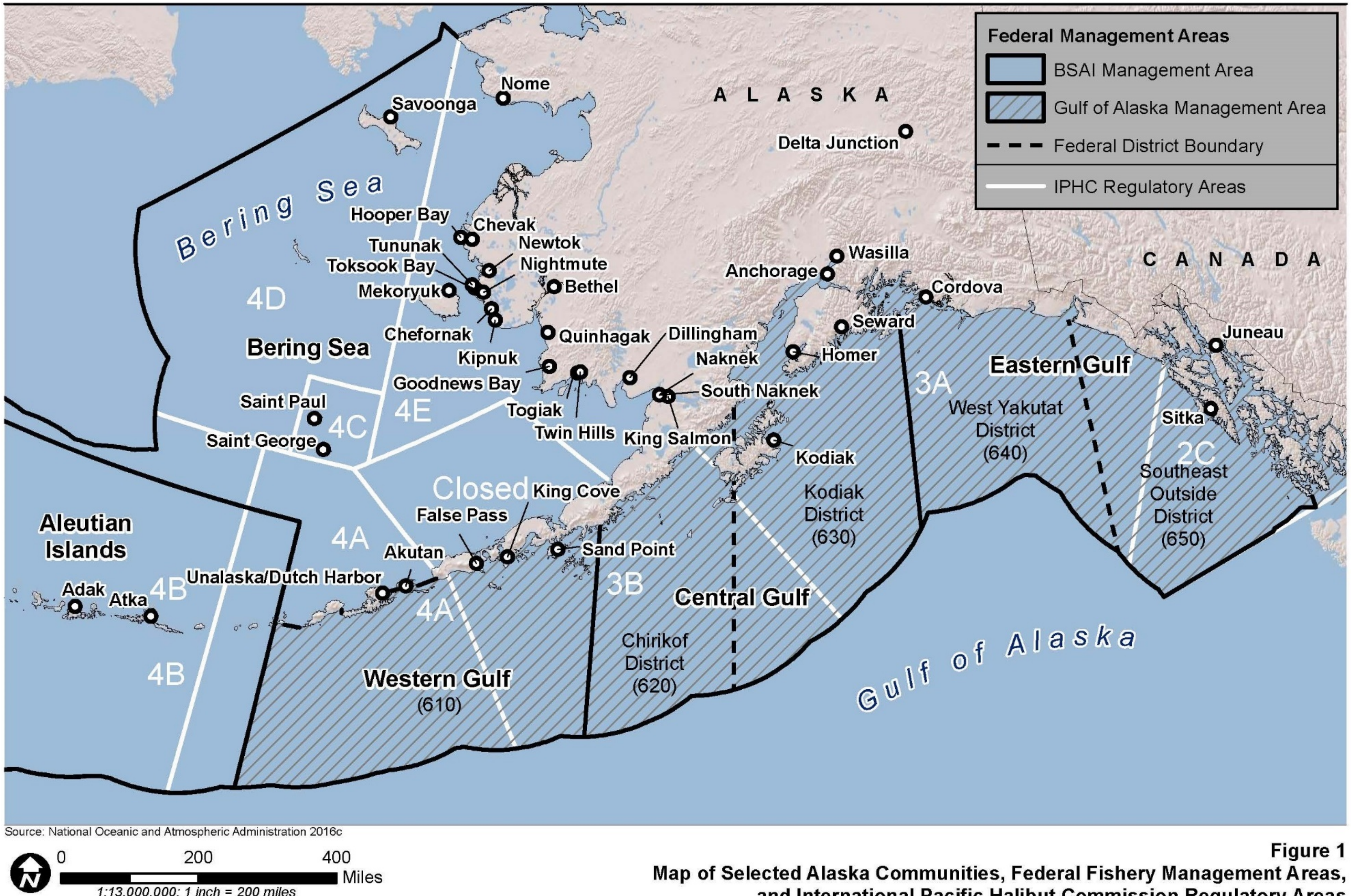

Figure 1
Map of Selected Alaska Communities, Federal Fishery Management Areas, and International Pacific Halibut Commission Regulatory Areas

Figure 2. Map of Selected Washington Communities

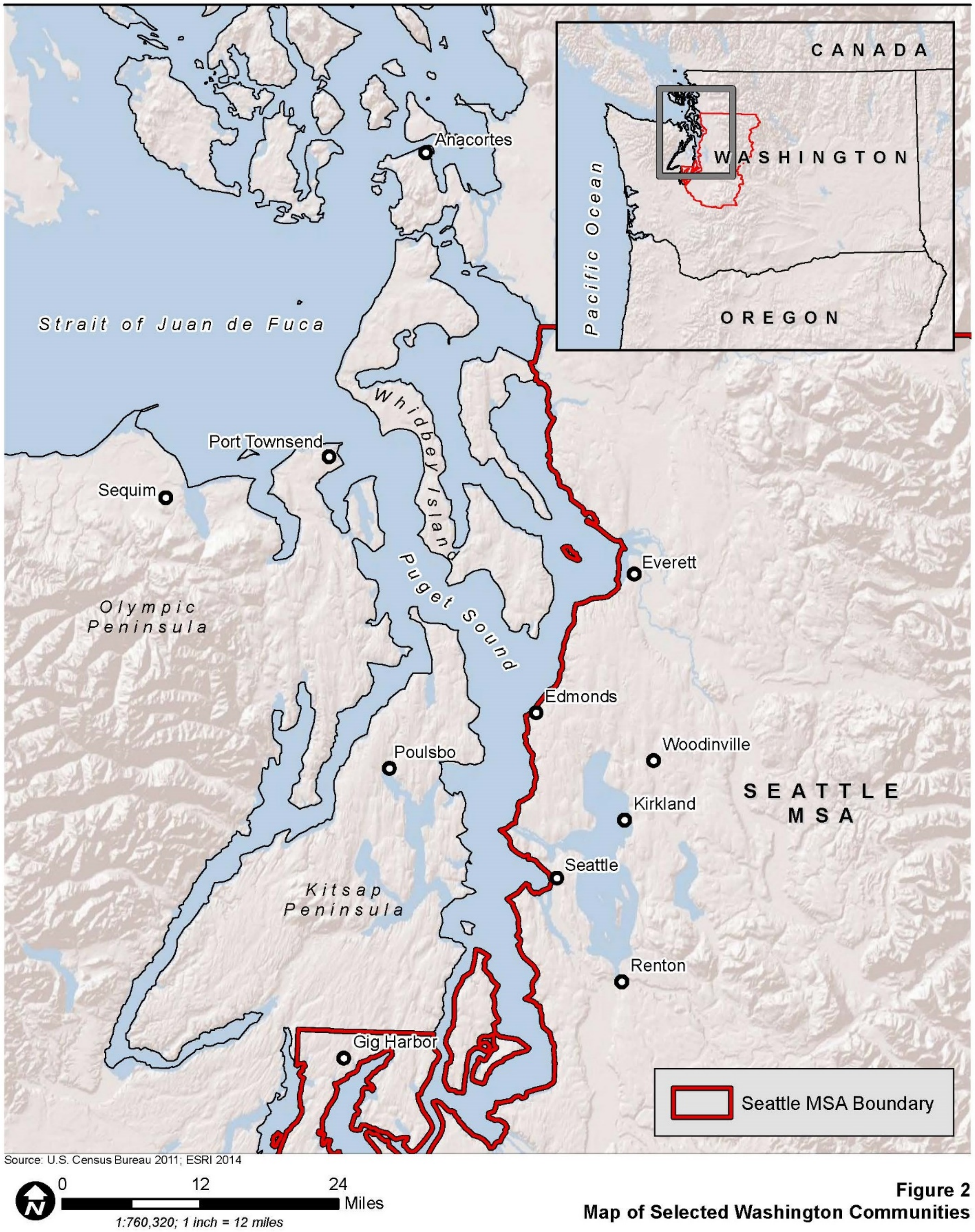

Figure 2
Map of Selected Washington Communities

4.4 Analysis of Alternatives

Section 7 provides a summary of potential community-level impacts by alternative. The analysis in that section is driven by the following components of the National Standard 8 guidelines:

- *The analysis should discuss each alternative's likely effect on the sustained participation of these fishing communities in the fishery.*
- *The analysis should assess the likely positive and negative social and economic impacts of the alternative management measures, over both the short and the long term, on fishing communities. Any particular management measure may economically benefit some communities while adversely affecting others. Economic impacts should be considered both for individual communities and for the group of all affected communities identified in the FMP.*[23]
- *A discussion of social and economic impacts should identify those alternatives that would minimize adverse impacts on these fishing communities within the constraints of conservation and management goals of the FMP, other national standards, and other applicable law (50 CFR 600.345).*

With respect to environmental justice foundational data presented by community in Section 6, for a minority population to be identified as one of potential concern, the proportion of minority residents in the geography being analyzed would need to be meaningfully greater than that of the general population and/or greater than 50 percent of the total population in the geography being analyzed. For a low-income population to be identified as of potential concern with respect to environmental justice analysis, the proportion of low-income residents in the geography being analyzed would need to be meaningfully greater than that of the general population. For analysis of Alaska, Washington, and Oregon communities (or groupings of communities), the general population(s) used as a benchmark are the total populations of their respective states, as shown in Table 7.[24]

[23] This portion of the National Standard 8 guidelines also includes the following: "*Impacts of both consumptive and non-consumptive uses of fishery resources should be considered.*" There are no known non-consumptive uses of BSAI non-CDQ Amendment 80 sector caught Pacific cod that would be relevant to this analysis. This topic is not considered further in this SIA.

[24] In this SIA, 2010 federal decennial census data are consistently used for total population, Native American/Alaska Native population, minority population, and group quarters population as it is the most recent data available for this set of variables that are comparable across the communities and regions in Alaska and the Pacific Northwest encompassed by the analysis. Data from the 2019 American Community Survey, another US Census Bureau product, are used for identifying low-income populations and selected per capita, household, and family income variables as these provide the most recent data available that are directly comparable across the communities and regions included in this analysis.

Table 7. States of Alaska, Washington and Oregon Selected Demographic Indicators

Geography	2010 Decennial Census Data				2019 American Community Survey Data				
	Total Population	Native American Residents (percent of total population)	Minority* Residents (percent of total population)	Residents Living in Group Quarters** (percent of total population)	Per Capita Income (dollars)	Median Household Income (dollars)	Number of Family Households	Median Family Income (dollars)	Low-Income*** Residents (percent of total population)
State of Alaska	626,932	14.1%	37.1%	1.8%	$36,787	$77,640	166,325	$92,588	10.7%
State of Washington	5,894,121	1.5%	27.5%	0.5%	$38,915	$73,775	1,841,954	$88,660	10.8%
State of Oregon	3,421,399	1.4%	21.5%	0.7%	$33,763	$62,818	1,016,766	$76,946	13.2%

*Defined as all persons other than those self-identied being in both "white" and "non-Hispanic" census categories.
**Defined as "other noninstitutional facilities," which excludes institutionalized populations, college/university student housing, and military quarters.
***Defined as those persons living below the poverty threshold by the U.S. Census Bureau in the 2015-2019 American Community Survey. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $26,246 in 2020.
Source: US Census 2010; US Census 2020

4.5 Data that would have been Useful but were Not Available

4.5.1 Useable Product Transfer Report Data to Establish Community Location and Relative Importance of Relevant Catcher/Processor Offloads

Communities may derive substantial benefits from being the location of catcher/processor offloads of product from the fisheries that may be affected by the proposed action alternatives. These potential benefits include shared state Fishery Resource Landing Tax revenues as well as support service provision related economic activity that may accompany catcher/processor port calls, such as fuel purchases, services related to crew changes, cold storage use, longshoring and stevedore services, logistical support services, and harbor services, among others. While no systematically collected time series data are available for fishery support service activities in the relevant fishing communities, as noted in Section 4.5.3, it would be useful to be able to gauge the relative importance of individual ports in overall patterns of catcher/processor offloads of product processed from the specific fisheries in question as well as the relative importance of those offloads to other economic activities within specific ports. Product Transfer Reports, required to be completed for such offloads and submitted to NOAA Fisheries Office of Law Enforcement, were identified as a potential key data source for identifying spatial patterns and order of magnitude attributes of these offloads. While Product Transfer Report data were obtained, it does not appear that the analysts can use these data to accurately estimate amounts of relevant offloads. One primary problem is with apparent errors in weights variously reported in pounds, metric tons, and kilograms. Specifically, a not uncommon apparent error are data entries that appear to have been made kilograms but with the units noted as metric tons, greatly overestimating the weight offloaded. To address in part the lack of useful Product Transfer Report data, the present analysis uses Alaska Department of Revenue Fishery Resource Landing Tax shared revenue data to identify Bering Sea/Aleutian Islands communities where relevant catcher/processor offloads likely take place.[25] It is important to note, however, that both Product Transfer Report data and Alaska Department of Revenue Fisheries Resource Landing Tax shared revenue data do not contain key fishery specific data that would be useful for the

[25] Regarding the relationship between Product Transfer Reports and the information reported to the Department of Revenue for taxation purposes, one firm contacted noted that they use an access database for fishery resource landing tax reports. Locations are drawn from what is reported on a trip basis on the Product Transfer Reports, while quantities of production are drawn from internal production reports that are generated daily.

current analysis, including the time of catch, location of catch, or program designation of the catch (e.g. American Fisheries Act [AFA]/Amendment 80/CDQ).

4.5.2 First Wholesale Value of Products Produced by BSAI Shore-Based Processors for Species Other Than Groundfish

Alaska Fisheries Information Network (AKFIN) staff have provided data to show the relative economic importance of species (and single species harvested in different area and gear fisheries) processed by shore-based processing plants that take deliveries of BSAI/Area 4 halibut. This shore-based processor "diversity" information is intended, in part, to provide quantitatively based insight into the level of engagement in and/or dependency on a particular fishery by shore-based processors operating in a given community or group of communities, as measured by gross or, better, net revenues.

Ideally, these comparisons of relative engagement/dependency would be made at the first wholesale level and reflect net income to the affected processors. However, at least two limitations in the available data prevent that approach. The first limitation is the lack of complete fixed cost and variable cost information to deduct from the gross revenue to calculate the gross margin. If only variable cost data were available, the contribution margin, or dollar contribution per unit, could be calculated. The lack of both types of cost data prevents the calculation of any measure of economic efficiency within or between sectors.

The second limitation results from a lack of comparable first wholesale gross revenue values across all species. AKFIN has reliable estimates of first wholesale gross revenues for groundfish species, but first wholesale gross revenue estimates for halibut, crab, herring, and salmon are less reliable. To generate the latter estimates, AKFIN staff must use value data from Commercial Operator Annual Report (COAR) forms and landings information from eLandings data. Previous attempts to generate comparable information by species have not provided results deemed sufficiently reliable for routine use in the analysis of management actions. Therefore, AKFIN staff provide comparisons of ex-vessel expenditures (i.e., ex-vessel gross revenues received from the processor by vessels making deliveries at the processor) by species/fishery for shore-based processor diversification comparisons in the absence of more useful data. Comparing ex-vessel value at the processor level, however, reflects a cost to the processor and not income. As a result, the comparison should be considered a very rough proxy for the analysis of the relative importance of each species or species group to the economic viability of processing firms and, by extension, to the communities in which they operate.

4.5.3 Systematically Collected Time Series Data on Fisheries Support Service Sector Entities and Community Patterns of Catcher Vessel, Catcher/Processor, and Shore-Based Processor Expenditures

No systematically collected time series data are available for fishery support service activities in the relevant fishing communities. While comprehensive fishing community profiles of Adak, Unalaska/Dutch Harbor, Akutan, King Cove, Kodiak, Sand Point, St. George, and St. Paul are available and contain detailed information on fishery support service businesses, these profiles are now dated to varying degrees.[26] Compiled in part using ethnographic research in each community, these profiles include operational profiles and qualitative employment information for attempted 100 percent samples of locally identified direct fishery support service businesses in all communities except Kodiak, where representative samples were sought.

[26] While no updated community profiles are yet available, supplemental information was collected in Unalaska/Dutch Harbor and Akutan in July 2019 and informed this analysis.

If systematically collected time series data on catcher vessel, catcher/processor, and shore-based processor support service expenditures by community and type of service provider were available, more accurate social and economic analyses of sector and community impacts would be possible, including a more accurate picture of local multipliers for fishery related expenditures. Additionally, this type of information would help in associating vessels with particular communities based on quantitative data for the purposes of social impact assessment as a supplement to, if not a replacement for, assigning vessels to communities based on for example, ownership address, homeport, or LLP license ownership address as proxies for revenue flows.

As previously noted (Section 4.5.1), in the case of Amendment 80 vessels, useable Product Transfer Report data are not available. Port call data are available, as shown in Table 8, but no information is available on the nature and magnitude of local expenditures related to these port calls.[27]

Table 8. Amendment 80 Catcher/Processor Port Calls, 2010-2019

Community	2010	2011	2013	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)
Adak	36	19	23	21	15	20	32	46	42	36	29.0	11.6%
Atka	0	0	0	0	0	6	6	1	5	0	1.8	0.7%
Sand Point*	0	1	1	0	0	1	0	0	0	0	0.3	0.1%
St Paul	4	2	3	24	3	8	0	1	7	3	5.5	2.2%
Togiak	0	0	0	0	16	35	36	20	40	36	18.3	7.3%
Unalaska/Dutch Harbor	186	214	196	181	156	165	154	151	131	154	168.8	67.3%
Kodiak	0	1	0	0	0	0	0	0	0	0	0.1	0.0%
Other/Unknown	54	58	56	18	25	10	11	10	11	13	26.6	10.6%
Transfer at Sea	4	0	0	0	0	0	1	0	0	0	0.5	0.2%
Total	**284**	**295**	**279**	**244**	**215**	**245**	**240**	**229**	**236**	**242**	**250.9**	**100.0%**

*Sand Point is grouped with the "BSAI" communities for this indicator due to its location in the Aleutians East Borough.
Source: Observer report data summarized by AKFIN.

4.5.4 Crew Employment and Income Data for Halibut Catcher Vessels and Halibut Shore-Based Processors

Economic Data Report (EDR) data are available for the BSAI groundfish Amendment 80 sector vessel crew employment and earnings and are utilized in this analysis. However, no EDR or similar data on catcher vessel crew employment and earnings are available for BSAI/Area 4 halibut fishery, nor are employment and earnings data for shore-based processors accepting deliveries of BSAI/Area 4 halibut. This lack of data represents a substantial impediment to a comprehensive analysis of the human dimensions of the fishery and the community footprint of potential social impacts associated with the proposed management actions.

[27] While St. Paul is shown in Table 8 as having the fourth largest number of Amendment 80 port calls among Alaska communities on an annual average basis 2010-2019, it does not appear in Table 3 as a catcher/processor product transfer location. This is because in the case of St. Paul, Fishery Resource Landing Tax revenues were less than five percent of the combined total of Fishery Business Tax + Fishery Resource Landing Tax revenue distributed to the community by the Alaska Department of Revenue on an annual average basis 2010-2019 (i.e., the screening criteria for inclusion in Table 3).

4.5.5 Current Data on Subsistence Harvest and Use of Halibut

Subsistence use of halibut (and Pacific cod) has deep roots and remain important parts of the social, cultural, and economic fabric of life in the communities of the BSAI region. Halibut (and Pacific cod) shows up as a resource in the archaeological record and patterns of use continue to evolve. In several of the communities of central focus for the BSAI groundfish portion of this analysis (Unalaska/Dutch Harbor, Atka, and Togiak), commercial and subsistence fisheries are intertwined. For example, while multiple species are still retained for subsistence or personal use from commercial catch, recent work (Reedy-Maschner and Maschner 2012) finds a substantial amount of a range of wild foods formerly harvested are now purchased or increasingly purchased. Pacific cod in particular is often purchased from processors after being de-wormed (Reedy 2016). Some of these purchases are from processors operating in the community, while others are not.

For the BSAI/Area 4 halibut portion of the analysis, there is clear regional variation in the amounts of halibut harvested for subsistence relative to the amounts of all fish harvested for subsistence. For example, Alaska Department of Fish and Game (ADFG) Community Subsistence Information System (CSIS) data suggest that in the Pribilof communities of St. George and St. Paul, which bridge the Aleutian Pribilof Islands Community Development Association (APICDA) and Central Bering Sea Fishermen's Association (CBSFA) regions, respectively, halibut is in the mid-80s as a percentage of pounds of all subsistence fish harvested. For other key communities in the APICDA region, analogous halibut as a percentage of all subsistence fish harvested figures range from the mid-20s to the mid-40s (Table 35; see Table 42 for St. Paul) In contrast, the analogous figures for key communities in the Coastal Villages Region Fund (CVRF), Norton Sound Economic Development Corporation (NSEDC), and Bristol Bay Economic Development Corporation (BBEDC) regions, with one exception, range from 12 to 7 percent (Table 50), to 8 percent (Table 56), to less than one percent (Table 63), respectively, with the exception being the CVRF community of Mekoryuk at 36 percent. It is critical to note, however, that CSIS type of data do not exist for multiple communities and that much of the available data are now dated (some of it being more than 30 years old).

It is also important to note that often percentage of subsistence harvest figures are of limited utility when a relatively low-volume resource may be of critical importance at a particular time of year or at particular points of longer relative scarcity/abundance cycles of other resources. While there are no direct impacts anticipated to halibut subsistence because of the proposed alternatives, indirect and/or cumulative impacts could occur. Further, baseline information on the retention of subsistence halibut from commercial fisheries harvest in some of the key commercial fishing communities relevant to the proposed management actions is unavailable. Together, this lack of data limits the ability to fully analyze potential interactive commercial and subsistence fishery impacts of the proposed fishery management alternatives.

4.5.6 Local Knowledge and Traditional Knowledge

Per National Standard 2 – Scientific Information (a)(6)(ii)(C):

> *Relevant local and traditional knowledge (e.g., fishermen's empirical knowledge about the behavior and distribution of fish stocks) should be obtained, where appropriate, and considered when evaluating the BSIA* [best scientific information available] (50 CFR 600.315[28])

There are no known peer-reviewed, published sources of local knowledge (LK) or traditional knowledge (TK) that would directly inform the analysis of the management actions being analyzed in this document,

[28] The National Standard 2 guidelines referenced in this SIA, current as of February 12, 2021, are from the Electronic Code of Federal Regulations (CFR) Title 50, Chapter VI, Part 600, Subpart D, Section 600.315 (cited as 50 CFR 600.315) are available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=6b0acea089174af8594db02314f26914&mc=true&r=SECTION&n=se50.12.600_1315 accessed 2/17/2021.

based in part on the nature of the proposed action alternatives. In short, the nature of the proposed action alternatives makes determining appropriate potential sources of LK or TK that would inform management decision making on the action alternatives challenging.

For the Amendment 80 fishery, however, relevant LK information, compiled by Council staff and derived from interviews and other correspondence with sector participants as well as from written and oral public testimony, has been presented in the “Operations and Annual Planning” discussion in the “Amendment 80 Fishery Description” in DEIS Section 3.3.3. The information presented in that section provides, among other things, insight into the range of opportunities and constraints faced by Amendment 80 vessel operators over the course of a fishing year, which may offer insights into the practicability of a range of adaptive responses to the range of halibut PSC limit reductions under the proposed alternatives.

For the BSAI/Area 4 directed halibut fishery, LK and/or TK that could inform the analysis of direct impacts of the proposed management actions on specific communities or sets of communities may well exist, but detailed information is not currently known to have been documented or have been otherwise readily available to or accessible by the study team.[29] Section 7.2.6 of this SIA (Potential Cumulative Small/Rural Community and Cultural Context Issues) does, however, provide descriptions of non-economic social and cultural aspects of the importance of halibut fishing for coastal Bering Sea communities for which secondary data are available. Staff also reached out to regional points of contact connected with BSAI communities and Alaska Native organizations for identification of potential additional data sources, as noted in that discussion. The purpose of that portion of the analysis is to convey the cultural significance of the BSAI halibut resource and to help inform the analysis of potential cumulative impacts of the no-action and proposed action alternatives, with the halibut fishing related descriptions of values and perceptions in that portion of the analysis being based on LK, TK, and the social science of LK.

Staff also reached out to points of contact connected with the Amendment 80 fishery but no similar information on the non-economic social and cultural aspects of fishing, including employment in the fishery as an integral part of self-identity, appears to be available for those serving aboard Amendment 80 vessels. Were those types of data to be available, they would likely have been useful to the Council in making more explicit the balance of impacts to the fisheries and communities that are potentially directly and indirectly affected by the proposed action alternatives.

[29] There is some limited general spatial information available on halibut commercial and subsistence fishing areas as well as areas of potential growth for commercial halibut fishery based on interviews in the Bering Straits region (Bering Sea Elders Advisory Group, 2011). Additionally, the Kawerak Subsistence Program produced a Bering Strait Region Local and Traditional Knowledge Pilot Project report (Ahmasuk, et al, 2008) that included tabular information on estimated harvest and use of non-salmon fish (including halibut) by community as well as availability of non-salmon fish (including halibut) by community, but that information is now considered out of date by current staff. Kawerak has produced a more recent report on local ecological knowledge of non-salmon fish used for subsistence in the Bering Strait Region (Raymond-Yakoubian, 2013) and this report includes information on how the 2009-2010 fishing season compared to previous years by community; percentage of surveyed households by community that tried to harvest, harvested, used, gave away, or received non-salmon fish, including halibut, during the 2009-2010 survey period; and total estimated harvest of non-salmon fish by community 2009-2010. While the information on halibut specifically is not especially detailed, this report does contain some contextual narrative that is not present in the other reports mentioned.

5 Quantitative Indicators of Community Fishery Engagement and Dependency

The sections below provide quantitative participation information, within the bounds of confidentiality restrictions, for the communities most directly engaged in and dependent on relevant sectors of the BSAI groundfish and halibut fisheries. Specifically, Sections 5.1 through 5.3 include a series of tables containing a range of quantitative information describing the distribution of sector-specific community engagement (or participation) in and dependency (or reliance) on the directed commercial BSAI groundfish and/or halibut fisheries for the following sectors:

- BSAI groundfish Amendment 80 sector catcher/processors (Section 5.1)
- BSAI halibut catcher vessels (Section 5.2)
- BSAI shore-based processors operating in Alaska accepting BSAI halibut deliveries (Section 5.3)

Additionally, this section also summarizes community and regional engagement in the BSAI halibut subsistence fishery (Section 5.4) and the BSAI sport halibut fishery (Section 5.5).

This information is summarized, on a regional/community basis, in the region/community specific discussions in Section 6 of this document.

5.1 BSAI Groundfish Amendment 80 Sector Trawl Catcher/Processors

The following series of tables provide a series of quantitative indicators of Amendment 80 sector engagement in and dependency on the BSAI groundfish fishery, by community and/or regional geography of ownership address depending on data confidentiality restrictions, as noted in the following paragraphs.[30]

Table 9 provides a count, by community of ownership address and year (2010-2019), of BSAI Amendment 80 groundfish trawl catcher/processors for the Seattle MSA, all other Washington communities, and "all other states" (all states other than Alaska, Washington, and Oregon) combined, along with annual average counts and percentages and the total number of unique vessels. There were no BSAI Amendment 80 catcher/processors with Alaska or Oregon ownership addresses active during the 2010-2019 period. As shown, the largest component of fleet ownership during any given year is, by far, the Seattle MSA, which included all vessels with Washington ownership addresses in the most recent nine years for which data are available (annually averaging over 80 percent of all participating vessels), followed by "all other states" combined (annually averaging under 20 percent of all participating vessels). Within the Seattle MSA, three different cities appear as ownership addresses in the 2010-2019 data. Renton appears as an ownership address for three vessels in 2011, four vessels in each year 2012-2016, and two vessels in 2017, while two vessels with Kirkland ownership addresses appear in the data each year 2013-2019. Seattle itself otherwise accounts for the balance of Seattle MSA ownership addresses for 2010-2019. In the most recent three years for which data are available, vessels with "all other states" ownership addresses accounted for about one-quarter of the active Amendment 80 fleet.

Table 10 provides BSAI Amendment 80 groundfish trawl catcher/processor first wholesale gross revenue information by community of ownership address and year (2010-2019) to the extent possible within data

[30] It is also important to note that ownership of Amendment 80 vessels active in the fisheries relevant to this analysis in one or more years over the 2010-2019 period has included ownership in part by the NSEDC CDQ group (5 different vessels, see Table 57).

confidentiality restrictions, along with annual averages in terms of dollars and percentages. This table clearly shows the concentration of the fleet first wholesale gross revenues in the Seattle MSA (annually averaging 80 percent of the sector total); the values for all other Washington communities plus all other states needed to be combined to show a grand total that would have otherwise been precluded by confidentiality restrictions.

Table 11 provides information on BSAI Amendment 80 groundfish catcher/processor dependency on BSAI groundfish compared to all other areas, species, and gear types fished by those same vessels. As shown, dependency on BSAI groundfish, as measured in percentage of annual average 2010-2019 total first wholesale gross revenues, was about 80 percent for Seattle MSA ownership address vessels. BSAI Amendment 80 groundfish catcher/processors with Washington ownership addresses outside of the Seattle MSA and in all other states combined showed about 97 percent dependency on the relevant fishery.

Table 12 provides information on "community catcher/processor fleet" dependency on BSAI Amendment 80 groundfish first wholesale gross revenue compared to all other areas, gear types, and species fished by the "community catcher/processor fleet" to the extent possible given data confidentiality restrictions (with the "community catcher/processor fleet" defined as all commercial catcher/processors with ownership addresses in the communities with at least one vessel active in the BSAI Amendment 80 sector at any time 2010-2019). BSAI Amendment 80 groundfish first wholesale gross revenues accounted for approximately one-quarter of Seattle MSA "community catcher/processor fleet" first wholesale gross revenues on an annual average basis over the years 2010-2019, while they accounted for nearly the entire "community catcher/processor fleet" total for all other participating communities, with this difference due, no doubt, to the much larger and more diversified catcher/processor fleet in the Seattle MSA.

Table 9. Individual Amendment 80 Trawl Catcher/Processors by Community of Vessel Historical Ownership Address, 2010-2019 (number of vessels)

Geography	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Total Unique CPs 2010-2019 (number)
Seattle MSA	16	17	16	15	15	15	16	14	14	15	15.3	80.53%	19
Sequim	1	0	0	0	0	0	0	0	0	0	0.1	0.53%	1
Washington Total	17	17	16	15	15	15	16	14	14	15	15.4	81.05%	20
All Other States Total	3	3	3	3	3	3	3	5	5	5	3.6	18.95%	5
Grand Total	**20**	**20**	**19**	**18**	**18**	**18**	**19**	**19**	**19**	**20**	**19.0**	**100.00%**	**24**

*Seattle MSA includes all communities in King, Pierce, and Snohomish counties (Kirkland, Renton, and Seattle are represented as active in the 2010-2019 data).

Note: Due to CP ownerhship movement between communities over the years shown, total unique CPs per community or state may not sum to state or grand totals.

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

Table 10. BSAI Amendment 80 Trawl Catcher/Processor First Wholesale Gross Revenues by Community of Vessel Historical Ownership Address, 2010-2019 (millions of 2018 real dollars)

Geography	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 ($ millions)	Annual Average 2010-2019 (percent)
Seattle MSA	$272.64	$325.18	$336.71	$258.31	$269.55	$247.16	$263.54	$259.59	$270.81	$232.72	$273.62	80.45%
Other WA and Other States	$51.15	$59.97	$60.82	$49.27	$47.38	$43.29	$42.96	$99.77	$108.64	$101.82	$66.51	19.55%
Grand Total	**$323.79**	**$385.15**	**$397.53**	**$307.58**	**$316.93**	**$290.45**	**$306.50**	**$359.36**	**$379.44**	**$334.54**	**$340.13**	**100.00%**

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

Table 11. BSAI Groundfish Trawl Catcher/Processor First Wholesale Gross Revenue Diversification by Community of Vessel Historical Ownership Address, All Communities, 2008-2019 (millions of 2018 real dollars)

Geography	Annual Average Number of BSAI Amendment 80 Trawl CPs 2010-2019	BSAI Amendment 80 Trawl CPs Annual Average First Wholesale Gross Revenues from BSAI Trawl-Caught Groundfish Only 2010-2019 ($ millions)	BSAI Amendment 80 Trawl CPs Annual Average Total First Wholesale Gross Revenues from All Area, Gear, and Species Fisheries 2010-2019 ($ millions)	BSAI Amendment 80 Trawl CPs BSAI Trawl-Caught Groundfish First Wholesle Gross Revenue as a Percentage of Total First Wholesale Gross Revenue Annual Average 2010-2019
Seattle MSA	15.4	$273.62	$340.38	80.39%
Other WA and Other States	3.6	$66.51	$68.34	97.31%
Grand Total	19.0	$340.13	$408.72	83.22%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

Table 12. BSAI Amendment 80 Catcher/Processor and All Catcher/Processor First Wholesale Gross Revenue Diversification by Community of Vessel Historical Ownership Address, 2008-2019 (millions of 2018 real dollars)

Geography	Annual Average Number of BSAI Amendment 80 Trawl CPs 2010-2019	Annual Average Number of All Commercial Fishing CPs in those Same Communities (the "Community CP Fleet") 2010-2019	All Commercial Fishing CPs Annual Average First Wholesale Gross Revenues from BSAI Trawl-Caught Amendment 80 Only 2010-2019 ($ millions)	All Commercial Fishing CPs Annual Average Total First Wholesale Gross Revenues from All Area, Gear, and Species Fisheries 2010-2019 ($ millions)	All Commercial Fishing Amendment 80 CPs BSAI Trawl-Caught Groundfish First Wholesale Gross Revenue as a Percentage of Total First Wholesale Gross Revenue Annual Average 2010-2019
Seattle MSA	15.4	50.3	$273.62	$1,115.06	24.54%
Other WA and Other States	3.6	3.6	$66.51	$68.34	97.31%
Grand Total	19.0	53.9	$340.13	$1,183.41	28.74%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

5.2 BSAI/Area 4 Halibut Catcher Vessels

The following tables provide a series of quantitative indicators of sector engagement in and dependency on the BSAI halibut fishery, by community and/or regional geography depending on data confidentiality restrictions, for BSAI halibut catcher vessels with local ownership addresses, as noted in the following paragraphs. For Alaska communities, overall community catcher vessel fleet dependency is also shown to the extent possible within data confidentiality restrictions.

Table 13 provides a count, by community of ownership address and year (2010-2019), of BSAI halibut catcher vessels for all Alaska communities with annual average participation of 2.0 or more vessels for this time period, plus Adak; Table 14 provides similar information for the Seattle MSA; state totals for Alaska and Washington; and for Oregon and all other states combined, along with annual average counts and percentages. As shown in these two tables, vessel ownership among states is heavily concentrated in Alaska, while within Alaska ownership is distributed across numerous communities. In addition to the 25 Alaska communities named in the table, four Alaska communities[31] saw an average of at least 1.0 but less than 2.0 vessels participating annually; another 21 Alaska communities appear in the data as participating in fishery at least a minimal level sometime during this time span (i.e., from 0.1 to 0.9 vessels, inclusive, on an annual average basis). As discussed in Section 6, marked downward trends in catcher vessel participation are seen in recent years in multiple Alaska communities and regions, none more obvious than among the communities within the CVRF region.

The only communities outside of Alaska with an annual average 2010-2019 of 2.0 or more catcher vessels with local ownership addresses active in the BSAI/Area 4 halibut fishery are the cities of Seattle and Everett, Washington (averaging 11.0 and 2.3 active vessels per year, respectively), both of which are in the Seattle MSA. Four other communities within the Seattle MSA (Edmonds, Gig Harbor, and Woodinville) and two other Washington communities outside of the Seattle MSA (Port Townsend and Poulsbo) had an annual average 1.0 or more but less than 2.0 vessels with local ownership addresses active in the fishery on an annual average basis 2010-2019. A total of 17 other Washington and three Oregon communities appear in the data as active in the fishery, each with an annual average level of engagement of less at 1.0 active catcher vessels per year. Other states represented in the data include California, Colorado, Florida, and Utah, each with state-wide annual average engagement levels 2010-2019 of less than 2.0 vessels.

Table 15 provides BSAI halibut catcher vessel ex-vessel gross revenue information by ownership address community and year (2010-2019) to the extent possible within data confidentiality restrictions, along with annual averages in terms of dollars and percentages. For Alaska, relatively high ex-vessel gross revenue communities (over $1 million) include Anchorage/Wasilla/Palmer, Homer, Juneau/Douglas/Sitka,[32] and Kodiak, four communities or groups of communities located in the GOA region,[33] along with St. Paul and Unalaska/Dutch Harbor in the BSAI region. This table clearly shows the concentration of the fleet ex-vessel values within Alaska compared to other states and within in the Seattle MSA for states outside of Alaska.

[31] Chevak (CVRF region), Cordova and Seward (GOA region), and Delta Junction (Interior region).

[32] As noted in Section 4.3.2, Anchorage, Wasilla/Palmer, Homer, and Juneau/Douglas have been determined as non-rural areas by the Federal Subsistence Board for the purposes of subsistence resource management.

[33] While among the top communities in terms of local ownership address total catcher vessel halibut ex-vessel gross revenues, BSAI halibut ex-vessel gross revenues account for less than four percent of total community fleet all area, species, and gear type fisheries ex-vessel gross revenues combined for each of these communities or groups of communities (and less than three percent in two of the four communities or groups of communities), as shown in Table 17.

Table 16 provides information on BSAI halibut catcher vessel dependency on BSAI halibut compared to all other areas, gear types, and species fished by those same vessels, to the extent possible given confidentiality restrictions. As shown, dependency on BSAI halibut, as measured in percentage of total ex-vessel revenues, ranged widely across geographies, but dependency ranging between 85 and 100 percent is seen for halibut is seen in multiple communities across four Alaska regions.

Table 17 provides information on Alaska community catcher vessel fleet dependency on BSAI halibut compared to all other areas, gear types, and species fished by those vessels with ownership addresses in that same community to the extent possible given data confidentiality restrictions. (This table includes all commercial fishing catcher vessels, not just vessels that participate in the BSAI halibut fishery for those communities that had at least local ownership address BSAI halibut catcher vessel participating in any year 2010-2019.) As shown, community fleet dependency on BSAI halibut for four of the six highest BSAI halibut ex-vessel gross revenue producing Alaska communities of Anchorage/Wasilla/Palmer, Homer, Juneau/Douglas/Sitka, and Kodiak ranges between 2.1 and 3.5 percent; for the other two relatively high-producing Alaska communities of St. Paul and Unalaska/Dutch Harbor, dependency of the overall local fleet was 99 percent and 38 percent, respectively. Among some communities with lower halibut harvest levels (and smaller community fleets), local fleet dependency on halibut was also high (e.g., Adak/Atka 86 percent, St. George 100 percent, and Savoonga 100 percent). The CVRF region communities represent a special case, with discontinuation of participation in the fishery partway through the 2010-2019 period, as discussed in Section 6.3.

Table 13. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, Alaska Communities, 2008-2019 (number of vessels)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
APICDA	Adak*	1	1	1	1	0	1	0	0	0	1	0.6	0.3%	3
APICDA	Akutan	4	3	5	3	4	3	3	1	1	1	2.8	1.6%	6
APICDA	Atka	3	3	4	5	5	4	3	3	0	0	3.0	1.7%	7
APICDA	Saint George Island	3	6	6	4	6	5	5	4	5	5	4.9	2.7%	8
APICDA	Unalaska/Dutch Harbor*	10	9	9	8	6	7	7	5	8	7	7.6	4.2%	16
APICDA	**Regional Subtotal**	**21**	**22**	**25**	**21**	**21**	**20**	**18**	**13**	**14**	**14**	**18.9**	**10.5%**	**39**
CBSFA	**Saint Paul Island**	**18**	**18**	**17**	**16**	**16**	**13**	**12**	**14**	**14**	**12**	**15.0**	**8.3%**	**24**
CVRF	Chefornak	23	21	8	20	2	0	0	0	0	0	7.4	4.1%	34
CVRF	Hooper Bay	7	9	9	11	0	0	0	0	0	0	3.6	2.0%	14
CVRF	Kipnuk	20	24	20	19	0	0	0	0	0	0	8.3	4.6%	37
CVRF	Mekoryuk	28	29	24	24	12	0	0	0	0	0	11.7	6.5%	34
CVRF	Newtok	8	8	8	10	1	0	0	0	0	0	3.5	1.9%	17
CVRF	Nightmute	5	8	7	4	2	0	0	0	0	0	2.6	1.4%	10
CVRF	Quinhagak	2	8	9	16	0	0	0	0	0	0	3.5	1.9%	18
CVRF	Toksook Bay	33	39	30	31	8	0	0	0	0	0	14.1	7.8%	54
CVRF	Tununak	27	29	26	28	2	0	0	0	0	0	11.2	6.2%	41
CVRF	All Other CVRF Region	5	6	9	15	0	0	0	0	0	0	3.5	1.9%	16
CVRF	**Regional Subtotal**	**158**	**181**	**150**	**178**	**27**	**0**	**0**	**0**	**0**	**0**	**69.4**	**38.5%**	**275**
NSEDC	Nome	8	8	7	4	5	5	5	7	6	5	6.0	3.3%	13
NSEDC	Savoonga	11	10	14	13	13	13	10	10	7	10	11.1	6.2%	34
NSEDC	All Other NSEDC Region	0	0	2	0	1	0	0	0	0	1	0.4	0.2%	4
NSEDC	**Regional Subtotal**	**19**	**18**	**23**	**17**	**19**	**18**	**15**	**17**	**13**	**16**	**17.5**	**9.7%**	**51**
BBEDC	Dillingham	0	1	2	3	2	2	2	3	4	4	2.3	1.3%	10
BBEDC	Togiak	8	12	16	10	13	13	14	13	12	13	12.4	6.9%	31
BBEDC	All Other BBEDC Region	2	0	3	1	0	1	3	5	4	6	2.5	1.4%	15
BBEDC	**Regional Subtotal**	**10**	**13**	**21**	**14**	**15**	**16**	**19**	**21**	**20**	**23**	**17.2**	**9.5%**	**56**
GOA	Anchorage	2	2	3	2	1	3	2	2	2	2	2.1	1.2%	6
GOA	Homer	12	14	15	13	11	11	12	15	15	14	13.2	7.3%	30
GOA	Juneau/Douglas	5	5	4	4	4	4	4	1	1	0	3.2	1.8%	7
GOA	Kodiak	16	12	13	11	10	10	13	11	10	11	11.7	6.5%	24
GOA	Sitka	7	8	5	2	2	3	3	3	3	3	3.9	2.2%	9
GOA	Wasilla	1	3	3	2	2	2	2	2	2	2	2.1	1.2%	4
GOA	All Other GOA Region	5	5	6	3	3	4	3	3	4	3	3.9	2.2%	17
GOA	**Regional Subtotal**	**48**	**49**	**49**	**38**	**34**	**37**	**39**	**37**	**37**	**35**	**40.3**	**22.4%**	**97**
Interior	**Regional Subtotal**	**2**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**3**	**1.9**	**1.1%**	**4**
ALASKA	**State Subtotal**	**276**	**303**	**286**	**285**	**134**	**106**	**105**	**104**	**100**	**103**	**180.2**	**100.0%**	**541**

*Denotes communities within a CDQ region that are not themselves CDQ communities. Communities listed by name include those with an annual average of at least 2.0 vessels with local ownership addresses active in the fishery, plus Adak, which was identified by the community dependency exercise as a BSAI halibut dependent community based on a combination of factors.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 14. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, All Regions, 2008-2019 (number of vessels)

Region	Community*	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
Alaska	(see previous table)	276	303	286	285	134	106	105	104	100	103	180.2	85.4%	541
	Seattle MSA	25	25	22	24	19	20	21	18	18	15	20.7	9.8%	36
	Other Washington	7	7	5	5	5	5	5	5	3	4	5.1	2.4%	10
Washington	State Subtotal	32	32	27	29	24	25	26	23	21	19	25.8	12.2%	44
Oregon	State Subtotal	3	3	2	2	1	1	1	1	0	0	1.4	0.7%	5
Other States	Subtotal	2	2	4	4	4	3	4	4	5	5	3.7	1.8%	7
Grand Total		**313**	**340**	**319**	**320**	**163**	**135**	**136**	**132**	**126**	**127**	**211.1**	**100.0%**	**587**

*The only communities outside of Alaska with an annual average of at least 2.0 vessels with local ownership addresses active in the fishery are the cities of Seattle and Everett, Washington (averaging 11.0 and 2.3 active vessels per year, respectively). A total of 15 communities within the Seattle MSA and a total of nine other Washington communities were active in the fishery with at least one vessel in one year 2010-2019. A total of three Oregon communities appear in the data as well (Gold Beach, Waldport, and Warrenton). Other states at least minimally represented in the data include California, Colorado, Florida, and Utah.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 15. BSAI Halibut Catcher Vessels Ex-Vessel Gross Revenues by Community of Vessel Historical Ownership Address, 2010-2019 (thousands of 2018 real dollars)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 ($ thousands)	Annual Average 2010-2019 (percent)
APICDA	AdakAtka**	$561	$989	$507	$648	$156	$380	$196	*	*	*	$358	1.4%
APICDA	Akutan	$264	$397	$196	$71	$88	$114	$99	*	*	*	$142	0.5%
APICDA	Saint George Island	$106	$214	$50	$198	$238	$229	$168	*	*	*	$192	0.7%
APICDA	Unalaska/Dutch Harbor	$2,462	$2,834	$1,877	$1,261	$1,164	$1,847	$1,608	$1,880	$1,407	$1,561	$1,790	6.8%
CBSFA	Saint Paul Island	$3,426	$4,527	$3,300	$2,300	$2,015	$1,712	$1,662	$1,881	$1,485	$1,496	$2,380	9.0%
CVRF	Hooper Bay	$23	$25	$24	$25	$0	$0	$0	$0	$0	$0	$10	0.0%
CVRF	Kipnuk	$51	$85	$43	$75	$0	$0	$0	$0	$0	$0	$25	0.1%
CVRF	Mekoryuk	$453	$618	$299	$301	$59	$0	$0	$0	$0	$0	$173	0.7%
CVRF	Toksook Bay	$429	$562	$499	$460	$100	$0	$0	$0	$0	$0	$205	0.8%
CVRF	All Other CVRF	$256	$433	$233	$346	$56	$0	$0	$0	$0	$0	$132	0.5%
NSEDC	Savoonga	$227	$157	$345	$151	$193	$53	$132	$146	$176	$347	$193	0.7%
NSEDC	Nome & All Other NSEDC	$253	$484	$267	$95	$145	$191	$239	$569	$212	$405	$286	1.1%
BBEDC	Togiak	$106	$213	$193	$146	$124	$165	$223	$270	$152	$105	$170	0.6%
BBEDC	Dillingham & All Other BBEDC	*	*	$13	$19	*	$72	$158	$148	$105	$168	$87	0.3%
GOA	Anchorage/Wasilla/Palmer**	$1,653	$5,140	$2,151	$1,017	$1,325	$1,530	$2,301	$2,158	$1,212	$1,554	$2,004	7.6%
GOA	Homer	$2,719	$4,998	$3,697	$1,767	$1,743	$2,286	$2,950	$3,323	$2,248	$1,955	$2,768	10.5%
GOA	Juneau/Douglas/Sitka**	$3,800	$6,405	$2,838	$1,122	$2,050	$1,986	$1,874	$830	$608	$535	$2,205	8.4%
GOA	Kodiak	$4,837	$5,379	$2,887	$2,287	$1,759	$2,087	$2,594	$2,119	$1,588	$1,568	$2,710	10.3%
Other GOA/Other AK	All Other GOA & All Other AK	*	*	$1,151	$709	*	$1,290	$1,358	$1,293	$1,150	$994	$1,264	4.8%
Alaska	State Subtotal	**$23,593**	**$35,626**	**$20,568**	**$12,997**	**$11,965**	**$13,941**	**$15,562**	**$15,007**	**$10,648**	**$11,281**	**$17,119**	**65.0%**
Washington	Seattle MSA	$9,252	$12,470	$8,514	$4,696	$4,166	$5,635	$6,162	$5,512	$3,051	$3,600	$6,306	23.9%
Washington	Other Washington	$2,771	$4,080	$2,032	$1,403	$1,327	$1,435	$1,540	$1,266	$724	$1,523	$1,810	6.9%
Washington	**State Subtotal**	**$12,024**	**$16,550**	**$10,547**	**$6,099**	**$5,493**	**$7,070**	**$7,702**	**$6,778**	**$3,775**	**$5,123**	**$8,116**	30.8%
OR & Other States	**Combined States Subtotal**	**$1,209**	**$1,763**	**$1,025**	**$918**	**$990**	**$949**	**$1,199**	**$1,083**	**$1,037**	**$1,031**	**$1,120**	4.3%
Grand Total		**$36,826**	**$53,940**	**$32,140**	**$20,014**	**$18,447**	**$21,960**	**$24,463**	**$22,869**	**$15,460**	**$17,435**	**$26,355**	**100.0%**

*Denotes confidential data or data suppressed to preserve other data confidentiality/allow regional or grand totals.

** Communities combined to preserve data confidentiality.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 16. BSAI Halibut Catcher Vessels Ex-Vessel Gross Revenue Diversification by Community of Vessel Historical Ownership Address, All Communities, 2010-2019 (thousands of 2018 real dollars)

Region	Community	Annual Average Number of BSAI Halibut CVs 2010-2019	BSAI Halibut CVs Annual Average Ex-Vessel Gross Revenues from BSAI Halibut Only 2010-2019 ($ thousands)	BSAI Halibut CVs Annual Average Total Ex-Vessel Gross Revenues from All Area, Gear, and Species Fisheries 2010-2019 ($ thousands)	BSAI Halibut CVs BSAI Halibut Ex-Vessel Value as a Percentage of Total Ex-Vessel Gross Revenue Annual Average 2010-2019
APICDA	AdakAtka**	3.6	$358	$416	86.0%
APICDA	Akutan	2.8	$142	$154	91.7%
APICDA	Saint George Island	4.9	$192	$192	100.0%
APICDA	Unalaska/Dutch Harbor	7.6	$1,790	$2,990	59.9%
CBSFA	Saint Paul Island	15.0	$2,380	$2,381	100.0%
CVRF	Hooper Bay	3.6	$10	$10	99.8%
CVRF	Kipnuk	8.3	$25	$26	97.6%
CVRF	Mekoryuk	11.7	$173	$173	99.9%
CVRF	Toksook Bay	14.1	$205	$207	98.8%
CVRF	All Other CVRF	31.7	$132	$140	94.4%
NSEDC	Savoonga	11.1	$193	$193	99.9%
NSEDC	Nome & All Other NSEDC	6.4	$286	$1,077	26.6%
BBEDC	Togiak	12.4	$170	$1,012	16.7%
BBEDC	Dillingham & All Other BBEDC	4.8	$87	$581	15.0%
GOA	Anchorage/Wasilla/Palmer**	4.4	$2,004	$6,498	30.8%
GOA	Homer	13.2	$2,768	$11,100	24.9%
GOA	Juneau/Douglas/Sitka**	7.1	$2,205	$3,685	59.8%
GOA	Kodiak	11.7	$2,710	$16,810	16.1%
Other GOA/Other AK	All Other GOA & All Other AK	20.8	$1,264	$6,779	18.7%
Alaska	State Subtotal	**180.2**	**$17,114**	**$54,424**	**31.4%**
Washington	Seattle MSA	20.7	$6,306	$32,471	19.4%
Washington	Other Washington	5.1	$1,810	$6,181	29.3%
Washington	State Subtotal	**25.8**	**$8,116**	**$38,652**	**21.0%**
Oregon & Other States	Combined States Subtotal	**5.1**	**$1,120**	**$6,488**	**17.3%**
Grand Total		**211.1**	**$26,363**	**$99,565**	**26.5%**

**Communities combined to preserve data confidentiality.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 17. BSAI Halibut Catcher Vessel and All Catcher Vessel Ex-Vessel Gross Revenue Diversification by Community of Vessel Historical Ownership Address, 2008-2019 (thousands of 2018 real dollars)

Region	Community	Annual Average Number of BSAI Halibut CVs 2010-2019	Annual Average Number of All Commercial Fishing CVs in those Same Communities (the "Community CV Fleet") 2010-2019	All Commercial Fishing CVs Annual Average Ex-Vessel Gross Revenues from BSAI Halibut Only 2010-2019 ($ thousands)	All Commercial Fishing CVs Annual Average Total Ex-Vessel Gross Revenues from All Areas, Gears, and Species Fisheries 2010-2019 ($ thousands)	All Commercial Fishing CVs BSAI Halibut Ex-Vessel Gross Revenue as a Percentage of Total Ex-Vessel Gross Revenue Annual Average 2010-2019
APICDA	AdakAtka**	3.6	3.7	$358	$415	86.3%
APICDA	Akutan	2.8	2.9	$142	$155	91.4%
APICDA	Saint George Island	4.9	4.9	$192	$192	100.0%
APICDA	Unalaska/Dutch Harbor	7.6	16.0	$1,790	$4,663	38.4%
CBSFA	Saint Paul Island	15.0	15.1	$2,380	$2,394	99.4%
CVRF	Hooper Bay	3.6	3.8	$10	*	*
CVRF	Kipnuk	8.3	13.8	$25	$278	9.1%
CVRF	Mekoryuk	11.7	12.0	$173	$201	86.1%
CVRF	Toksook Bay	14.1	22.1	$205	$784	26.1%
CVRF	All Other CVRF	31.7	53.2	$132	$1,042	12.7%
NSEDC	Savoonga	11.1	11.1	$193	$193	99.9%
NSEDC	Nome & All Other NSEDC	6.4	29.7	$286	$2,061	13.9%
BBEDC	Togiak	12.4	59.4	$170	$2,986	5.7%
BBEDC	Dillingham & All Other BBEDC	4.8	182.8	$87	$15,832	0.5%
GOA	Anchorage/Wasilla/Palmer**	4.4	197.9	$2,004	$56,754	3.5%
GOA	Homer	13.2	384.7	$2,768	$92,649	3.0%
GOA	Juneau/Douglas/Sitka**	7.1	602.8	$2,205	$81,131	2.7%
GOA	Kodiak	11.7	256.3	$2,710	$127,241	2.1%
Other GOA/Other AK	All Other GOA & All Other AK	20.8	935.3	$1,264	$152,745	0.8%
Alaska	State Subtotal	**180.2**	**2,807.5**	**$17,114**	**$541,715**	**3.2%**
Washington	Seattle MSA	20.7	372.1	$6,306	$413,042	1.5%
Washington	Other Washington	5.1	161.8	$1,810	$38,177	4.7%
Washington	State Subtotal	**25.8**	**533.9**	**$8,116**	**$451,238**	**1.8%**
Oregon & Other States	Combined States Subtotal	**5.1**	**21.7**	**$1,120**	**$9,887**	**11.3%**
Grand Total		**211.1**	**3,363.1**	**$26,363**	**$1,002,840**	**2.6%**

**Communities combined to preserve data confidentiality.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

5.3 Shore-Based Processors in Alaska Accepting BSAI/Area 4 Halibut Deliveries

The following tables provide a series of quantitative indicators of sector engagement in and dependency on the BSAI halibut fishery, by community and/or regional geography depending on data confidentiality restrictions, for shore-based BSAI halibut processors operating in Alaska, as noted in the following paragraphs. Overall community shore-based processor dependency is also shown to the extent possible within data confidentiality restrictions.

Table 18 provides information on the distribution of shore-based processors in Alaska communities that accepted BSAI halibut deliveries in the period 2010-2019. For the purposes of this analysis, shore-based BSAI halibut processors are defined as those shore-based entities (as identified by F_ID [intent to operate] and SBPR [shore-based processor][34] codes in AKFIN data) accepting BSAI halibut deliveries. As shown, 22 Alaska communities were the locations of BSAI halibut shore-based processing over this period, but eight of those communities processed BSAI halibut in less than half of the years covered by the data. BSAI halibut was processed every year in 11 communities (Adak, Akutan, and Unalaska/Dutch Harbor; St. Paul; Nome and Savoonga; Twin Hills; and King Cove, Kodiak, Sand Point, and Seward). In two communities (Anchorage and Home), BSAI halibut processing took place in nine out of the 10 years covered by the data, while in one community (Atka) processing took place in eight of the 10 years covered by the data. Of the eight remaining communities, all of which processed in four of the 10 years covered by the data, six were in the CVRF communities (each of which processed annually 2010-2013, but none of which processed 2014-2019); one was in the ADICA region (False Pass, which processed in 2010-2011 and again 2014-2015) and one as in the BBEDC region (Togiak, which processed in each of the most four most recent years covered by the data).

Table 19 provides information on the ex-vessel values associated with BSAI halibut deliveries to shore-based processors by community and year (2010-2019) to the extent possible within data confidentiality restrictions. As shown, no individual community data can be disclosed, but deliveries of BSAI halibut to processors in the APICDA and CBSFA regions combined accounted for about 81 percent of all ex-vessel values associated with BSAI halibut deliveries to all geographies combined during this period. GOA communities accounted for roughly 15 percent. NSEDC and BBEDC communities together accounted for about three percent, with the remaining two percent attributable to CVRF communities.

Table 20 provides information on average annual BSAI halibut shore-based processor dependency on BSAI halibut compared to all area and species fisheries landings processed by those same processors for the years 2010-2019, as measured in percentage of ex-vessel values associated with deliveries made to the processors. As shown, of the deliveries made to the combined Akutan and Unalaska/Dutch Harbor BSAI halibut processors, approximately five percent of all ex-vessel values of landings of all species were associated with BSAI halibut deliveries over that period, while for the other BSAI Aleutian/Pribilof (APICDA/CBSFA) BSAI halibut processors that figure was approximately 17 percent. For the relevant NSEDC and BBEDC region processors combined and for the relevant GOA processors combined dependency was about seven and two percent, respectively), but dependency was virtually absolute (well over 99 percent) for the relevant CVRF region processors.

Table 21 provides information on average annual total shore-based processor dependency (all shore-based processors in the communities that had at least one BSAI halibut processor, not just the shore-based processors that participated in the BSAI halibut fishery themselves) on BSAI halibut compared to all area and species fishery landings processed by all processors for the years 2010-2019, within the constraints of

[34] "SBPR" is used as an abbreviation for "shore-based processor(s)" in tables (only) in this SIA.

confidentiality restrictions, as measured by ex-vessel values associated with those landings. As shown, for that span of years, BSAI ex-vessel value of landings accounted for about four percent of all shore-based processor ex-vessel value of landings for Akutan and Unalaska/Dutch Harbor combined, while for the other BSAI Aleutian/Pribilof (APICDA/CBSFA) communities that figure was approximately 16 percent. For all processors combined in relevant NSEDC and BBEDC communities and for the combined processing sectors in the relevant GOA communities dependency on BSAI halibut was relatively modest as measured by proportion of total ex-vessel values of deliveries (about seven and one percent, respectively), but dependency was again virtually absolute (well over 99 percent) for the all combined processors in the relevant CVRF region communities that had a least one shore-based processor accepting any BSAI halibut landings that year.

Table 18. Shore-Based Processors in Alaska Accepting BSAI Halibut Deliveries by Community of Operation, 2010-2019 (number of processors)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Total Unique SBPRs* 2008-2019 (number)
APICDA	Adak	1	1	1	2	2	1	1	2	1	1	1.3	5.37%	5
APICDA	Akutan	1	1	1	1	1	1	1	1	1	1	1.0	4.13%	1
APICDA	Atka	1	1	1	1	1	1	1	1	0	0	0.8	3.31%	1
APICDA	False Pass	1	1	0	0	1	1	0	0	0	0	0.4	1.65%	1
APICDA	Unalaska/Dutch Harbor	2	2	2	2	2	3	3	2	2	3	2.3	9.50%	4
CBSFA	St Paul/St Paul Island	2	2	1	1	1	1	1	1	1	1	1.2	4.96%	2
CVRF	Chefornak	1	1	1	1	0	0	0	0	0	0	0.4	1.65%	1
CVRF	Hooper Bay	1	1	1	1	0	0	0	0	0	0	0.4	1.65%	1
CVRF	Kipnuk	1	1	1	1	0	0	0	0	0	0	0.4	1.65%	1
CVRF	Mekoryuk	1	1	1	1	0	0	0	0	0	0	0.4	1.65%	1
CVRF	Toksook Bay	1	1	1	1	0	0	0	0	0	0	0.4	1.65%	1
CVRF	Tununak	1	1	1	1	0	0	0	0	0	0	0.4	1.65%	1
NSEDA	Nome	1	1	1	1	1	1	1	1	1	1	1.0	4.13%	1
NSEDA	Savoonga	1	1	1	1	1	1	1	1	1	1	1.0	4.13%	1
BBEDC	Togiak	0	0	0	0	0	0	1	1	1	1	0.4	1.65%	1
BBEDC	Twin Hills	1	1	1	1	1	1	1	1	1	1	1.0	4.13%	1
GOA	Anchorage	1	3	5	3	4	2	1	1	2	0	2.2	9.09%	5
GOA	Homer	2	0	1	1	2	2	1	1	1	1	1.2	4.96%	3
GOA	King Cove	1	1	1	1	1	1	1	2	2	2	1.3	5.37%	2
GOA	Kodiak	5	4	3	3	4	4	4	5	4	5	4.1	16.94%	7
GOA	Sand Point	1	1	1	1	1	1	1	1	1	1	1.0	4.13%	1
GOA	Seward	1	3	1	1	1	1	1	1	3	3	1.6	6.61%	4
All	**Grand Total**	**28**	**29**	**27**	**26**	**24**	**22**	**20**	**22**	**22**	**22**	**24.2**	**100.00%**	**46**

*SBPR = shore-based processor.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 19. Ex-Vessel Values of BSAI Halibut Deliveries to Shore-Based Processors in Alaska by Community of Operation, 2010-2019 (millions of 2018 real dollars)

Region	Community(ies)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 ($ millions)	Annual Average 2010-2019 (percent)
APICDA	Akutan/Unalaska/Dutch Harbor	$19.82	$27.38	$14.30	$9.25	$10.32	$12.00	$13.90	$13.09	$7.91	$7.93	$13.59	54.8%
APICDA/CBSFA	Adak/Atka/False Pass/St. Paul	$11.34	$18.06	$8.64	$4.19	$3.63	$4.78	$4.08	$3.15	$3.53	$3.34	$6.47	26.1%
CVRF	Chefornak/Kipnuk/Toksook Bay	$.80	$.27	$.82	$1.03	$.00	$.00	$.00	$.00	$.00	$.00	$.29	1.2%
CVRF	Hooper Bay/Mekoryuk/Tununak	$.41	$.52	$.26	$.18	$.00	$.00	$.00	$.00	$.00	$.00	$.14	0.6%
NSEDA/BBEDC	Nome/Savoonga/Togiak/Twin Hills	$.75	$.79	$.72	$.34	$.43	$.36	$.63	$1.00	$.54	$.87	$.64	2.6%
GOA	Anchorage/Homer/King Cove/Kodiak/Sand Point/Seward	$3.89	$6.84	$4.29	$2.86	$2.70	$3.24	$3.71	$3.18	$2.74	$3.31	$3.68	14.8%
	Grand Total	**$37.02**	**$53.86**	**$29.03**	**$17.85**	**$17.08**	**$20.37**	**$22.32**	**$20.42**	**$14.72**	**$15.45**	**$24.81**	**100.0%**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 20. Shore-Based Processors in Alaska Accepting BSAI Halibut Deliveries Ex-Vessel Values Diversity by Community of Operation, 2008-2019 (millions of 2018 real dollars)

Region	Community(ies)	Annual Average Number of BSAI Halibut SBPRs* 2010-2019	BSAI Halibut SBPRs Annual Average Ex-vessel Values Paid for BSAI Halibut Only 2010-2019 ($ millions)	BSAI Halibut SBPRs Annual Average Total Ex-vessel Values Paid for All Area, Gear, and Species Fisheries 2010-2019 ($ millions)	BSAI Halibut SBPRs Ex-Vessel Values Paid for BSAI Groundfish as a Percentage of Total Ex-vessel Values Paid Annual Average 2010-2019
APICDA	Akutan/Unalaska/Dutch Harbor	3.3	$13.59	$267.85	5.07%
APICDA/CBSFA	Adak/Atka/False Pass/St. Paul	3.7	$6.47	$39.18	16.52%
CVRF	Chefornak/Kipnuk/Toksook Bay	1.2	$.29	$.29	99.88%
CVRF	Hooper Bay/Mekoryuk/Tununak	1.2	$.14	$.14	99.99%
NSEDA/BBEDC	Nome/Savoonga/Togiak/Twin Hills	3.4	$.64	$8.67	7.41%
GOA	Anchorage/Homer/King Cove/Kodiak/Sand Point/Seward	11.4	$3.68	$243.07	1.51%
	Grand Total	**24.2**	**$24.81**	**$559.21**	**4.44%**

*SBPR = shore-based processor.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 21. All Areas and Species Ex-Vessel Values Diversity by Community of Operation for All Shore-Based Processors (for Alaska communities with at least one Shore-Based Processor accepting BSAI halibut deliveries), 2008-2019 (millions of 2018 real dollars)

Region	Community(ies)	Annual Average Number of BSAI Halibut SBPRs* 2010-2019	Annual Average Number of All SBPRs in those Same Communities (the "Community SBPR Sector") 2010-2019	All Community SBPRs Annual Average Ex-vessel Values Paid for BSAI Halibut Only 2010-2019 ($ millions)	All Community SBPRs Annual Average Total Ex-vessel Values Paid from All Area, Gear, and Species Fisheries 2010-2019 ($ millions)	All Community SBPRs Annual Average BSAI Halibut Ex-vessel Values Paid as a Percentage of Total Ex-Vessel Values Paid Annual Average 2010-2019
APICDA	Akutan/Unalaska/Dutch Harbor	3.3	8.5	$13.59	$312.43	4.35%
APICDA/CBSFA	Adak/Atka/False Pass/St. Paul	3.7	4.3	$6.47	$40.38	16.03%
CVRF	Chefornak/Kipnuk/Toksook Bay	1.2	1.2	$.29	$.29	99.88%
CVRF	Hooper Bay/Mekoryuk/Tununak	1.2	1.2	$.14	$.14	99.99%
NSEDA/BBEDC	Nome/Savoonga/Togiak/Twin Hills	3.4	3.4	$.64	$8.67	7.41%
GOA	Anchorage/Homer/King Cove/Kodiak/Sand Point/Seward	11.4	37.1	$3.68	$371.40	0.99%
	Grand Total	**24.2**	**55.7**	**$24.81**	**$733.30**	**3.38%**

*SBPR = shore-based processor.

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

5.4 Subsistence Halibut Harvest

5.4.1 Overview

The harvest and processing of wild resources for food, raw materials, and other traditional uses have been a central part of the customs and traditions of many cultural groups in Alaska, including Aleut, Athabascan, Alutiiq, Euro-American, Haida, Inupiat, Tlingit, Tsimshian, and Yupik for centuries. The Alaska legislature passed the state's first subsistence statute in 1978 and established subsistence as the priority use of Alaska's fish and wildlife. The law defined subsistence as "customary and traditional uses" of fish and wildlife and highlighted the unique importance of wild resources, and the continuing role of subsistence activities in sustaining the long-established ways of life in Alaska. Subsistence uses of fish and land mammals are given a priority over commercial and recreational fishing and hunting in state and federal law, meaning that when the harvestable portion of a fish stock or game population is not sufficient for all public uses, regulation requires that subsistence uses be the last to be restricted.

Federal and state laws differ in who qualifies for participation in subsistence fisheries and hunts. Rural Alaska residents qualify for subsistence harvesting under federal law. From 1978 to 1989 only rural residents qualified under state law for subsistence harvesting, but since 1989 all Alaska residents qualify. The federal law that is parallel to the State of Alaska's subsistence law is the Alaska National Interest Lands Conservation Act (ANILCA), Title VIII. Neither the state nor the federal subsistence laws apply to halibut specifically. However, the International Pacific Halibut Commission (IPHC) has a definition for subsistence fisheries. The Commission defines subsistence as non-commercial, customary, and traditional uses of halibut for direct personal, family, or community consumption or sharing as food or customary trade. Within Alaska, the definition makes an exception to include halibut less than 32 inches (U32) that are retained for personal use by vessels fishing CDQ in Areas 4D and 4E. As detailed in DEIS Section 4 ("Pacific Halibut"), IPHC takes an allocation for subsistence use "off the top" before it determines annual commercial catch limits for each of its management areas.

According to ADFG's 2017 subsistence update, roughly 83 percent of Alaska's population lived in nonsubsistence (urban) areas as defined by the Joint Board of Fisheries and Game while 17 percent lived in rural areas.[35] As of 2010, Alaska Natives made up 55 percent of the rural population and 12 percent of the urban population. The 2017 subsistence update reports the percentage of households in rural areas that participate in subsistence activities. Harvest and use of fish – including non-halibut species – and game are reported in six areas: Arctic, Interior, Southcentral, Southeast, Southwest, and Western. Across all areas, 83 percent of households participated in subsistence fish harvest and 95 percent used subsistence fish; 60 percent of households participated in subsistence game harvest and 86 percent used subsistence game. Southwest and Western households ranked among the highest use regions. For fish, the Southwest area reported 86 percent household harvest participation and 94 percent household use; the Western area reported 98 percent harvest participation and 100 percent use.

In that 2017 update, ADFG ranked wild resources according to usable weight of subsistence harvest. Fish species accounted for 54 percent of usable weight, followed by land mammals (22 percent), marine mammals (14 percent), plants (4 percent), birds (3 percent), and shellfish (3 percent). Salmon species alone accounted for 32 percent of total usable weight, and non-salmon species – including halibut – accounted for 21 percent of usable weight. Excluding plants, total subsistence harvest accounted for 33.6 million pounds per year in the 2017 study, representing only 0.9 percent of the fish and game harvested

[35] https://www.adfg.alaska.gov/static/home/subsistence/pdfs/subsistence_update_2017.pdf

annually in Alaska. By comparison, the study found that commercial fishing accounted for 98.6 percent of total fish and game harvest by usable weight. The remainder of total harvest accounts for sport and personal use fishing and hunting. On a pounds per person per year basis across all categories of wild food harvest in 2017, Southwest Alaska and Western Alaska ranked in the top four areas: 210 pounds. in Southwest Alaska and 379 pounds in Western Alaska. The other two areas in the top-four were Interior (293 pounds) and Arctic (402 pounds).

Halibut have been harvested for centuries by the indigenous coastal peoples of the lands bordering the eastern north Pacific Ocean, including Southeast, Southcentral, and Western Alaska. Early fishing was conducted by hook and line from large canoes, which could venture as far as 20 miles from shore (32 km). Hooks were carved from wood or bone to include spirit figures to attract halibut and were selective for large fish suitable for drying and smoking. Lines of up to sixty fathoms in length were made of twisted fibers of cedar, animal sinew, or kelp.

5.4.2 Subsistence Management

The management of subsistence halibut fisheries in Alaska is the responsibility of NMFS[36] but data collection and harvest estimation are performed by the ADFG Division of Subsistence Fisheries under contract to NMFS. Participation and harvest information are collected through a mailed survey and site-visit interview process for which data are available from 2003. The survey was funded annually until 2012. Due to funding constraints, the survey and estimation work has occurred biennially since then, covering 2014, 2016, and 2018. Overall, ADFG has conducted the subsistence survey in 13 years. The most recent available survey results pertain to the 2018 fishing year and were published in January 2020. The estimates reported in this document rely on the 2018 survey results that are published in ADFG Technical Paper 456 (Fall and Koster, 2020), which includes extensive documentation of survey methodology.

Despite a long history of harvest, federal halibut fishing regulations did not officially recognize and authorize the subsistence fishery until 2003 (68 FR 18145, April 15, 2003). Regulations were developed pursuant to action taken by the Council in October 2000 to adopt a subsistence halibut program recognizing the Alaska subsistence fishery. The regulations were amended in May 2005 and October 2008; current regulations can be found at 50 CFR Part 300. To fish for subsistence halibut an individual must reside in an eligible community, be a member of an eligible recognized tribe, or be a resident of a designated rural area.[37] Regulations recognize the residents of 118 rural communities and designated rural areas as well as members of 123 Organized Tribal Entities (tribes) as eligible to participate in subsistence halibut fishing. The tribes listed in regulation are those with customary and traditional uses of halibut. Individuals who are eligible through their tribal membership are not required to live in an eligible community or rural area to participate in the fishery. Special permits for community harvest, ceremonial, and educational purposes are also available to qualified Alaska communities and tribes. Eligible participants must register by obtaining a Subsistence Halibut Registration Certificate (SHARC) from NMFS RAM division.

Regulations list eligible communities by IPHC area and subarea. Within Area 4, 4A includes three communities (Akutan, Nikolski, and Unalaska); 4B includes two communities (Adak and Atka); 4C includes two communities (St. George and St. Paul); 4D includes three communities (Diomede, Gambell, and Savoonga); and 4E includes 54 communities (see §300.65(g)(1)).

[36] A broader history of Federal subsistence management is available at the U.S. Department of Interior Office of Subsistence Management website: https://www.doi.gov/subsistence/library/history.
[37] 50 CFR 300.65(g)(1), (2), or (3).

In surveyed years – 2003 through 2012 and biannually since 2014 – ADFG has administered a voluntary SHARC survey to SHARC holders. The results of this survey are combined with data from some limited on-site visits to create the annual harvest estimate. On-site visits have occurred in roughly four of five communities during each study year. However, the response rates for remote Alaskan villages have often been low. SHARC registrations have dropped in many remote communities. These limited community visits and in-person surveys (used to improve community-wide survey response rates) are generally focused on communities and regions in Areas 2C and 4E. To protect confidentiality, data for many tribal and community reporting entities with five or fewer SHARCs issued have not been included in ADFG subsistence reports since 2008. As a result, many communities known to participate in the BSAI halibut subsistence fishery are not listed in the data. For example, 16 reporting tribal or community entities listed in the SHARC data as engaged in BSAI halibut subsistence fishing in 2008 have no non-confidential data values for more recent years. While values for those communities are not reported individually, estimated harvests and participation rates are included in the management area and state totals. Another 34 reporting tribal or community entities listed in the SHARC data that had no reported engagement (zero values) in the BSAI halibut subsistence fishery in 2008 have no non-confidential values in more recent years. However, some communities that were visited by ADFG in most study years are captured in the state's subsistence reports; in Area 4E, this includes Tununak and Toksook Bay. In summary, while data based on SHARC surveys are the most complete and comprehensive recent subsistence halibut harvest information available, these limitations reduce their utility for many communities throughout the BSAI region and caution should be used in their interpretation.

The available community-level harvest data for halibut are published in Fall and Koster (2020) for the 2018 harvest year and in earlier summary reports since the beginning of the harvest monitoring program began in 2003. Estimates of harvest of all fish and wildlife resources for communities based on ADFG Division of Subsistence comprehensive surveys are available online via ADFG's CSIS portal.[38] CSIS reports estimated harvest in pounds and pounds-per-capita, as well as the percentage of households in a community that harvest, attempt to harvest, or use the resource (i.e., received from harvesters).[39]

5.4.3 Subsistence Halibut Data

Subsistence harvest data for halibut are available from both ADFG and IPHC. Table 22 shows estimated ADFG's Alaska subsistence halibut harvest within IPHC Area 4 during each year that was surveyed and fully reported from 2003 through 2018.[40] Table 23 shows IPHC's estimates of subsistence removals from 2010 through 2019 for all coastwide management areas; these estimates were first published in June 2020.[41] The two data sources are generally consistent with one another. The historical catalog of IPHC annual fishery statistics is available at https://www.iphc.int/library/documents/category/annual-reports.

NMFS publishes annual statistics on SHARC holders.[42] As of 2020, 6,775 SHARCs are issued; 4,616 are issued to rural residents and 2,159 are issued to tribal members. By "rural city," the top five geographies by SHARC holders are Sitka (731), Kodiak (516), Petersburg (490), Cordova (230), and Wrangell (227). The first community ranked that is proximate to the BSAI FMP area is Unalaska with 37 SHARC holders (ranked 12th). The top five tribal affiliations by SHARC holders are the Central Council Tlingit and Haida Indian Tribes (335), Ketchikan Indian Corporation (276), Qagan Tayagungin Tribe of Sand Point Village

[38] Available at: http://www.adfg.alaska.gov/sb/CSIS/. For halibut, access CSIS >> Resource Category >> Fish. The currently available CSIS estimates are continuous from 1980 through 2016.

[39] Note that community-level results from the SHARC survey are not in the CSIS. Harvest data for halibut in the CSIS come from the comprehensive survey, which overlaps with the SHARC survey for some communities in some years.

[40] For other areas, refer to Table 6 in Fall and Koster (2020).

[41] https://www.iphc.int/uploads/data/time-series-datasets/excel/iphc-2019-tsd-020.xlsx

[42] https://www.fisheries.noaa.gov/alaska/commercial-fishing/permits-and-licenses-issued-alaska#subsistence-halibut

(224), Sitka Tribe of Alaska (132), and Native Village of Tununak (69). The complete lists of community and tribal SHARC counts for 2020 are available in the following reports: Community: https://www.fisheries.noaa.gov/sites/default/files/akro/20sharc_by_city.csv; and Tribal: https://www.fisheries.noaa.gov/sites/default/files/akro/20sharc_by_tribe.csv. For 2020, only one special permit for community, ceremonial, or educational use is issued; that permit is for Ketchikan Indian Corporation.

Of the 8,576 individuals who were potential subsistence halibut users in 2018, ADFG estimated that 4,094 participated (48 percent). Potential participants in 2018 included SHARC holders, two special community/ceremonial permits, and identified potential halibut fishers who did not hold SHARCs in two communities. Of the 2,857 individuals who were members of an eligible tribe, an estimated 1,211 participated (42 percent). Of the 5,719 individuals who qualified as residents of rural communities, an estimated 2,883 participated (50 percent). The estimated total of 4,094 subsistence halibut fishery participants in 2018 is the lowest estimate since the SHARC program began in 2003 and a seven percent decrease from the estimate of 4,408 participants in 2016. The estimates are based on 5,852 survey responses (68 percent of all potential participants). The response rate for residents of the 118 eligible rural communities and rural areas who did not register as tribal members was 77 percent (4,381 of 5,719).

Surveys were mailed to all 8,489 SHARC holders in 2018 and information was supplemented through contacts and interviews in five Southeast and Western Alaska communities. Surveys were also administered to two community/ceremonial permits, which were returned. The surveyors note that estimating catch in subareas with a small number of communities can be challenging and is sometimes influenced by a small number of individuals who do return the survey. ADFG received a survey return rate of 77 percent across all 118 eligible rural communities, or individuals with SHARC permits who did not register as tribal members (4,381 out of 5,719). The return rate was 64 percent in the 11 communities with more than 100 nontribal SHARC holders that accounted for 84 percent of all nontribal SHARCs issued in rural communities. Return rates were higher in larger communities where the majority of SHARCs are issued. The 68 percent return rate is considered good, though not as high as the recent peak of 71 percent in 2012.

Table 22. Alaska Subsistence Halibut Harvest (net weight pounds) and Percentage of Alaska State Subsistence Total in IPHC Area 4 by Geographic Area Fished, 2003-2012, 2014, 2016, and 2018 with Selected ADFG Management Subareas

Area			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2014	2016	2018	2018 Rel. 12-yr Avg.
4A	**Eastern Aluetians**	**Harvest**	**21,197**	**28,877**	**35,615**	**27,062**	**14,946**	**19,553**	**33,499**	**14,548**	**13,606**	**9,543**	**7,727**	**8,054**	**13,237**	**68%**
		% AK Total	2.0%	2.4%	3.0%	2.4%	1.4%	2.2%	3.9%	1.8%	2.0%	1.4%	1.0%	1.1%	2.1%	
4B	**Western Aleutians**	**Harvest**	**2,582**	**916**	**1,351**	**2,761**	**1,997**	**4,737**	**1,175**	**450**	**537**	**1,698**	**254**	**294**	**1,684**	**108%**
		% AK Total	0.2%	0.1%	0.1%	0.2%	0.2%	0.5%	0.1%	0.1%	0.1%	0.2%	0.0%	0.0%	0.3%	
4C	**Pribilof Islands**	**Harvest**	**22,881**	**9,734**	**7,716**	**8,527**	**15,077**	**5,657**	**6,323**	**10,859**	**1,648**	**1,176**	**3,389**	**4,300**	**5,152**	**64%**
		% AK Total	2.2%	0.8%	0.7%	0.8%	1.5%	0.6%	0.7%	1.4%	0.2%	0.2%	0.4%	0.6%	0.8%	
	St. George	*Harvest*	*2,042*	*1,823*	*2,145*	*3,443*	*3,736*	*1,150*	*700*	*720*	*490*	-	-	*370*	*401*	24%
		% AK Total	*0.2%*	*0.2%*	*0.2%*	*0.3%*	*0.4%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*	-	-	*0.1%*	*0.1%*	
	St. Paul	*Harvest*	*20,839*	*7,911*	*5,571*	*5,085*	*11,342*	*4,507*	*5,623*	*10,139*	*1,158*	*1,176*	*3,389*	*3,930*	*4,751*	71%
		% AK Total	*2.0%*	*0.7%*	*0.5%*	*0.5%*	*1.1%*	*0.5%*	*0.7%*	*1.3%*	*0.2%*	*0.2%*	*0.4%*	*0.5%*	*0.8%*	
4D	**NW Bering Sea**	**Harvest**	**4,380**	**10,923**	**5,848**	**8,297**	**3,204**	**3,131**	**644**	**1,171**	**615**	**672**	**54**	**-**	**-**	
		% AK Total	0.4%	0.9%	0.5%	0.7%	0.3%	0.4%	0.1%	0.1%	0.1%	0.1%	0.0%	-	-	
4E	**E. Bering Sea Coast**	**Harvest**	**53,775**	**28,501**	**54,119**	**70,743**	**52,135**	**15,898**	**8,749**	**10,055**	**6,168**	**8,384**	**71,327**	**41,370**	**25,160**	**72%**
		% AK Total	5.2%	2.4%	4.6%	6.3%	5.1%	1.8%	1.0%	1.3%	0.9%	1.2%	9.4%	5.7%	4.1%	
	Bristol Bay	*Harvest*	*435*	*203*	*2,169*	*1,336*	*2,116*	*84*	-	-	*403*	*329*	*1,160*	*496*	*2,622*	300%
		% AK Total	*0.0%*	*0.0%*	*0.2%*	*0.1%*	*0.2%*	*0.0%*	-	-	*0.1%*	*0.0%*	*0.2%*	*0.1%*	*0.4%*	
	Y-K Delta	*Harvest*	*53,284*	*28,298*	*51,950*	*69,407*	*50,019*	*14,669*	*7,468*	*9,484*	*5,283*	*7,239*	*69,765*	*39,351*	*22,088*	65%
		% AK Total	*5.1%*	*2.4%*	*4.4%*	*6.2%*	*4.8%*	*1.7%*	*0.9%*	*1.2%*	*0.8%*	*1.1%*	*9.2%*	*5.4%*	*3.6%*	
	Norton Sound	*Harvest*	*56*	-	-	-	-	*1,145*	*1,281*	*571*	*482*	*816*	*403*	*1,522*	*450*	57%
		% AK Total	*0.0%*	-	-	-	-	*0.1%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*	*0.2%*	*0.1%*	
Area 4 Subtotal			**104,815**	**78,951**	**104,649**	**117,390**	**87,359**	**48,976**	**50,390**	**37,083**	**22,574**	**21,473**	**82,751**	**54,018**	**45,233**	**67%**
	% Area 4		10.1%	6.6%	8.9%	10.4%	8.5%	5.5%	5.9%	4.6%	3.2%	3.1%	10.9%	7.4%	7.3%	
Alaska Total			**1,041,330**	**1,193,162**	**1,178,222**	**1,125,312**	**1,032,293**	**886,988**	**861,359**	**797,560**	**697,656**	**686,991**	**760,469**	**727,178**	**615,789**	**67%**

Source: Fall and Koster 2020, Table 6

Table 23. IPHC total subsistence halibut removal estimates by area, 2010 through 2019

IPHC Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
2A	25,300	24,500	32,200	28,500	31,800	33,900	29,600	27,000	28,000	32,200
2B	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000
2C	424,800	387,000	396,000	396,000	422,971	422,971	436,464	436,464	366,214	366,214
3A	312,700	266,100	253,500	253,500	241,369	241,369	222,454	222,454	187,698	187,698
3B	23,000	22,000	16,000	16,000	13,378	13,378	14,242	14,242	16,644	16,644
4A	14,500	13,600	9,500	9,500	7,727	7,727	8,054	8,054	13,237	13,237
4B	500	500	1,700	1,700	254	254	294	294	1,684	1,684
4C	10,900	1,600	1,200	1,200	3,389	3,389	4,300	4,300	5,152	5,152
4D	1,200	600	700	700	54	54	-	-	-	-
4E	10,100	6,200	8,400	8,400	71,327	71,327	41,370	41,370	25,160	25,160
4D/E U32 CDQ	9,500	16,900	20,200	10,000	5,500	4,700	5,500	7,400	9,989	7,252
Total	**1,237,500**	**1,144,000**	**1,144,400**	**1,130,500**	**1,202,769**	**1,204,069**	**1,167,278**	**1,166,578**	**1,058,778**	**1,060,241**

Source: IPHC data - https://www.iphc.int/datatest/subsistence-fisheries, accessed June 2020.
Notes: Estimates for Canada (2B) are supplied by Fisheries and Oceans Canada (DFO) and have not changed since 2010. Estimates for Alaska (2C, 3A/B, and 4A/B/C/D/E) are based on the SWHS, which is not conducted every year; estimates for 2013, 2015, 2017, and 2019 are carried over from the previous year.

ADFG survey estimates found that statewide subsistence harvests accounted for 2.3 percent of total Alaska halibut removals in 2018. Over the 13 years of the SWHS the average net weight of subsistence-caught halibut has ranged from 23.7 pounds in 2003 to 18.2 pounds in 2008. Average weight in 2018 was up to 20.6 pounds which was an increase over recent years.

Across all Alaska areas, the 2018 subsistence harvest was estimated at 615,789 net weight pounds. For comparison, the total removals from Alaska waters in 2018 was estimated at 30,151,032 pounds While subsistence accounted for roughly 2.1 percent of total removals, the 2018 commercial fishery accounted for 55 percent. Sport fisheries (harvests and other mortalities) accounted for 19.3 percent of removals. Commercial bycatch in other fisheries accounted for 18.7 percent of removals (down from 20.8 percent in 2016), and non-harvest mortality (formerly "wastage") accounted for 2.2 percent.

As in most years, the majority of 2018 subsistence harvest occurred in Areas 2C and 3A. Area 2C accounted for 59 percent of harvest by weight, while Area 3A accounted for 30 percent. Area 4E accounted for four percent of harvest. Area 3B accounted for three percent. Area 4A accounted for two percent. Area 4C accounted for one percent. Area 4B accounted for less than one percent. No harvest was estimated for Area 4D. ADFG's total halibut removal estimates include 9,989 pounds of under 32-inch U32 halibut taken under an exemption for subsistence/personal use by CDQ organizations in Areas 4D and 4E (described below)[43] Fall and Koster (2020) provide community case studies that describe activity in Areas 4D and 4E beginning on page 18 of ADFG Technical Paper No. 456.

Fall and Koster note the estimated population in eligible rural communities. This information is useful in gauging the scale of individuals who might have benefitted from subsistence halibut fishing through "use," even though fewer than 5,000 individuals participated in direct harvest. The 2000 and 2010 U.S. Census estimates for this set of communities was 82,707 and 84,353, respectively. The Alaska Department of Labor and Workforce Development estimated the population of these communities in 2016 at 86,525. An additional 8,000 to 9,000 individuals who reside in non-rural Alaska communities are eligible to participate by virtue of their tribal membership. Alaska Natives who live in non-rural places but are not members of an eligible tribe are eligible to participate in subsistence fishing but may benefit through sharing of harvested resources. Further discussion on the local economics of subsistence uses is included later in this section.

ADFG estimates that roughly 75 percent of subsistence halibut are taken with setline gear; the remainder is taken with handline gear. SHARC survey respondents were asked to classify their subsistence and recreational fishing separately to avoid double-counting. Virtually all who reported subsistence and recreational catch separately were respondents from Areas 2C or 3A; those individuals were likely making a distinction between subsistence fishing with setlines and recreational fishing with handlines (e.g., rod and reel).

Since 1998, commercial Pacific halibut vessels fishing for specific CDQ groups in Area 4E have been permitted by the IPHC to retain U32 Pacific halibut (less than 32 inches or 81.3 cm in fork length), under an exemption requested by the NPFMC. Beginning in 2002, the retention allowance was expanded to also include vessels that land all their annual catch in Areas 4D or 4E. The harvests reported under this exemption are reported separately from the household survey conducted by the ADFG for the subsistence harvest, where survey participants are instructed to exclude any U32 Pacific halibut retained during commercial fishing.[44] [45] As shown in Table 24, from 1998 through 2019, CVRF reported an average

[43] IPHC's 2019 fishery statistics report reports a different amount of retained U32 fish by CDQ participants but it is similar in order of magnitude (see Table 24).

[44] https://iphc.int/uploads/pdf/rara/iphc-2016-rara26.pdf accessed 8/21/2020.

[45] SHARC survey respondents are instructed to not include any U32 retained fish in the subsistence harvests they report back to ADFG and therefore they do not appear in most tables and figures in Fall and Koster 2020 (because they are not accomplished under subsistence regulations). The exceptions are tables and figures that report total halibut removals in Alaska where rather than report the U32 retained halibut as a separate category, which would not

annual net weight of 6,409 pounds, which was the highest among the three groups, despite the fact that CVRF CDQ subsistence retention from commercial catch dropped to zero pounds in 2015 with the suspension of the local small boat commercial halibut fishery (discussed in Section 6.3.5) and has remained there since. Aggregating all three CDQ groups, the average retention of U32 halibut from 2010 through 2019, the baseline years used for this analysis, was 9,688 pounds per year.

Table 24. Reported Annual Amounts (pounds, net weight) of U32 Halibut Retained for Subsistence Use by CDQ Harvesters Commercially Fishing in Areas 4D and 4E, by CDQ Group, 1998-2019

Year	BBEDC	CVRF	NSEDC	Total
1998	2,690	900	0	3,590
1999	418	7,483	0	7,901
2000	3,772	9,618	0	13,390
2001	10,773	19,494	0	30,267
2002	6,593	7,473	4,371	18,437
2003	6,346	5,034	2,961	14,341
2004	4,826	7,120	4,242	16,188
2005	8,750	11,335	3,136	23,221
2006	2,836	13,467	3,407	19,710
2007	3,135	11,398	4,516	19,049
2008	1,816	12,926	6,924	21,666
2009	922	4,277	6,060	11,259
2010	2,155	3,924	3,438	9,517
2011	2,752	9,909	4,206	16,867
2012	5,095	10,424	4,668	20,187
2013	3,493	5,250	1,290	10,033
2014	3,456	963	1,114	5,533
2015	2,460	0	2,206	4,666
2016	3,456	0	2,001	5,457
2017	5,261	0	2,119	7,380
2018	8,510	0	1,479	9,989
2019	3,349	0	3,903	7,252
Average 1998-2019	**4,221**	**6,409**	**2,820**	**13,450**
Average 2010-2019	**3,999**	**3,047**	**2,642**	**9,688**

Source: Data from 1998-2016 from IPHC Report of Assessment and Research Activities 2016 https://iphc.int/uploads/pdf/rara/iphc-2016-rara26.pdf, data from 2017-2019 from IPHC Annual Reports.

effectively show up in the figures (given how relatively small they are), those harvests are included in the subsistence category. This lumping of categories is logically consistent, given that these fish are being used for food in traditional ways in rural subsistence communities (Fall, personal communication, 8/21/2020).

5.4.4 Economics of Subsistence Uses

Contemporary subsistence uses in rural Alaska occurs within a mixed economy. Communities engaged in subsistence harvest include both a fishing and hunting component and a cash component. Rural households use cash for items like fuel oil, electricity, clothing, and shelter, but also to purchase equipment that is necessary for subsistence activity (e.g., firearms, ammunition, nets, boats, snowmachines, and personal gear). In many rural communities, cash-paying jobs are few or unstable (seasonal or temporary). Economic activity often takes place in small-scale family groups, and economic goals tend to focus on the household unit (ADFG 2017). In the Aleutians, Reedy (2016) notes that, aside from housing, groceries are the largest household expenditure in Unalaska/Dutch Harbor and Adak. Groceries accounted for 8 percent to 21 percent (Atka) of expenditures among eight studied Aleutian communities.

Rural households with higher cash incomes are observed to produce *more* wild foods than those with less cash. Higher relative income and higher producing households are central to the sharing economy within subsistence use communities. ADFG's Division of Subsistence cites a "30-70 rule," whereby 30 percent of households in a community often produce 70 percent of the community's wild harvest in terms of usable pounds.[46] In addition to relative income, higher producing households might also be those with more available labor (i.e., physically capable individuals). For all subsistence resources, ADFG estimates that 60 percent of rural Alaska households harvest wildlife but 86 percent of households use the harvest. For fish, the estimate is that 83 percent of households harvest subsistence fish, but 95 percent use the harvest. These facts underline the reverberating effect of subsistence harvest throughout rural communities and their extensions through family and tribal ties. The 2017 ADFG Subsistence Update estimated the monetary value of wild food harvest in defined subsistence areas at an annual value of $170 million to $340 million. This calculation was based on usable pounds of all resource types (fish, land mammals, marine mammals, plants, birds, etc.) and a replacement cost ranging from $5/pound to $10/pound.

Reedy-Maschner and Maschner (2012) note that the delineation between commercial and subsistence activity in rural Alaska communities is often overstated. In many cases an individual will use the same vessel to harvest both commercial individual fishing quota (IFQ) and subsistence halibut, as well as other wild foods. For example, open skiff vessels that have a small commercial market in Atka are critical for residents' access to non-commercial wild foods at sea and on land (Reedy 2016). While vessel identification data are not available for subsistence use, the authors recognize the potential for interconnectedness between these two modes of harvest. Subsistence and commercial fishing also coincide in the previously mentioned case where U32 halibut taken on CDQ trips can be retained as subsistence fish in eligible communities. More broadly, engagement in small scale fishing – through a CDQ reserve or individually – can financially sustain a fishing platform that is also available for subsistence use. Moreover, cash earned from crew work on commercial vessels is often applied to the inputs necessary for subsistence harvest of both marine and land resources.

Individuals in eligible rural communities or tribal members might also conduct subsistence harvest in areas outside of the place where they reside. For example, a study of subsistence fisheries in eight communities in the Arctic-Kotzebue management subarea from 2012 through 2014 included halibut harvest by residents of non-coastal communities (Braem *et al*., 2018). Halibut were recorded as a minor species in areas that predominantly focus on salmon and freshwater species such as the Bristol Bay area (Halas and Neufield, 2018). These reports indicate that individuals may travel to participate in subsistence fishing with family or other relations and bring those resources back to their home economy.

Braem et al. (2018) also note occurrences where localized disasters were mitigated or alleviated by access to subsistence fishing opportunities, or by distribution of subsistence species from CDQ groups. For

[46] http://www.adfg.alaska.gov/static/home/library/pdfs/subsistence/ak_economies_subsistence.pdf

example, in 2014 an unusual thaw event caused fish and game that were stored outside – as is customary in the area – to spoil. Data reflect that residents in the affected communities increased subsistence harvest that year to replace the lost food. In both that event and an event where severe coastal storms destroyed food caches, a CDQ group (NSEDC) and an Alaska Native Claims Settlement Act (ANCSA) corporation (NANA Inc.) provided halibut and salmon from harvest on corporation-owned vessels and facilitated contributions through bycatch donation programs.

5.4.5 Halibut in the Context of Other Subsistence Resources

Halibut is just one of many important sources of wild foods in rural Alaskan communities. Key regions where subsistence uses have been studied and reported include the Aleutian Islands, the Pribilof Islands, Central Yupik places, and St. Lawrence Island. A 2016 report commissioned by the U.S. Department of Interior Office of Subsistence Management focused on the Aleutian region reported the most recent available data on total subsistence harvest for eight Aleutian Islands communities: Unalaska, Nikolski, Atka, Adak, Akutan, False Pass, Nelson Lagoon, Port Heiden (Reedy 2016). Among 13 selected species, halibut ranked third in usable subsistence pounds per capita behind caribou and salmon. Other important non-salmon species included Pacific cod, rockfish, and greenling (pogies). The communities with the greatest per capita non-salmon fish harvest were Akutan, Unalaska, and Atka. Adak and Akutan were the only communities where per capita non-salmon harvest outstripped salmon harvest. Akutan and Unalaska were the communities that relied on non-salmon species and had little land mammal harvest. Some of the studied Aleutian Islands communities – e.g., Atka – were relatively more reliant on land mammals such as feral reindeer than fish, but still recorded salmon and non-salmon harvests in line with the volumes in other communities. Reedy (2016) includes data on subsistence use of birds, eggs, plants, and invertebrates with data collected between 2009 and 2015. Within the APICDA region, Unalaska is the community with the greatest number of halibut subsistence fishermen and the largest volume of harvest. The AFSC has compiled socioeconomic community profiles on each community in the region based on ADFG data, United States Fish and Wildlife Service (USFWS) reports, and researchers' interaction with civic leaders through a survey to elicit communities' most important subsistence species. AFSC found that halibut were specifically listed as a key subsistence resource in Adak, Unalaska, and St. George. The profiles for Akutan and Atka referred generally to 'fish' or 'non-salmon fish.' Other key resources in the region include salmon, crab, Pacific cod, seal, sea lion, duck, geese, marine/terrestrial birds, marine invertebrates, and local vegetation.

As noted in Section 4.5.5, subsistence use of Pacific cod has deep roots in the social, cultural, and economic fabric of communities in the Aleutian region; Pacific cod shows up as a resource in the archaeological record and patterns of use continue to evolve. A 2003 study of Unalaska ranked Pacific cod eighth in terms of subsistence harvest and use of species harvested elsewhere, behind four salmon species, halibut, moose, and crab, but ahead of seal and caribou (Hamrick and Smith 2003).

A survey conducted by ADFG in 2008 found that 33.3 percent of households in Akutan used Pacific cod, which was less that the percentage using halibut (86.1 percent), char (63.9 percent), and Dolly Varden (58.3 percent).[47] The range of subsistence uses in Akutan was also lower in 2008 than in 1990. In 1990, 27 kinds of resources were used by at least 50 percent of Akutan households. In 2008, without exception, the percentage of households using these resources dropped, including 51 percent less households using Pacific cod. Involvement of households in commercial fishing is often associated with high levels of production of fish and wildlife resources for subsistence uses. Of all Akutan's households, 33 percent were involved in commercial fishing in 2008. These households averaged harvests of 941 pounds of wild foods, compared to 538 pounds for other households. A 2016 study of 26 households in Akutan (70 percent of households) found that the percentage of households harvesting subsistence resources in

[47] CSIS data accessed in 2018.

2015/2016 had declined for all resources except for salmon relative to findings from similar surveys in the 1990s (Schmidt *et al*. 2018).

5.4.6 Western Alaska & Industry Joint Working Group

The Chaninik Qaluyat Nunivak (CQN) Working Group, formed in 2013, is an example of cooperation between subsistence users and the BSAI commercial groundfish fishery.[48] CQN "was established to address tensions stemming from overlapping use of Kuskokwim Bay area fishing grounds by tribal community commercial and subsistence users and off-shore commercial bottom-trawl fisheries."[49] CQN is comprised of members from the Bering Sea Elders Group, the Association of Village Council Presidents, and the Alaska Seafood Cooperative. The group was created out of a desire to work together to provide opportunity for a productive yellowfin sole fishery while minimizing the impacts on residents who use the same region for subsistence and other fisheries. Chief among the issues of concern is the effect of halibut bycatch in the yellowfin sole trawl fishery on subsistence resources near the Kuskokwim Bay, Etolin Strait, and Nunivak regions.

CQN has supported research into deck sorting halibut on Amendment 80 trawl vessels to reduce bycatch mortality rates[50] and methods to reduce the impact of yellowfin sole trawling in the Kuskokwim Bay area. CQN's contributions to deck sorting research include funding for satellite tags that improve understanding of release mortality rates and the efficacy of the deck sorting initiative. CQN is also supporting the deployment of real-time seafloor temperature loggers to help both subsistence fishermen and Amendment 80 yellowfin sole vessels identify the optimal time to harvest their target species. Using baseline knowledge of seasonal temperatures and correlation with target species presence, temperature data may help trawl vessels minimize the time that they need in the area to achieve their harvest objectives and thus reduce their impact on subsistence fishing in the form of bycatch. Temperature readings might also allow subsistence users to optimize their effort and improve their harvest efficiency for species including halibut and salmon, as well as develop a better general understanding of their local ecosystem as the climate is changing. CQN participants who communicated with the analysts stated that in some areas, such as Togiak, it is accepted knowledge that warmer bottom temperatures correlate to greater halibut presence, but this relationship is not established in other areas – e.g., Kuskokwim Bay – and satellite surface temperatures are not a reliable indicator of bottom conditions.

Efforts to collect bottom temperatures with moorings and correlate them with surface temperatures available by satellite are in an early stage. The investigators are contending with the challenges of sea ice and the availability of vessels to successfully retrieve the physical data loggers in the spring. They are working through the stages of determining how much temperature variation exists in the study area to understand how many collection stations are necessary on an ongoing basis. Temperature variation is caused by seasonal effects and mixing between river outflows and the ocean; it is not yet established whether consistent patterns exist. The first year of study included mooring locations in shallow water and along the edge of the groundfish trawl area at the fishing depth. Both depth ranges were studied at locations along a north/south gradient.

[48] Information in this subsection provided via personal communication by T. Loomis, CQN co-chair (August 2019) and John Gauvin, Alaska Seafood Cooperative (June 2020).

[49] https://www.alaskapacific.edu/stories/new-relationships-in-kuskokwim-bay, accessed June 3, 2020.

[50] See deck sorting information provided in the "Pacific halibut mortality as related to groundfish revenue" discussion in DEIS Section 3.4.2.

5.5 Sport Halibut Harvest

The sport fishing category includes non-commercial recreational fishing and commercial recreational fishing, generally referred to as charter fishing. Together, halibut and salmon are the major sport fish species in Alaska, though NMFS's regulatory authority for recreational fisheries extends only to halibut. Sport fishing regulations for halibut in Alaska are developed on the international, federal, and state levels by the IPHC, NPFMC, NMFS, and ADFG. Although ADFG does not directly manage Alaska halibut fisheries, the State has adopted regulations that affect sport fishing for halibut.

This section focuses on sport harvest activity in the management areas that are geographically consistent with the BSAI, though sport harvest is managed and reported by IPHC and ADFG areas. This section includes data from both IPHC and ADFG and, while estimation and reporting methodologies may differ, it is clear from both sources that sport harvest is a small component of halibut removals in the region and is also a small portion of total sport harvest for Alaska and coastwide. Additional information is available in AFSC's Community Profiles, which are updated with sport harvest and charter permit information through 2014.[51]

This section does not break out harvest information for charter operations as opposed to unguided recreational fishing. Charter businesses are required by Alaska Board of Fisheries regulations to report effort under the ADFG Saltwater Logbook program. However, ADFG's policy is not to release charter logbook information if the data represent fewer than four businesses. For the area under consideration, fewer than four businesses were operating in all but one year during the 2006 through 2019 period. Only one year during that period (2007) would be reportable. Per communication with ADFG staff, the analysts can report that fewer than 100 halibut were harvested annually by charter operations in IPHC areas 4A or 4B in five of the six years since 2014; no charter fish are reportable in Areas 4CDE. Additional description of charter activity in the region of study is included at the end of this section.

Across all IPHC areas, including those outside of Alaska, recreational removals (mortality) account for 17 percent to 19 percent of total halibut removals according to the fishery statistics put out by IPHC for their three most recent Annual meetings covering fishing years 2017 through 2019.[52] The greatest proportion of coastwide removals was commercial landings (61 percent to 62 percent from 2017 through 2019). Bycatch in other commercial fisheries – including but not limited to Amendment 80 – accounted for 14 percent to 17 percent of removals during the 2017 through 2019 period. Subsistence removals were stable from 2017 through 2019, accounting for 3 percent of removals. This section is focused on halibut fishing in IPHC Area 4, where non-commercial recreational catch is quite low and only a small amount of guided recreational activity occurs. A 2013 ADFG estimate found that charter operations in Area 3B and Area 4, combined, represented less than 0.4 percent of Alaska's total charter/non-charter recreational yield.[53] For this reason, *all* recreational anglers in areas outside of 2C and 3A (i.e., in Area 4) are subject to the regulations that govern unguided (non-commercial, non-charter) anglers in Areas 2C and 3A. The most salient of these regulations are a sport fishing season that extends from February 1 to December 31 and a bag limit of two halibut of any size per person per day unless otherwise specified. The complete regulations are defined in Sections 26 and 29 of the IPHC's annual management measures and summarized by NMFS for public consumption.[54]

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[51] http://www.afsc.noaa.gov/maps/ESSR/recreation/default.htm

[52] Data for years prior to 2017 can be found in IPHC Annual Reports at: https://www.iphc.int/library/documents/category/annual-reports

[53] See Section 4.4, of the Recreational Quota Entity Secretarial Review Draft at https://www.npfmc.org/wp-content/PDFdocuments/halibut/HalibutCharterRQE517.pdf

[54] https://www.fisheries.noaa.gov/alaska/recreational-fishing/unguided-sport-fishing-halibut-alaska

Due to the relatively small volume of recreational use in Area 4 and the management under a daily bag limit rather than an area/sector allocation – such as the Catch Sharing Plan that defines the commercial IFQ and charter sector allocations in Areas 2C and 3A – IPHC accounts for recreational removals using a projection. Projected sport harvest in areas outside of 2C and 3A are combined with projected subsistence harvest and projected bycatch in non-target commercial fisheries and then deducted from Total Constant Exploitable Yield (TCEY) to arrive at Fishery Constant Exploitable Yield (FCEY), which then becomes the annual combined catch limit for the commercial IFQ sector and the charter allocation to 2C and 3A.[55]

The analysts summarize recreational catch of halibut for the ADFG management areas that coincide with Area 4 in which halibut were recorded on the annual Statewide Harvest Survey (SWHS) from 2010 through 2018 (Table 25). Those areas include ADFG Areas R, S, and T in the Southcentral region and Areas V and W in the Arctic-Yukon-Kuskokwim region.[56] The primary place where unguided recreational halibut fishing occurs within Area 4 is in Unalaska Bay in Area R. The data in the table represent the number of halibut that were retained. (Records dating farther back in time showed a one-year incidence of recreational halibut catch in Areas V and W in 2005 (32 fish in Area V and 96 fish in Area W). Note that the data in the table are derived from a scientific survey of resident and non-resident angler households, and that the precision of the estimates depend on the amount of fishing that occurs and the number of survey responses received. As a result, standard error for the total sport harvest estimate may be large; standard error for Area R has been around 38-41 percent in recent years.

Table 25. Sport harvest estimates by selected ADFG region and area, 2009-2018 (Source: SWHS)

Region	Area	Unguided Recreational Harvest (number of fish)									
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Southcentral	Alaska Peninsula/ Aleutian Islands (Area R)	3,300	2,352	2,034	3,625	2,025	1,063	778	1,657	409	1,148
	Kvichak River Drainage (Area S)	0	0	33	0	0	0	32	0	0	0
	Nushagak, Wood River, & Togiak (Area T)	0	0	0	0	0	0	0	21	0	0
Arctic-Yukon-Kuskokwim	Kuskokwim River/Bay Drainages (Area V)	0	0	0	0	0	33	0	0	0	0
	Seward Peninsula/ Norton Sound (Area W)	0	0	0	15	0	0	0	0	0	21
Alaska Total		440,255	397,998	393,571	387,713	453,594	407,975	420,484	399,635	352,454	351,842

ADFG reports final sportfishing harvest estimates to IPHC using the Commission's management area definitions for use in the calculation of total removals and setting FCEY for the commercial IFQ fishery and the 2C/3A charter sector. In a letter to IPHC dated October 2019 accompanying final 2018 estimates, ADFG outlines the department's estimation methods.[57] Estimates for IPHC areas 3B and 4 combine charter and unguided activity and are based entirely on the SWHS. Because ADFG does not sample sport harvest in those areas, the department applies the average fish weight of unguided Kodiak sport harvest as a proxy to calculate yield (14.08 net pounds in 2018, down from 15.35 pounds in 2017). Unguided Kodiak harvest is used because the unguided sector is not affected by size limits. In 2018, recreational halibut harvest in IPHC Area 4 was estimated to equal 13,000 pounds of removals, which was up from 6,000 pounds estimated in 2017 and close to the 15,000 pounds estimated in 2016. The October 2019

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[55] This process is diagramed in a flowchart in Figure 4-1, Section 4.4, of the Recreational Quota Entity Secretarial Review Draft https://www.npfmc.org/wp-content/PDFdocuments/halibut/HalibutCharterRQE517.pdf

[56] Maps of the regions and areas as well as SWHS data are available to the public at: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

[57] https://www.npfmc.org/wp-content/PDFdocuments/halibut/ADFG_sport_fishery_report_IPHC_2019.pdf

ADFG letter provided preliminary 2019 harvest projections for Area 4, projecting 810 fish at an average net weight of 16.92 pounds for a yield of 14,000 pounds in removals.[58]

To compare the scale of sport halibut harvest in Area 4 to that of Areas 2C and 3A, the analysts refer to ADFG's final 2018 harvest estimates for Areas 2C and 3A.[59] In 2018, Area 2C charter harvest was estimated using charter logbooks at 69,992 fish with a net weight yield of 656,000 pounds (avg. net wt. 9.37 lbs.), down from 70,647 fish at 901,000 pounds in 2017. Unguided harvest in 2C was in 2018 was estimated using the SWHS at 57,688 fish with a yield of 1,216,000 pounds (avg. net wt. 21.09 lbs.), down from 60,817 fish with a net weight yield of 1,218,000 pounds in 2017. Area 3A charter harvest was estimated at 136,312 fish with a yield of 1,874,000 pounds (avg. net wt. 13.75 lbs.), down from 142,664 fish with a net weight yield of 2,076,000 pounds. Unguided harvest in 3A was 105,880 fish with a yield of 1,555,000 pounds (avg. net wt. 14.69 lbs.), down from 108,972 fish with a net weight yield of 1,530,000 pounds. These annual reports document recreational removals in 2C and 3A dating back to 1995. Total recreational harvest estimates (charter and non-charter) in Area 2C have ranged from 1,029,000 pounds in 2011 to 3,264,000 pounds in 2008. Total recreational harvest estimates (charter and non-charter) in Area 3A have ranged from 3,542,000 pounds in 2016 to 6,283,000 pounds in 2007. Recreational harvest estimates for 2019 should be available in December 2020 barring delays in data collection.

IPHC has recently published estimates of retained sport catch by area for 2013 through 2019.[60] Discard mortality and, thus, total removals are also reported but are not available for Areas 4BCDE. During that period retained sport catch in Area 4A – where most of the sport activity in the BSAI region occurs – ranged from three to seven metric tons per year, or roughly 6,000 pounds (2017) to 15,000 pounds (2016).

Another measure of recreational fishing engagement at the community level is the number of sportfishing licenses sold in a community. AFSC's Alaska Community Profiles uses AKFIN data to map the number of licenses sold in a community, sportfish licenses sold to community residents, charter fishing businesses in a community, and charter guide licenses held by community residents. The most recent data included in the map function is for 2014. While use of these licenses does not necessarily indicate engagement in the halibut recreational fishery, it gives some indication of communities' sportfishing engagement in general. Of the Bering Sea communities identified in this SIA, Unalaska, Dillingham, King Salmon, and Nome possessed the greatest number of sportfishing licenses, though far fewer than communities such as Kodiak and Homer. The only active charter fishing business identified in the study area by the AFSC Alaska Community Profiles in 2014 was a single operation in Unalaska.

Unalaska/Dutch Harbor experienced a pulse in halibut sport charter business activity following the local landing of a new world-record Pacific halibut in 1995 and then another 1996, with the 459-pound Pacific halibut caught in 1996 remaining the current (as of 2020) all-tackle world-record.[61] The community, however, saw drop-off in sport charter demand in more recent years. Information gathered during recent (July 2019) fieldwork in the community suggest that there are currently two fishing charter businesses in the community, both of which are active during the summer months. One is a long-established undertaking run by an otherwise retired individual who started the business while still working full-time

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[58] ADFG assumes a 6.0 percent release mortality rate in Area 4 based on non-charter data from other areas. Due to the low amount of catch, release mortality for 2018 was estimated at 0.000 million pounds. Zero is an effect of rounding to three digits; the October 2019 ADFG letter states that "Areas 3B and 4 each had negligible amounts of release mortality from the sport fishery."

[59] https://www.npfmc.org/wp-content/PDFdocuments/halibut/ADFG_sport_fishery_report_IPHC_2019.pdf

[60] https://www.iphc.int/data/datatest/pacific-halibut-recreational-fisheries-data, accessed June 2020.

[61] https://igfa.org/igfa-world-records-search/?search_type=CommonNameSummary&search_term_1=Halibut%2C+Pacific. Accessed 6/5/2020.

in another occupation in the community. The other is relatively recently established and is primarily run by two individuals who currently have other full-time employment. Depending on weather, sea conditions, fishing conditions, and customer preference, charter destinations at times range widely beyond Unalaska Bay. A long-established third charter business is also active in Unalaska, but a part of a multi-faceted business with the tourism-oriented portion of that business focused on birdwatching, whale-watching, eco-tourism, and the like rather than on recreational fishing (although, according to its owner, charter fishing was included in its portfolio of services in its early years of operation).

Aside from salmon and crab, sportfishing for non-halibut species in the ADFG saltwater areas that coincide with IPHC Area 4 also occurs at low volumes. Reported catch of groundfish species that are also considered in this analysis included Pacific cod, rockfish (primarily black and yelloweye), and sablefish. Recreational catch of Pacific cod almost exclusively occurred in Unalaska Bay within Area R (Alaska Peninsula/Aleutian Islands). From 2010 through 2017, total catch ranged from 686 fish (2017) to 3,789 fish (2012) with an annual average of 1,317 fish and a median of 985 fish. Fifty-two Pacific cod were caught in Area T during 2016. Recreational catch of rockfish and sablefish were also exclusive to Area R. Average rockfish catch was 1,216 fish during the 2010 through 2017 period (maximum of 2,455; minimum of 409). Average sablefish catch was 72 fish (maximum of 133; minimum of zero).

6 Regional and Community Context of the Fisheries

Relatively recent information on the range of BSAI groundfish fishing communities relevant to the proposed action may be found in a number of other NPFMC groundfish-related documents, including the Proposed Bering Sea/Aleutian Islands Halibut Prohibited Species Catch Limit Revisions – Appendix C: Community Analysis (AECOM 2015) and the Catcher/Processor Mothership Restrictions in the Bering Sea and Aleutian Islands when taking Directed Non-CDQ Pacific Cod Deliveries from Trawl Catcher Vessels – Appendix 1: Social Impact Assessment (Wislow Research 2019).

Less recent, but more comprehensive community/fishery context information may be found in the Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement (NMFS 2004) and Sector and Regional Profiles of the North Pacific Groundfish Fishery (Northern Economics and EDAW 2001), in a technical paper (Downs 2003) supporting the Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska (NMFS 2005) as well as that Environmental Impact Statement itself, the Final Environmental Impact Statement for Steller Sea Lion Protection Measures for Groundfish Fisheries in the Bering Sea and Aleutian Islands Management Area (NOAA 2014), and Final Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis to Reduce Gulf of Alaska Halibut Prohibited Species Catch Limits, Amendment 85 to the Fishery Management Plan for Groundfish of the Gulf of Alaska: Appendix 7 – Community Analysis (AECOM 2013). These sources also include specific characterizations of the degree of individual community and regional engagement in, and dependency upon, the North Pacific groundfish fishery.

For this analysis, these documents, as well as other NPFMC-related documents concerning other fisheries but containing detailed community profile information for a number of the BSAI groundfish-related communities, are incorporated by reference, including the Five-Year Review of the Crab Rationalization Management Program for Bering Sea and Aleutian Islands Crab Fisheries – Appendix A: Social Impact Assessment (AECOM 2010); Comprehensive Baseline Commercial Fishing Community Profiles: Unalaska, Akutan, King Cove, and Kodiak, Alaska – Final Report (EDAW and Northern Economics 2005); and Comprehensive Baseline Commercial Fishing Community Profiles: Sand Point, Adak, St. Paul and St. George, Alaska – Final Report (EDAW/AECOM and Northern Economics 2008).

In general, the fishing communities expected to be potentially directly and adversely affected by the proposed action alternatives are those BSAI groundfish communities where potentially affected vessels are owned; where vessels make product transfers/port calls and generate associated economic activities and public revenues, including those derived from shared state Fishery Resource Landing Taxes; where vessel support services are provided; where vessels are otherwise located or homeported during the year and generate some level of related economic activity; and where skippers and crew reside. Similarly, in general, the fishing communities expected to be potentially directly, indirectly, and adversely affected by the no-action alternative under specific circumstances, but potentially directly, indirectly, and beneficially affected by proposed action alternatives under other circumstances, are those BSAI halibut communities where potentially affected vessels are owned; where vessels make deliveries to shore-based processors and generate associated economic activities and public revenues, including those derived from local landing or severance taxes and/or state shared Fishery Business Taxes; where vessel support services are provided; where vessels are otherwise located or homeported during the year and generate some level of related economic activity; and where skippers and crew reside.

Community-level information for some of these potential data categories, however, is not available or is too inconsistently collected to be useful for multi-community analyses. Information on vessel homeport (or the meaning of homeport designations for given vessels), for example, is known to be inconsistent enough for homeport designation to be of limited utility as an indicator of location of vessel-associated economic activity in general; direct information on the location of vessel purchases of support services specifically is not readily available. Information is not readily available on the community of long-term residence of vessel skippers and crew and processing crew that work aboard the potentially affected vessels or in the shore-based processors active in the BSAI halibut fisheries. Information developed for other recent analyses, however, suggests that, generally, companies operating vessels in the BSAI groundfish and BSAI halibut catcher vessel sectors tend to recruit crew from many locations, depending on the specific location of vessel ownership, homeport, and/or the scale and scope of vessel operations. Different shore-based processors use a combination of local and regional or national hiring that varies based on the location of the processing plant; the processing season and combination of species processed; and individual operational characteristics, including the size of plant operations, the mix of product forms produced, and the scale of the operating company. To the extent that these types of information are available for the individual communities characterized, a summary of these types of data is included in the regional/community characterizations below.

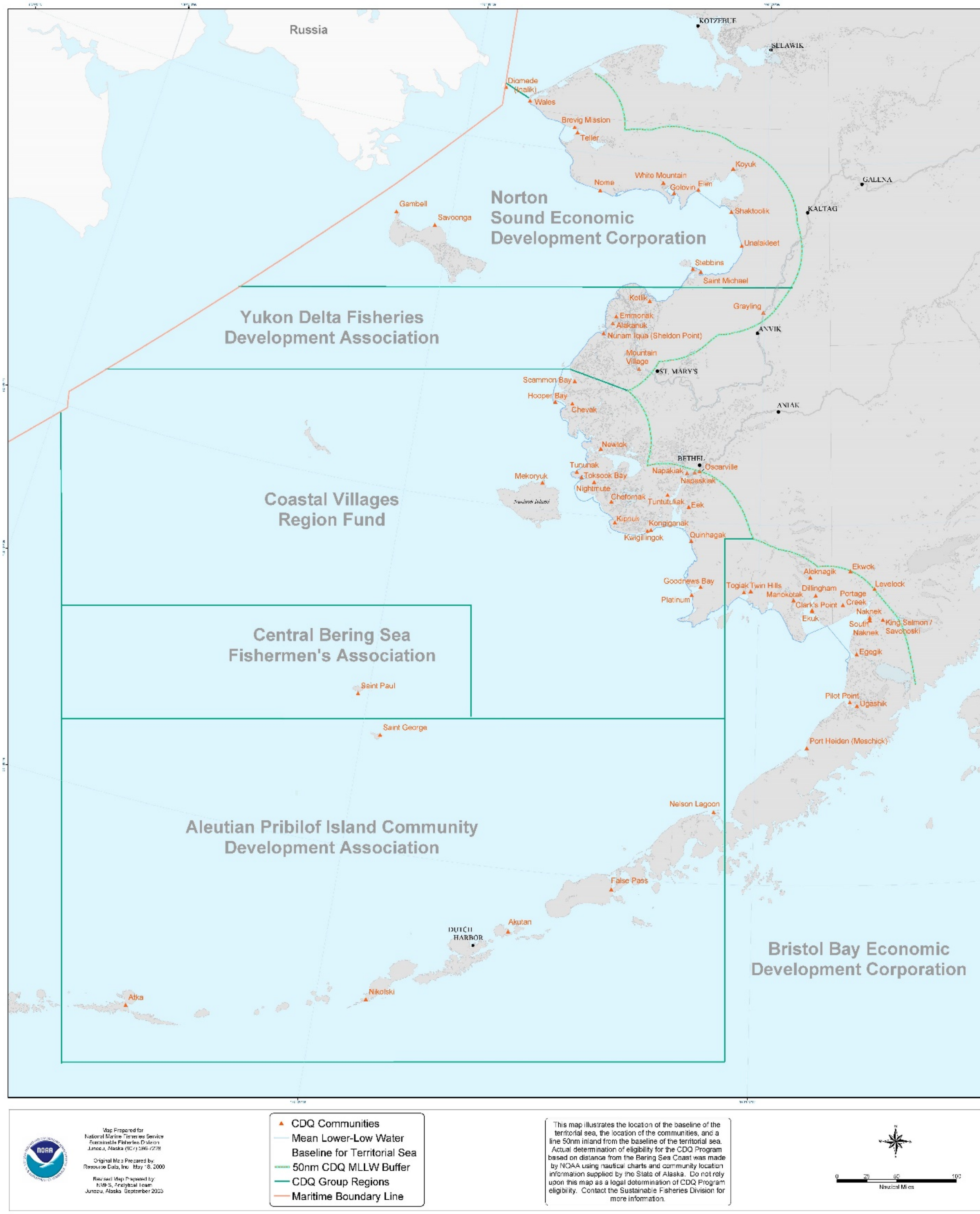
Similarly, the availability, timeliness, and comprehensiveness of information on the subsistence use of halibut (and other subsistence resources) varies by community. The most recent subsistence halibut data available for most communities is from Fall and Koster (2020). To the extent that this type of information is available for the individual communities characterized, a summary of data from this and other relevant sources is included in the regional/community characterizations below. Supplementary information on the harvest of fish, other marine species, land mammals, and terrestrial vegetation are drawn from ADFG Division of Subsistence's most recent report on "Food Production and Nutritional Values of Noncommercial Fish and Wildlife Harvests in Alaska" (2019)[62] and "Estimated Harvests of Fish, Wildlife, and Wild Plant Resources by Alaska Region and census Areas, 2017" (2019).[63]

The following sections provide a regional and community-by-community characterization of the local community context of BSAI Amendment 80, BSAI halibut commercial, and BSAI halibut subsistence fisheries for those communities. For Alaska communities, these are organized by CDQ region as these regions provide logical units of socioeconomic analysis, covering the BSAI coastal region, and the fact that CDQ entities mediate, to varying degrees, direct engagement of local communities in the relevant fisheries (and would themselves be potentially affected in multiple ways by the proposed management alternatives). Two communities that are not a part of any CDQ group, Unalaska and Adak, are included in the APICDA regional discussion due to their location, cross-cutting ties with multiple regional institutions, and the key roles they play in the BSAI fisheries relevant to this analysis. Figure 3 provides a map showing the locations of Western Alaska CDQ program eligible communities and the CDQ groups to which they belong.

[62] http://www.commonwealthnorth.org/download/Wild-Harvest-Notebook.pdf accessed 8/20/2020.

[63] https://www.adfg.alaska.gov/static-sub/CSIS/PDFs/Estimated%20Harvests%20by%20Region%20and%20Census%20Area.pdf accessed 8/20/2020.

Figure 3. Western Alaska Community Development Quota Program Eligible Communities and CDQ Groups



Source: https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/community-development-quota-cdq-program, accessed 4/18/2021

Table 26 provides selected demographic indicators for each of the CDQ groups, including all communities in each CDQ group, not just those communities that were considered potentially substantially engaged in or dependent on the Amendment 80 fishery and/or the BSAI/Area 4 halibut fishery for the purposes of this analysis. As shown, while there is considerable variation in the number of communities and the total population across the different CDQ regions, the percentage of Alaska Native, minority, and low-income residents for each of the regions is greater than the analogous percentages for general population of the state of Alaska. As described in the individual CDQ regional discussions, different CDQ groups are differently situated with respect to direct and indirect participation in the Amendment 80 fishery and the BSAI/Area 4 directed halibut fishery, both in terms of CDQ and non-CDQ portions of both fisheries. Further, patterns of CDQ allocations themselves among the six CDQ groups vary considerably by fishery, including the major Amendment 80 BSAI groundfish species and BSAI/Area 4 halibut, such that changes in the relative value of one or the other would differentially impact individual CDQ groups.

Table 26. CDQ Group and State of Alaska Selected Demographic Indicators

		2010 Decennial Census Data			2019 American Community Survey Data		
CDQ Group	Number of Communities	Total Population	Alaska Native/ Native American Residents (percent of total population)	Minority* Residents (percent of total population)	Per Capita Income (dollars)	Number of Family Households	Low-Income** Residents (percent of total population)
APICDA	6	1,295	22.2%	90.4%	$31,922	105	13.2%
BBEDC	17	5,417	61.5%	74.7%	$31,090***	1,125	15.1%
CBSFA	1	479	82.3%	89.4%	$33,925	69	15.2%
CVRF	20	8,570	95.3%	97.3%	$13,726	1,666	34.8%
NSEDC	15	9,731	68.1%	85.8%	$23,807	1,954	20.8%
YDFDA	6	3,210	94.2%	96.7%	$12,723	657	38.5%
All CDQ Groups	**65**	**28,702**	**76.0%**	**88.6%**	**$20,909*** **	**5,576**	**26.2%**
State of Alaska	--	**626,932**	**14.1%**	**37.1%**	**$36,787**	**166,325**	**10.7%**

*Defined as all persons other than those self-identied being in both "white" and "non-Hispanic" census categories.
**Defined as those persons living below the poverty threshold by the U.S. Census Bureau in the 2015-2019 American Community Survey. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $26,246 in 2020.
***Calculation does not include Portage Creek.
Source: US Census 2010; US Census 2020

6.1 Aleutian Pribilof Islands Community Development Association Region, Unalaska, and Adak

6.1.1 Location

APICDA is a CDQ entity that includes six communities located on the western portion of the Alaskan Peninsula and in the Aleutian and Pribilof Islands (Figure 3) that have a combined total population of 1,295 (and Table 26). As identified through initial screening criteria, BSAI communities potentially substantially engaged in or dependent upon the BSAI/Area 4 halibut fishery in APICDA include Akutan, Atka, and St. George. Other communities in APICDA include False Pass, Nelson Lagoon and Nikolski. False Pass appears in the data used for this analysis as being the location of shore-based BSAI/Area 4 processing in four of the ten years 2010-2019; Nelson Lagoon and Nikolski do not appear in the data as participating either the harvesting or processing sector of the commercial BSAI/Area 4 halibut fishery in any year 2010-2019.

Unalaska and Adak, the two non-CDQ communities on the Aleutian Chain, are included in this regional discussion due to the key roles they play in the BSAI fisheries relevant to this analysis. Because of substantial existing capacity to participate in Bering Sea fisheries, Unalaska did not qualify as a CDQ community, but with an Aleut population larger than that of each of the APICDA communities,[64] it is an ex-officio member of APICDA, and Unalaska/Dutch Harbor residents participate in several APICDA programs. Adak was almost exclusively a military installation at the time of the creation of the CDQ program and therefore was not considered for inclusion as a CDQ community. Following base closure, however, Adak has been the focus of effort by the regional ANCSA corporation (the Aleut Corporation) and others to develop a sustainable civilian community with a local economy based on commercial fishing and maritime services.

Akutan, False Pass, and Nelson Lagoon are located within the Aleutians East Borough (AEB).[65] The rest of the APICDA member communities (Atka, Nikolski, and St. George), along with Unalaska and Adak, are not located within an organized borough.[66] All APICDA communities are home to federally recognized Tribal entities, as is Unalaska. With respect to IPHC Regulatory Areas, as shown on Figure 1: False Pass is adjacent to Area 3B to the south and the Closed Area to the north; Akutan and Unalaska/Dutch Harbor are in Area 4A; Atka and Adak are in Area 4B; and St. George is in Area 4C. Nikolski, located on Umnak Island to the west of Unalaska Island, is in Area 4A and Nelson Lagoon, on the northern coastline of the Alaska Peninsula to the east of False Pass, is adjacent to the Closed Area.

6.1.2 Historical Overview

Archaeological evidence suggests that the Alaskan peninsula and Aleutian Islands have been inhabited for around 9,000 years. Excavation of kitchen-middens revealed consistent use of marine resources, including bone fishhooks and fish scrapers, stone sinkers, as well as bones of many marine species including whales, sea-lions, sea otters, seals, sea birds, fish (including halibut, cod, and sculpin) and mollusk shells (Jochelson 2002). The Native people of the region refer to themselves as Unangax̂ (Unangam tunuu in their own language) or Aleut (a name applied by foreigners in the mid-1700s) (APIA 2019). Unangax̂ subsisted on sea mammals, fish, shellfish, birds, and plants. They fashioned lines of dried, braided kelp, notched stone sinkers and large two-piece bone hooks with a curve and a barb to fish for cod and halibut while smaller rounded hooks made from a single piece of bone or shell were used to fish for sculpin and flounders (Collins *et al.* 1945).

[64] In 2010, Unalaska's Aleut population was larger than the Aleut populations of the potentially BSAI halibut dependent APICDA member communities (Akutan, Atka, and St. George) combined, and it was only about seven percent smaller than the Aleut populations of all APICDA member communities combined.

[65] Port Moller, site of a shore-based processing plant since about 1916 (currently owned by Peter Pan Seafoods https://dcced.maps.arcgis.com/apps/MapJournal/index.html?appid=05c3d6a437f64ff6905d2b04246931c6 accessed 8/4/2020), is a seasonally occupied unincorporated location within the AEB that is neither an ANCSA nor an APICDA (or BBEDC) community. While not a year-round community, it is the focus of activity of the "Gentleman's Fleet," an assemblage of fishing vessels that travel to the port to harvest red and silver salmon every summer. The fleet reportedly takes its name from a cordial working relationship cultivated by several generations of crews looking out for one another while fishing out of the port (https://alaska.coastguard.dodlive.mil/2015/06/where-no-coast-guardsman-has-gone-before-port-mollers-gentlemans-fleet/). Before implementation of the BSAI crab rationalization program, Port Moller had a history of participation in the crab fisheries included in that program, based on the activity of locally operating floating processors. Following implementation of rationalization, however, the processor quota shares originally associated with Port Moller have been processed at shore-based processing facilities in another AEB community owned by the same firm that accumulated the processing history that qualified for initial allocation of the shares (AECOM 2010).

[66] AEB communities that are not members of APICDA include Cold Bay, King Cove, and Sand Point.

Russian ships first made contact in the Aleutians in 1741 and subsequently discovered St. George in 1786 while searching for fur seal breeding grounds. Seasonal work camps were established in St. George where Russians forced many Unangax to relocate and harvest fur seals. These seasonal work camps became permanent, year-round villages by the early 1800s. Commercial fishing for cod and salmon was developed rapidly in the region as the fur industry declined, and by the early 1900s, commercial fishing became the largest source of employment in the Aleutians, concentrated particularly in the eastern region (NPFMC 2007). During World War II many Unangax were evacuated and interned in Southeast Alaska.

Larger scale commercial fishing started in the early 1900s when fishing stations opened throughout the eastern Aleutians, and one shore station opened at Attu (western Aleutians) where Atka mackerel and greenling were caught. Salmon canneries opened in the eastern islands of Unalaska and Umnak, with limited success. A purse seine fishery for herring developed in the vicinity of Unalaska/Dutch Harbor with catches peaking in 1932 at about 2,800 metric tons, then declining until the fishery was abandoned in 1946 (INPFC 1979, Bakkala 1981). Whaling was also common in the early 1900s. Norway built a whaling station in Akutan in 1907 which operated until 1939 when it was sold to the Navy with the threat of World War on the horizon.

A mostly foreign groundfish fleet developed in the 1960s targeting pollock and Pacific ocean perch. At this time, the American fleet started fishing for red king crab near Adak and Unalaska (NPFMC 2007). As the abundance of red king crab declined in the Aleutian Islands, fishers gradually transitioned to harvesting golden king crab and by 1982, golden king crab landings exceeded those for red king crab, although the total volume of golden king crab landed was never as high as for red king crab (Otto 1981). Regulations restricted foreign fishing beginning in the mid-1970s and, by the 1990s the groundfish fleet was a domestic fleet with total catches in excess of 150,00 metric tons. In 1999 the pollock fishery was severely restricted due to concerns regarding the fishery's impact on Steller sea lions (Barbeaux 2004). Since then, total groundfish catches have averaged slightly above 100,000 metric tons and are roughly 50 percent Atka mackerel, 30 percent Pacific cod and 15 percent Pacific ocean perch. Recently, the highest exploitation rates on groundfish are for Pacific cod and Atka mackerel, followed by halibut, Pacific ocean perch and sablefish, targeting pollock, Atka mackerel, and Pacific cod (NPFMC 2007).

A summary of the institutional structure of the contemporary APICDA region communities relevant to this SIA analysis is shown in Table 27. Narrative summaries of the historic context of each community listed are presented in the following sections.

Table 27. Community Institutional Summary (Selected APICDA CDQ Communities, Adak, and Unalaska)

Community	Alaska Native Community Name (Language)	Borough	Municipal Government	Incorporation Type (and Date)	ANCSA Community	ANCSA Regional Corporation	ANCSA Village Corporation	Federally Recognized Tribe	CDQ Community (Group)
Adak	Adaax (Unangan Aleut)	Unorganized Borough	City of Adak	2nd Class City (2001)	No	Aleut Corporation	--	--	No
Akutan	Achan-ingiiga (Unangan Aleut)	Aleutians East Borough	City of Akutan	2nd Class City (1979)	Yes	Aleut Corporation	Akutan Corporation	Native Village of Akutan	Yes (APICDA)
Atka	Atx^ax^ (Unangan Aleut)	Unorganized Borough	City of Atka	2nd Class City (1988)	Yes	Aleut Corporation	Atxam Corporation	Native Village of Atka	Yes (APICDA)
St. George	information unavailable	Unorganized Borough	City of St. George	2nd Class City (1983)	Yes	Aleut Corporation	St. George Tanaq Corporation	St. George Island (Pribilof Islands Aleut Communities of St. Paul & St. George Islands)	Yes (APICDA)
Unalaska	Iluulux^ (Unangan Aleut)	Unorganized Borough	City of Unalaska	1st Class City (1942)	Yes	Aleut Corporation	Ounalashka Corporation	Qawalangin Tribe of Unalaska	No*

*Although Unalaska is not a CDQ community, it is an ex-officio member of APICDA..

Source: DCRA Community Database, https://dcra-cdo-dcced.opendata.arcgis.com/ Accessed 10/6/2020.

6.1.2.1 Adak

Adak Island was abandoned in the early 19th Century when Aleut hunters moved or were forced eastward because of the Russian fur trade. The Native people continued to use the island as a place to fish and hunt until the beginning of World War II. The island had been designated in 1913 as part of the Aleutian Island Reservation, but in the 1940's became a key operations and supply location for United States military forces after the Japanese occupation of Kiska and Attu Islands during World War II. Adak's population in the spring of 1944 was made up of at least 32,000 military personnel, peaking at approximately 90,000 during the early staging periods of the war. After World War II, Adak was developed into a Naval Air Station and played an important role during the Cold War as a submarine surveillance center. The navy base housed 6,000 personnel and their families during its peak, but substantial cutbacks occurred in 1994 and navy family housing and schools were closed. Adak Naval Station officially closed on March 31, 1997. Aleut Corporation acquired most Adak's facilities in 2004 in a land transfer agreement under the federal Base Realignment and Closure process and in 1998 about 30 families with children (mostly Aleut Corporation shareholders) relocated to Adak.

Adak incorporated as a 2nd Class City in 2001 and provides police and fire services, electricity (from diesel fuel), water, and a sewer system. Adak Medical Clinic is operated by Eastern Aleutian Tribes. Although Adak was an Aleut village in earlier times, it was a military base during the latter half of the twentieth century. While neither an ANCSA community (as it was a military installation rather than civilian community at the time of ANCSA) nor the location of a federally recognized Alaska Native tribe, Adak does have strong ties to the Aleut Corporation, which is an ANCSA regional corporation, and its subsidiaries, which have been heavily involved with the conversion of the former military installation into a civilian community with a local economy based on commercial fishing and maritime support services and has taken an active role in the development of the city after the base closure, taking over responsibility for some services to the community, such as the landfill. The Aleut Corporation and its subsidiaries own much of the infrastructure in the community, including the building that houses seafood processing operations, and are otherwise directly involved in fishery issues as the recipient of a directed fishery allocation of AI pollock to support the economic development of the community of Adak. While not a CDQ community, Adak is the only community outside of the GOA with a Community Quota Entity (CQE).[67] The local CQE, the Adak Community Development Corporation (ACDC), is involved with range of fishery issues, including (1) managing the community's 10 percent allocation of the Western Aleutian golden king crab quota initially allocated under the BSAI crab rationalization program to aid in the development of seafood harvesting and processing activities within the community and (2) increasing Adak ownership of IFQ in the halibut and sablefish fisheries through the CQE program. The City of Adak is financially involved in the local seafood processing plant as it bought processing equipment from a former plant operator and then financed the sale of the gear to the most recent plant operator, which ceased operations in June 2020.

6.1.2.2 Akutan

Akutan began in 1878 when the Western Fur and Trading Company established a sea otter trading post and a Russian Orthodox Church and school were built. Alexander Nevsky Chapel was built in 1918 to replace the original structure. The Pacific Whaling Company built a whale processing station across the bay from Akutan in 1912. It was the only whaling station in the Aleutians and operated until 1939. After the Japanese attacked Unalaska in June 1942, the U.S. government evacuated Akutan residents to the

[67] Adak, an AI coastal community in Area 4B, may hold halibut quota shares (QS) in Area 4B in all vessel categories. All other CQE communities are in the GOA region and may hold halibut QS in Area 2C, 3A, and/or Area 3B (but not in Area 4). Source: https://www.ecfr.gov/cgi-bin/text-idx?SID=edd486aecba9bfd09bd71897f21adf3e&mc=true&node=pt50.13.679&rgn=div5#ap50.13.679.0000_0nbspnbspnbsp.55 accessed 2/17/2021.

Ketchikan area. The village was re-established in 1944, although many villagers chose not to return. This exposure to the outside world brought many changes to the traditional lifestyle and attitudes of the community. The Wakefield Seafood Processors began to process king crab in 1948. In 1979, Seawest, Inc. purchased Wakefield operations, which triggered rapid expansion of Akutan's shore-based facilities. Akutan incorporated in 1979 as a 2nd Class City with a mayoral form of government and is a part of the AEB.[68] The Akutan Corporation is the local ANCSA chartered village corporation, the Aleut Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Akutan.

6.1.2.3 Atka

Atka is a Native village that has persisted for thousands of years, though its population is declining. The island has been occupied by Unangas for at least 2,000 years. Recent archaeological evidence indicates that the present village site may have had human use since prehistoric times. The townsite was settled in the 1860s. After the end of the sea otter hunting era in the late 1800s, Atka had no viable cash economy. Reindeer were introduced to the island in 1914. During the 1920s, Atka became relatively affluent due to fox farming. After the Japanese attacked Unalaska and seized Attu and Kiska in June 1942, the U.S. Government evacuated Atka residents to the Ketchikan area and burned the village to the ground to prevent Japanese forces from using it and advancing. The community was rebuilt by the U.S. Navy after the war, and residents were allowed to return. Many Attu villagers, released from imprisonment in Japan in 1945, relocated to Atka. Atka incorporated as a 2nd Class City in 1988, is in the Aleutians West Census Area, and is not under the jurisdiction of a borough. The community has a mayor and a seven-member city council and municipal employees which include a fire chief, a Village Public Safety Officer (VPSO), and Anchorage-based City Administrator. The Atxam Corporation is the local ANCSA chartered village corporation, the Aleut Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Atka.

6.1.2.4 St. George

In 1868, the Pribilof Islands were declared a special Federal Reserve with the purpose of managing fur seals and other fur-bearing species, and the federal government began to contract seal harvest to private companies. In 1870, the U.S. Government awarded the Alaska Commercial Company a 20-year sealing lease, and they provided housing, food, and medical care to the Aleuts in exchange for seal harvesting. In 1890, a second 20-year lease was awarded to the North American Commercial Company. However, fur seals were severely over-harvested, and poverty ensued. The 1910 Fur Seal Act ended private leasing on the islands and placed the community and fur seals under the U.S. Bureau of Fisheries. Food and clothing were scarce, social and racial segregation was practiced, and working conditions were poor. During World War II, the Pribilof Aleuts were moved to Funter Bay on Admiralty Island in Southeast Alaska as part of the emergency evacuation of residents from the Bering Sea. Unlike Aleutian Islands residents, they were confined in an abandoned cannery and mine camp. In 1979, the Pribilof Aleuts received $8.5 million in partial compensation for the unfair and unjust treatment the federal administration subjected them to from 1870 to 1946. With Alaska Statehood in 1959, 70 percent of revenues from the commercial fur seal hunt began to go to the State of Alaska. This decrease in federal revenue, in combination with an unexplained decline in productivity of the seal population in the 1960s, led the federal government to begin phasing out of the Pribilof Islands. Federal sealing operations were consolidated in Saint Paul in 1972, leaving Saint George as a research station to monitor the status of the fur seal population. Many

[68] Among Alaska communities in the BSAI region identified through use of initial screening criteria as potentially substantially engaged in or substantially dependent upon the BSAI commercial halibut fishery, only Akutan is part of an organized borough.

Saint George residents chose to relocate to Saint Paul or left the Pribilof Islands entirely, but a majority remained in the community. In 1983, Congress passed the Fur Seal Act Amendments, which brought government control of the commercial seal harvest and the federal presence in the Pribilof Islands to an end. Saint George incorporated as a 2nd Class City in 1983. The St. George Tanaq Corporation is the local ANCSA chartered village corporation, the Aleut Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is St. George Island.

6.1.2.5 Unalaska

Unalaska became a Russian trading port for the fur seal industry in 1768. In 1787, many hunters and their families were enslaved and relocated by the Russian American Company to the Pribilof Islands to work the fur seal harvest. By the late eighteenth century, the Aleutians had for the most part been abandoned by Russians in favor of eastern trapping grounds. However, several strategic outposts remained including one in Iliuliuk Harbor. In 1825, the Russian Orthodox Church of the Holy Ascension of Christ was constructed. The founding priest, Ivan Veniaminov, composed the first Aleut writing system with local assistance and translated scripture into Aleut. Since Aleuts were not forced to give up their language or culture by the Russian Orthodox priests, the church became strong in the community. By 1830 and 1840, however, only 200 to 400 Aleuts lived in Unalaska.

By 1850, Russians abandoned the outpost due to the diminished availability of furs. American influence in Alaska increased as people migrated northward; drawn by furs, fishing, and whaling. Dutch Harbor flourished in the 1880s as a coaling station and commercial trade center. The Klondike Gold Rush of the 1890s brought many ships to Dutch Harbor, lured by its position as a gateway to the gold fields of northwest Alaska. By the turn of the twentieth century, several seafood processors may have been in operation processing herring, salmon, and whale meat. As coal began to be replaced by oil as ship fuel, the coal trade began to diminish in Dutch Harbor. Fox farming became popular throughout the Aleutians in 1910, which brought economic relief to Unalaska until the Great Depression of the 1930s saw the demise of the fur industry. Unalaska incorporated as a 1st Class City in March 1942. Dutch Harbor Naval Station and Fort Mears were established in Unalaska as diplomatic relations with the Japanese deteriorated. Other military installations were established on Hog Island and remote locations throughout the area. Permanent facilities including a major hospital complex, docking and fueling facilities, submarine drydocking and repair facilities, an airport, and extensive living and recreational facilities were built to serve military personnel stationed in Unalaska. During this time, many Native residents were evacuated to Southeast Alaska communities. On June 3, 1942, Japanese naval forces bombarded Dutch Harbor, damaging or destroying several facilities and killing dozens of U.S. military personnel. Following the war, many villages returned only to find their villages severely damaged or destroyed. The population of Unalaska following the conflict was reported to be about 300. Interest in fishery resources in the Aleutians began to increase around 1950 with the harvesting and processing of halibut, salmon, and king crab. The growth of the king crab fishery in the early 1960s greatly improved the local economic condition. Unalaska became a rapidly growing and culturally diverse community, primarily focused on fishing and fish-processing activities. Subsistence activities are important to both the Unangan community and many long-term non-Native residents, as well. The Ounalashka Corporation is the local ANCSA chartered village corporation, the Aleut Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Qawalangin Tribe of Unalaska.

6.1.3 Demographics

Demographic and socioeconomic characteristics for the potentially substantially engaged or substantially dependent BSAI halibut communities as determined by use of initial screening criteria in the APICDA region are presented in Table 28. All the APICDA member communities can be considered small, rural communities with a high percentage of Alaska Native residents, although the community of Akutan represents an exception with respect to its percentage of Alaska Native residents, as noted below.

Among the APICDA member communities considered BSAI halibut-dependent, the communities of Atka and St. George have total populations of 61 and 102 people, respectively. Approximately 95.1 and 88.2 percent of residents in Atka and St. George, respectively, reported they were Alaska Native during the 2010 U.S. Census. The community of Akutan, the other APICDA member community considered BSAI-halibut dependent, is demographically unique among CDQ communities since it is the home of a large shore-based processor and the demographics of the processing workforce residing in company housing at the plant site tend to overshadow the small, predominately Alaska Native population residing within the traditional community footprint.[69] In 2010, Akutan's total population was 1,027 with 5.5 percent stating they were Alaska Native. The percentages of minority residents in Atka and St. George are similar to their respective percentages of Alaska Native residents, suggesting relatively homogenous populations in both communities. In Akutan, however, the population in group quarters is high (91.2 percent of all residents) and approximately 90.8 percent of residents are minority. These statistics reflect the sizable minority workforce associated with the shore-based processor in Akutan.

Economic indicators for 2019[70] in these three CDQ communities show approximate per capita income between $28,000 and $33,000 annually, although median household incomes are higher in St. George (approximately $64,000) than in Akutan and Atka (approximately $48,000 and $49,000, respectively). The percent of the population considered low-income was 2.7 percent for St. George, which was lower than the percentages of the population in Akutan (16.3 percent) and Atka (14.0 percent).

[69] Initially (in 1992) Akutan was deemed not eligible for participation in the CDQ program as the community was home to "previously developed harvesting or processing capability sufficient to support substantial groundfish participation in the BSAI…" though the community met other qualifying criteria. The Akutan Traditional Council subsequently initiated action to show that large industrial enclave-style development of the locally operating shore-based processor was essentially socially and economically separate and distinct from the traditional community of Akutan. With the support of APICDA and others, Akutan obtained CDQ status in 1996, becoming a member community of APICDA.

[70] Some of the social and economic data used in this document are from the U.S. Census American Community Survey (ACS). The ACS asks a broader range of questions than the decennial census and is meant to sample the entirety of the U.S. population on a range of issues. The ACS is conducted annually, and the data used in this analysis is based on a 5-year aggregation of data. However, the 5-year ACS surveys approximately 1 in 12 households and this can result in substantial margins of error, particularly in smaller communities. For example, while Adak's median household income is estimated at $70,000, the margin of error is $27,546. This means that there is a 90 percent chance that the true median household income in Adak is anywhere from $42,454 to $97,546. Similarly large margins of error are present in other communities. Despite this, the ACS provides the most recent and most reliable source for these social and economic data currently.

Table 28. APICDA Region BSAI Halibut Dependent Communities and State of Alaska Selected Demographic Indicators

Community	2010 Decennial Census Data: Total Population	Alaska Native/ Native American Residents (percent of total population)	Minority* Residents (percent of total population)	Residents Living in Group Quarters** (percent of total population)	2019 American Community Survey Data: Per Capita Income (dollars)	Median Household Income (dollars)	Number of Family House-holds	Median Family Income (dollars)	Low-Income*** Residents (percent of total population)
Adak****	326	5.5%	81.9%	66.6%	$35,193	$70,000	25	$68,750	16.4%
Akutan	1,027	5.5%	90.8%	91.2%	$32,871	$48,125	48	$49,167	16.3%
Atka	61	95.1%	95.1%	0.0%	$23,247	$48,750	8	--	14.0%
St. George	102	88.2%	91.2%	3.9%	$27,799	$63,750	13	$76,875	2.7%
Unalaska****	4,376	6.1%	66.3%	48.0%	$39,292	$94,750	611	$101,250	5.7%
State of Alaska	**626,932**	**14.1%**	**37.1%**	**1.8%**	**$36,787**	**$77,640**	**166,325**	**$92,588**	**10.7%**

*Defined as all persons other than those self-identied being in both "white" and "non-Hispanic" census categories.

**Defined as "other noninstitutional facilities," which excludes institutionalized populations, college/university student housing, and military quarters.

***Defined as those persons living below the poverty threshold by the U.S. Census Bureau in the 2015-2019 American Community Survey. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $26,246 in 2020.

****Note: neither Adak nor Unalaska are member communities of APICDA, but both are within the geographic region encompassed by APICDA and both were identified by community dependency exercise as BSAI halibut dependent communities. Adak and Unalaska were the only non-CDQ communities in any region of Alaska identified as BSAI halibut dependent communities.

Source: US Census 2010; US Census 2020.

Unalaska, traditionally an Aleut community, has become a plural community with port and fisheries-related development. In 2010, the total population of Unalaska was 4,376 people, 6.1 percent of whom stated they were Alaska Native. Adak is also a relatively diverse community with a shore-based processor and is still transitioning from its days as a relatively large military base in the 1990s to a small civilian Alaskan community. Unlike all the other communities in the region, including Unalaska, and all the other communities analyzed as potentially substantially engaged or substantially dependent halibut communities in this document, Adak was until recently not classified as “rural” for the purposes of federal subsistence regulation[71] due to its former military status.[72] In 2010, the total population of Adak was 326 people, with 5.5 percent stating they were Alaska Native.

Adak and Unalaska both had a substantial proportion of their population living in group quarters, and the percentage of minority residents was much higher than the percentage of Alaska Native residents. Like the statistics for Akutan, these numbers can be attributed to the sizable minority workforce associated with shore-based processors in both communities.

Unalaska had the highest income rates across all indicators for the five relevant communities in this region. Adak had higher median per capita, household income, and family income levels than Akutan, Atka, and St. George but, along with Akutan, had the largest proportion of low-income residents among the five relevant communities in this region.

One demographic challenge faced in common by the communities of Adak, Akutan, Atka, and St. George in recent years has been retaining a large enough number of children to retain a school in the community. Alaska schools need at least 10 students to receive funding from the state; while a community or borough

[71] An individual must have their primary, permanent place of residence in a rural area to qualify to hunt, trap, or fish under federal subsistence regulations, with “rural” meaning any community or area of Alaska determined by the Federal Subsistence Board to qualify as such. Only residents of communities or areas that the Board has determined to be rural are eligible for subsistence priority (Coble 2015).

[72] Adak was recommended for rural status in the Rural Determinations Decennial Review published in 2006. See: https://www.doi.gov/sites/doi.gov/files/migrated/subsistence/library/policies/upload/Review2006a.pdf accessed 2/24/2021.

may choose to operate the school without state funding few, if any, have found it feasible to do so for the long term. The school in St. George did not meet the state funding threshold for the 2017-2018 school year and remains closed at present. [73] Table 29 provides information on school enrollments, for both kindergarten through 12th grade (KG-12) and pre-kindergarten through 12th grade (PK-12), by community for the 2019-2020 school year, the most recent year for which data are available. The communities included in the table are those that directly participated in the BSAI/Area 4 halibut fishery, as measured by catcher vessels with local ownership addresses that were active in the fishery and/or locally operating shore-plants that accepted BSAI/Area 4 halibut deliveries during at least one year 2010-2019 as indicated in the dataset used for this analysis.

Table 29. Selected APICDA Region Schools Total Enrollments, Kindergarten-Grade 12 and Pre-Kindergarten-Grade 12, by Community, 2019-2020 School Year (as of Oct 1, 2019)

Community	School District	School	Total KG-12	Total PK-12
Adak	Aleutian Region School District	Adak School	18	19
Atka	Aleutian Region School District	Yakov E. Netsvetov School	10	10
Akutan	Aleutians East Borough School District	Akutan School	20	20
False Pass	Aleutians East Borough School District	False Pass School	6	7
St. George	Pribilof School District	PSD Correspondence Program*	6	6
Unalaska	Unalaska City School District	Eagle's View Elementary School	238	238
Unalaska	Unalaska City School District	Unalaska Jr/Sr High School	174	174

*The St. George school has been closed due to low enrollment since the 2017-2018 school year..
Source: https://education.alaska.gov/data-center, accessed 8/3/2020.

6.1.4 Local Economy

The economy of the APICDA region is focused primarily on supporting the various regional commercial fisheries. For example, shore-based seafood processing plants are located throughout the region, including in the communities of Adak, Akutan, Atka, and Unalaska. Unalaska/Dutch Harbor is the primary port in the area, serving as the base of operations for approximately 300 vessels that fish within the BSAI. Data from 2010 estimate that roughly a quarter of total landings made in Alaska that year occurred within this area, with landings of pollock and Pacific cod accounting for most landings (Himes-Cornell *et al.* 2013). In general, tourism is not a primary economic driver in the communities in this area, although some sportfishing, hunting, bird watching, and eco-tourism opportunities exist.

The economic importance of commercial fishing for Unalaska/Dutch Harbor cannot be overstated, as Unalaska/Dutch Harbor has ranked as the number one U.S. port in volume of landings since 1992 and has ranked second in value of landings (behind New Bedford, Massachusetts) since 2000. In recent years, employment statistics for Unalaska/Dutch Harbor have shown that the top three employers in the community were seafood processing companies, and that their employees accounted for over half of all employment in the city. The support service sector for the commercial fishing fleet is by far the most developed in the BSAI region, and Unalaska and firms dependent on the fisheries, such as stevedoring

[73] Two other APICDA communities that did not participate directly in the BSAI/Area 4 halibut fishery are in the same situation as St George with respect to school closings. The school in Nikolski failed to meet the threshold number of students required to qualify for state funding in the 2009-2010 school year and has been closed since then (https://www.aleutregion.org/nikolski_school_information accessed 8/3/2020); the school in Nelson Lagoon was last open for the 2011-2012 school year (https://education.alaska.gov/data-center accessed 8/3/2020). While not an APICDA community, the school in the AEB community of Cold Bay was last open for the 2013-2014 school year (https://education.alaska.gov/data-center accessed 8/3/2020).

and shipping, consistently rank as some of the largest employers. There is no other community in the region with the level of development or the range of services provided to the various sectors in the BSAI, which include accounting and bookkeeping, banking, construction and engineering, diesel sales and service, electrical and electronics services, freight forwarding, hydraulic services, logistical support, marine pilots/tugs, maritime agencies, gear replacement and repair, vessel repair, stevedoring, vehicle rentals, warehousing, and welding, among others (AECOM 2010; NOAA 2014).

In Adak, the former military infrastructure has facilitated the Aleut Enterprise Corporation's ability to provide services to the region, as the airport in Adak is the largest in the Aleutians and the harbor facilities consist of three deep water piers and a small boat harbor. Fuel sales and providing a convenient port for crew transfers are two ways that Adak supports the commercial fishery in the BSAI. Observer data suggest that catcher vessels regularly made embarkations and disembarkations in the community. While the data are silent on the nature of these visits to Adak, it can safely be assumed that at least a portion of these port calls included crew transfers, provisioning, fueling, product offloads, and purchases of other local goods and services (NOAA 2014).

6.1.5 Engagement in the Commercial BSAI/Area 4 Halibut Fishery

6.1.5.1 Catcher Vessels with Local Ownership Addresses and Ex-Vessel Gross Revenues

Table 30 provides trend information on the number of vessels with ownership addresses in APICDA region communities that were active in the BSAI/Area 4 commercial halibut fisheries 2010-2019. As shown, the CDQ communities of Akutan, Atka, and St. George averaged between three and five BSAI halibut vessels annually from 2010-2019, while the non-CDQ communities of Adak and Unalaska averaged less than one and about eight vessels, respectively.

Table 30. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, APICDA Region Communities, 2008-2019 (number of vessels)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
APICDA	Adak*	1	1	1	1	0	1	0	0	0	1	0.6	0.3%	3
APICDA	Akutan	4	3	5	3	4	3	3	1	1	1	2.8	1.6%	6
APICDA	Atka	3	3	4	5	6	4	3	3	0	0	3.1	1.7%	7
APICDA	Saint George Island	3	6	6	4	6	5	5	4	5	5	4.9	2.8%	8
APICDA	Unalaska/Dutch Harbor*	10	9	9	8	6	7	7	6	8	7	7.7	4.3%	16
APICDA	**Regional Subtotal**	**21**	**22**	**25**	**21**	**22**	**20**	**18**	**14**	**14**	**14**	**19.1**	**10.7%**	**39**

*Denotes communities within a CDQ region that are not themselves CDQ communities.
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Information on BSAI halibut ex-vessel gross revenues of vessels with ownership addresses in the regional communities, to the extent possible within confidentiality constraints, is provided in Table 15. As shown, these revenues varied widely by community ($142,000 [Akutan] to $1.8 million [Unalaska/Dutch Harbor] on an annual average basis for those individual communities for which data can be disclosed, with the remaining communities [Adak and Atka combined and St. George] having $358,000 and $192,000 in average annual halibut ex-vessel revenues, respectively). Information on BSAI halibut vessel diversity, as measured by relative dependency on halibut ex-vessel revenues compared to the total ex-vessel revenues for all species, gear, and area fisheries pursued by those same vessels on an annual average basis 2010-2019, is provided in Table 16. As shown in that table, levels of halibut dependency range from 60 percent to 100 percent for the vessels involved in the halibut fishery.

For that same 2010-2019 period, Table 17 shows the annual average number of BSAI halibut catcher vessels with local ownership addresses, the annual average number all commercial fishing catcher vessels (all species, gear, and area fisheries) with local ownership addresses (i.e., the local "community commercial fishing fleet"), BSAI halibut ex-vessel gross revenues for the community commercial fishing fleet, total ex-vessel gross revenue for the commercial fishing fleet (from all species, gear, and area fisheries), and the percentage of halibut ex-vessel gross revenues as a percentage of the total ex-vessel gross revenues of the community commercial fishing fleet (i.e., the "dependency" of the community fleet on BSAI halibut as measured in the proportion of ex-vessel revenues derived from that fishery). For three of the four communities (or groups of communities), the halibut fleet is essentially the community commercial fisheries fleet, such that dependency does not change (that is, it still ranges from 86 percent [Adak/Atka combined] to 91 percent [Akutan] to 100 percent [St. George]. In the case of Unalaska/Dutch Harbor, the vessels active in the halibut fishery were 60 percent dependent on that fishery alone, while the Unalaska/Dutch Harbor "community fleet" as a whole was 38 percent dependent on halibut ex-vessel revenues alone. This community fleet level of dependency was, by far, the highest among communities shown in Table 17 with halibut ex-vessel values greater than $1 million, apart from St. Paul.

Beyond these averages, Adak had no vessels active in the fishery in the four out of the six most recent years for which data are available; Akutan has declined to a single vessel in the most recent three years for which data are available; and Atka did not have any vessels in the most recent two years for which data are available. The apparent causes of these declines vary by community.

Adak has had challenges with stability in the local processing sector, with several changes of ownership and intermittent interruption of operations occurring during the 2010-2019 period. More recently, operations at the plant were indefinitely suspended in June 2020. [74] While several factors reportedly led to the plant closure, one factor that made operational viability particularly challenging, as cited by informed industry sources, was the loss of favorable access opportunities to Pacific cod harvested in the federally managed fishery that existed under FMP Amendment 113 that were vacated by the courts in early 2019.[75]

Interviews in Akutan in 2019 suggested that quota held by multiple local residents has been fished off a combination of a single local resident-owned vessel and another vessel or other vessels with ownership addresses outside the community but whose owner(s) have kinship or other long-standing relationships with the community rather than on more vessels with local ownership addresses. This pattern was attributed to a set of circumstances particular to the vessels involved rather than movement of quota or vessels out of the community but none-the-less represents a change in local fishery engagement patterns.

Atka has experienced the closure of Atka Pride Seafoods, the local processing plant that was a 50/50 joint venture between APICDA and the Atka Fishermen's Association. It was not open in 2018 or 2019 due to a combination of factors including lowered halibut quotas, competition with the processing operation in Adak, and other factors not directly related to fishing conditions, according to APICA leadership. As a 2018/2019 interim[76] measure during the non-operation of the local processing plant, APICDA fostered a

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[74] Bristol Bay Times, June 27, 2020 (accessed 8/5/2020): http://www.thedutchharborfisherman.com/article/2026adak_fish_plant_closes_following_management#:~:text=The%20only%20seafood%20shore%20plant,and%20workers%20removing%20vintage%20military

[75] According to persons involved in the process, there are active discussions in progress exploring different scenarios for re-opening the plant, but no firm commitments are in place to do so.

[76] According to APICDA leadership, as of 2019, plans to reopen the plant are being actively explored, but no firm timeline had been established; more recently with the Coronavirus pandemic of 2020, all plans have been put on indefinite hold. Earlier Council analyses noted that the potential for diversification of the plant through crab processing

substitute opportunity program for Atka fishermen to fish their quota off a single larger vessel (rather than their smaller individually owned vessels) which had additional safety advantages under conditions of lower halibut abundance that can mean longer trips farther offshore. Most of the deliveries of the catch under this program were made to Adak but, in some instances, deliveries were made to Unalaska/Dutch Harbor and/or Akutan, also according to APICDA leadership. With 2020 came additional changes: due to Coronavirus pandemic conditions, emergency transfers were utilized to harvest the Atka fishermen's quota so as not to unnecessarily risk the health of local fishermen by having them physically present on the vessel. With the plant in Adak not operating, deliveries of the Atka quota catch for the 2020 season have been made exclusively to Unalaska/Dutch Harbor, according to APIDCA management.

In the case of St George, local fishermen access APICDA-held CDQ quota to pursue the halibut fishery, but there is no shore-based processing capacity on the island. Instead, APICDA, through one of its subsidiaries, owns and maintains vessels to tender locally caught halibut the roughly 45 miles from St. George to the shore-based processor in St. Paul. These tenders typically winter in Homer (and occasionally in Nelson Lagoon). According to APICDA management, the St. George halibut program is one of its larger local fisheries programs, which speaks to the fundamental importance of the fishery to that community, which has few other income or employment opportunities.

In 2020, the decision was made not to open the St. Paul shore-based processor for halibut season due to Coronavirus pandemic conditions (as noted in Section 6.2.5.1, below), which meant that St. George residents were unable to pursue the directed halibut fishery, given the fact that the APICDA tenders, while adequate to support a small community fishery, do not have the capacity to make the 200+ mile run to the closest alternate shore-based processors (in Unalaska/Dutch Harbor) feasible. According to APICDA management, in response to this situation they have leased out most of the CDQ halibut that would be otherwise have been harvested by St. George residents, with the harvester planning to deliver to Unalaska/Dutch Harbor. This is a much longer than typical run, with additional turn-around time and fuel expense, so the standard lease rates to the quota holder have gone down considerably (and therefore the benefits that APICDA has been able to generate from their CDQ have also decreased). The lease revenue that is being generated from the CDQ is being used to partially offset a relief/mitigation program for St. George fishermen. In consideration of COVID and the St. Paul shore-based processing closure, APICDA is making a one-time direct payment to fishermen and crew based on their past years' average earnings, after deducting some expenses that would have otherwise occurred under normal fishing operations (Drobnica, personal communication, 8/14/2020).

6.1.5.2 Other Measures of CDQ Community, Unalaska, and Adak BSAI/Area 4 Halibut Harvest Engagement

In addition to catcher vessel–related activity, engagement in and dependency on the BSAI halibut harvest sector can be gauged in part by looking at the number of individuals holding quota shares in the halibut fishery, although this information is complicated by the fact that some CDQ community fleets participate in the fishery to greater or lesser degrees through the use of CDQ quota, which is further complicated by the fact that percentage of quota held as CDQ reserves in the different subareas of Area 4 varies from none (Area 4A) to 100 percent (Area 4E). Nonetheless, the level of quota shareholding in a community is typically indicative of one type of engagement in the halibut fishery.

The quota share pool (measured in quota share units) is converted to IFQ TAC (measured in pounds) each year. The ratio of quota share units to pounds varies year-to-year based on multiple factors, including abundance, and varies by IPHC regulatory area. Table 31 shows the quota share pool, IFQ TAC, and ratio

was being explored and, according to APICDA leadership, that is still the case. Additionally, given the instability of processing in Adak in recent years, it is recognized there may be additional opportunities available for Atka in the future as the only other extant community in the western Aleutian Islands region.

of quota share units to IFQ pounds of halibut for 2019 by area, along with CDQ reserve and distribution of CDQ reserve by CDQ group for each area (which does not vary by year) for reference. 2019 is shown for consistency with fisheries data used as quantitative indicators of community fishery engagement and dependency in Section 5 (i.e., the most recent full-year data available for those indicators). Table 32 provides analogous information for 2020, the most recent data available for this indicator.

Table 31. Halibut Quota Share Pools and IFQ TACs (2019) and CDQ Reserve and Distribution by CDQ Group by IPHC Regulatory Area

Area	Quota Share Pool (units)	IFQ TAC (pounds)	Ratio (QS:IFQ)	CDQ Reserve (percent)	Distribution of CDQ Reserve by CDQ Group (percent)
2C	59,477,396	3,610,000	16.4757:1	0%	not applicable
3A	184,893,008	8,060,000	22.9396:1	0%	not applicable
3B	54,201,315	2,330,000	23.2624:1	0%	not applicable
4A	14,586,011	1,650,000	8.8400:1	0%	not applicable
4B	9,284,774	968,000	9.5917:1	20%	100% APICDA
4C	4,016,352	455,000	8.8271:1	50%	85% CBSFA / 15% APICDA
4D	4,958,250	637,000	7.7838:1	30%	30% NSEDC / 26% BBEDC / 24% CVRF / 20% YDFDA
4E	139,592	0	not applicable	100%	70% CVRF/30% BBEDC
All Areas	**331,556,698**	**17,710,000**	**not applicable**	**not applicable**	**not applicable**

Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

Table 32. Halibut Quota Share Pools and IFQ TACs (2020) and CDQ Reserve and Distribution by CDQ Group by IPHC Regulatory Area

Area	Quota Share Pool (units)	IFQ TAC (pounds)	Ratio (QS:IFQ)	CDQ Reserve (percent)	Distribution of CDQ Reserve by CDQ Group (percent)
2C	59,477,396	3,410,000	17.4421:1	0%	not applicable
3A	184,893,008	7,050,000	26.2260:1	0%	not applicable
3B	54,201,315	2,410,000	22.4902:1	0%	not applicable
4A	14,586,011	1,410,000	10.3447:1	0%	not applicable
4B	9,284,774	880,000	10.5509:1	20%	100% APICDA
4C	4,016,352	383,000	10.4866:1	50%	85% CBSFA / 15% APICDA
4D	4,958,250	536,200	9.2470:1	30%	30% NSEDC / 26% BBEDC / 24% CVRF / 20% YDFDA
4E	139,592	0	not applicable	100%	70% CVRF/30% BBEDC
All Areas	**331,556,698**	**17,710,000**	**not applicable**	**not applicable**	**not applicable**

Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

As shown in Table 33, APICA region communities with local ownership of halibut quota shares include communities in three different IPHC management subareas within Area 4 (Areas 4A, 4B, and 4C) and one in Area 3 (Area 3B). Also shown is the 2019 IFQ pounds of halibut by community of quota holder as calculated by community shareholding as described in the bullets that follow the table and relevant quota share units to IFQ pounds ratios shown in Table 31. Table 34 provides similar information for 2020, with the relevant quota share units to IFQ pounds ratios shown in Table 32. As noted in the tables and the bulleted notes that follow, the nature, level, and area diversity of halibut quota share holding varies widely between the communities.

Table 33. Halibut Quota Share Holders and Quota Share Units Held, APICDA Region Communities, 2019

Community	Community Located in IPHC Area	Number of Unique Quota Share Holders	Total Quota Share Units Held 2019	Percent of QS Units Held in Region 2019	2019 IFQ Pounds
Adak	4B	1	1,196,304	23.92%	124,723
Akutan	4A	8	273,563	5.47%	30,946
Atka	4B	9	418,656	8.37%	39,391
False Pass	3B	3	386,123	7.72%	16,599
St George	4C	3	32,783	0.66%	3,694
Unalaska/Dutch Harbor	4A	20	2,693,016	53.86%	293,228
Regional Total	**--**	**44**	**5,000,445**	**100.00%**	**508,581**

Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

Table 34. Halibut Quota Share Holders and Quota Share Units Held, APICDA Region Communities, 2020

Community	Community Located in IPHC Area	Number of Unique Quota Share Holders	Total Quota Share Units Held 2020	Percent of QS Units Held in Region 2020	2020 IFQ Pounds
Adak	4B	1	1,196,304	24.08%	113,384
Akutan	4A	8	273,563	5.51%	26,445
Atka	4B	9	418,656	8.43%	36,183
False Pass	3B	3	386,123	7.77%	17,169
St George	4C	3	32,783	0.66%	3,111
Unalaska/Dutch Harbor	4A	20	2,661,262	53.56%	249,803
Regional Total	**--**	**44**	**4,968,691**	**100.00%**	**446,095**

Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

Compared to other CDQ regions, halibut quota share holdings within the APICDA region are relatively diversified.

- Communities in the APICDA region span four different IPHC regulatory areas (see Figure 1).
    - Akutan and Unalaska/Dutch Harbor are the only communities in Area 4A, which does not have a CDQ reserve (Table 32).
    - Adak and Atka are the only communities in Area 4B, which has a 20 percent CDQ reserve that is 100 percent allocated to APICDA (Table 32).
    - St. George (APICDA) and St. Paul (CBSFA) are the only two communities in Area 4C, which has a 50 percent CDQ reserve that is allocated 15 percent to APICDA and 85 percent to CBSFA (Table 32).

    - False Pass is in Area 3B, which is located within the federal Gulf of Alaska management area (rather than the BSAI management area). Area 3B does not have a CDQ reserve (Table 32).

- All quota shares held in Adak are held by ACDC, the CQE for Adak. ACDC held quota shares are all in Area 4B. Adak is not a CDQ community.
- All quota shares in Akutan are held by individuals and all shares held are in Area 4A.
- All quota shares in Atka are held by individuals. Eight individuals hold Area 4B shares exclusively and one individual holds Area 3B shares and CDQ flagged[77] shares in Area 4A.
- All quota shares in False Pass are held by individuals and all are in Area 3B.
- All quota shares in St. George are owned by individuals. Two individuals hold Area 4C shares exclusively and one individual holds Area 4C shares plus CDQ flagged shares in Areas 2C, 3A, 3B, and 4A.
- All quota shares held in Unalaska/Dutch Harbor are held by individuals, with the holdings varying more widely across IPHC regulatory areas than is typical in other communities, regardless of CDQ region. Unalaska/Dutch Harbor is the only community where there was a difference in quota shareholders and/or quota shares held between 2019 and 2020 among all the communities shown in Table 33 or analogous tables in the other CDQ regional discussions. Unalaska/Dutch Harbor is not a CDQ community (but is an ex-officio/non-voting member of APICDA).
    - In 2019, 12 individuals held Area 4A shares exclusively; two held Area 4A and 4B shares; one held Area 4A and 4E shares; one held Area 4A, 4C, and 4D shares; two hold Area 4B shares exclusively; one held Area 4A and 3A shares; and one held Area 4A and 3B shares.
    - In 2020, the number of quota shareholders remained at 20, but the net number of quota shares held dropped by 31,754, all of which were Area 4A shares. The pattern of quota share holding "portfolios" by area described for 2019 did not change in 2020, although the specific individuals involved did change.
        - In one instance, quota shares transferred between two individuals who are (or were) residents, resulting in no net change in quota share holdings at the community level. Both individuals held or now hold only Area 4A quota shares.
        - In another instance, an individual who held 33,452 Area 4A shares (only) in 2019 does not appear as a quota shareholder in the 2020 data.

[77] CDQ flagged shares represent CDQ compensatory shares that were automatically issued to qualified individuals as compensation for the potential loss of fishing history that would have otherwise qualified for IFQ but for the CDQ program. These compensatory shares were issued in IPHC regulatory areas that did not have CDQ reserves (i.e., Areas 2C, 3A, 3B, and 4A). The intent, according to those involved with the process, was not for those individuals who were awarded CDQ compensatory shares to actually fish those shares, rather, the intent was that the CDQ compensatory shares could be sold, and the proceeds of those sales would then serve as compensation for the potential loss of fishing history that would have otherwise qualified for IFQ but for the CDQ program. When CDQ compensatory shares are sold, the CDQ flag is removed from the shares in the data, so any remaining shares so flagged in the data are still held by the individual to whom they were originally issued. Any individuals shown in the data holding quota share units in Area 4E, which has a 100 percent CDQ reserve, did not qualify for compensatory shares. As there is no Total Allowable Catch (TAC) set in 4E, those shares are not issued quota pounds (i.e., they cannot be fished and typically have no sale value).

- In a third instance, an individual who did not appear as a shareholder in the 2019 data shows up in the 2020 data as holding 1,698 Area 4A quota shares (only).

Another important way that communities are engaged in the commercial halibut fishery harvest sector, beyond local individuals owning vessels active in the fishery or holding halibut quota share units, is through employment of local residents as crew members on vessels participating in the fishery. However, as noted in Section 4.5.4, sources of systematically collected quantitative data on crew employment and earnings are not available for the halibut fishery in this or other regions.

6.1.5.3 Shore-Based Processors and First Wholesale Gross Revenues

As shown in Table 18, shore-based processors in Adak, Akutan, and Unalaska/Dutch Harbor accepted BSAI halibut deliveries every year during the period 2010-2019, while Atka accepted deliveries eight out of those ten years. The average number of processors accepting BSAI halibut was greater than one in Unalaska/Dutch Harbor (2.3) and Adak (1.3). In the case of Adak, however, while more than one processor name appears in the data, only one unique physical plant was active in the community during these years. The Atka shore-based processing plant did not operate in 2018 and 2019 for a combination of reasons, as noted earlier. In False Pass, the processing plant accepted halibut only intermittently in during the 2010-2019 period (in 2010-2011 and in 2014-2015); in 2017 the plant changed ownership structure[78] and in 2018 and 2019 focused exclusively on salmon.[79]

More recently, as noted above, the plant in Adak plant suspended operations in June 2020. Additionally, due to Coronavirus pandemic conditions, the decision was made not to open the shore-based processing plant in False Pass in 2020 that had processed halibut at least some years 2010-2019 and is owned in part by APICDA.[80]

As noted in Section 4.5.2, first wholesale gross revenue data for shore-based processors sufficient to calculate processing diversity are not available. For the reporting of ex-vessel value of deliveries of BSAI halibut to shore-based processors, plants in Unalaska/Dutch Harbor and Akutan were grouped together and plants in the APICDA region communities of Adak, Atka, and False Pass were grouped with St. Paul from the CBSFA region due to data confidentiality restrictions. As shown in Table 19, on an annual average basis, shore-based processors in Unalaska/Dutch Harbor and Akutan combined accounted for over half of all ex-vessel gross revenues of BSAI halibut deliveries to shore-based processors, while the plants in Adak, Atka, False Pass, and St. Paul combined accounted for over one-quarter of the total. Together, these two groups of communities accounted for approximately 81 percent of all ex-vessel gross revenues of BSAI halibut deliveries to shore-based processors in all regions combined.

[78] APICDA Joint Ventures has retained a 25 percent interested in False Pass Seafoods (formerly Bering Pacific Seafoods) and False Pass Fuel Services, while Trident Seafoods now holds the balance of ownership interest and is the managing partner in these enterprises.

[79] A second, relatively large shore-based processing plant was recently built in False Pass and began operations in June 2019. According to the company's website, the plant is in a favorable geographic position to process salmon, pollock, and cod from both the Gulf of Alaska and Bering Sea (https://www.silverbayseafoods.com/, accessed 7/31/2020). As noted in Table 18, no BSAI/Area 4 halibut deliveries were accepted by shore-based processors in False Pass in 2019. According to company management, while BSAI Area 4 halibut has not been an operational focus of the new plant to date, and there are no immediate plans to have it become so in the near term, operations are subject to change as conditions in individual fisheries warrant. This plant has not yet had a "typical" annual cycle, as COVID-19 pandemic considerations changed plans, including seasonal labor phasing, before the plant had completed a full 12 months of operations.

[80] According to APICDA management, the salmon that would have been processed at the False Pass plant that did not open in 2020 were sent instead to shore-based processors at other locations in the Aleutians East Borough, including King Cove, Sand Point, and/or Port Moller.

As shown in Table 21, however, annual average ex-vessel gross revenues of BSAI halibut landings at Unalaska/Dutch Harbor and Akutan plants combined ($14 million) accounted for about four percent of all ex-vessel gross revenues of the landings of all species at all shore-based processors in those communities combined ($312 million). As shown in that same table, annual average ex-vessel gross revenues of BSAI halibut landings at Adak, Atka, False Pass, and St. Paul plants combined ($6.5 million) accounted for about 16 percent of all ex-vessel gross revenues of the landings of all species at all shore-based processors in those communities ($40 million).

6.1.6 Engagement in the Subsistence BSAI Halibut Fishery

As described in an earlier NPFMC analysis (AECOM 2015)[81] for those APICDA region communities for which subsistence data were available, including Unalaska and Adak, the community with the largest number of estimated halibut subsistence fishermen was Unalaska, with an average of 56.3 fishermen reported for the city and 13.3 reported for the tribal village from 2009-2012. The average number of halibut landed for 2009-2012 was 608.3 and 91.3, representing an estimated 9,829.8 and 1,382.3 pounds for the city and tribal village, respectively, making Unalaska, by this measure, easily the community most heavily engaged in the subsistence halibut fishery among all communities for which information is available. For the communities of Adak, Akutan, Atka, and St. George, the total number of estimated halibut fishermen was under 10 for each community for each year, with proportionally fewer halibut landed compared to Unalaska.

ADFG's Division of Subsistence has collected comprehensive subsistence harvest information for at least some years for key subsistence species across many Alaskan communities. While in many cases these data are dated (e.g., 1994 is the most recent year available for Atka, St. George, and Unalaska), they still represent the most comprehensive data encompassing all subsistence resources available that is comparable across regions. These data are accessible through the Community Subsistence Information System and include information on percentage of households using the subsistence species, estimated total harvest, and, for some fish species, amount of subsistence harvest retained from commercial fisheries, among other variables. Table 35 presents selected information for the potentially substantially engaged or substantially dependent halibut communities in the APICDA region as selected by initial screening criteria. Of those communities for which there are data, each has 85 percent of households using subsistence halibut, although the number of pounds harvested per community varies widely between communities and, in the case of Akutan, between study years. The percentage of halibut of all subsistence fish harvested is especially high in St. George, while the percentage of retention of subsistence halibut from commercial fishing is relatively high in Akutan. No data are available for Adak (likely because Adak, a former military installation, was only relatively recently classified as rural for the purposes of subsistence resource management, as noted in Section 6.1.3).

[81] See Table 2-8 in that analysis (Proposed Bering Sea/Aleutian Islands Halibut PSC Limit Revisions Appendix C: Community Analysis).

Table 35. Selected CSIS Halibut, Fish, and All Resources Subsistence Harvest Information, APICDA Region Communities, Various Years

Community	Year(s) Data Are Available	Percent Using Halibut	Percent Harvesting Halibut	Halibut Reported Pounds Harvested	Halibut Estimated Total Pounds Harvested	All Fish Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Fish Harvested	All Resources Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Resources Harvested	Estimated Pounds of Subsistence Halibut Harvested Retained from Commercial Fisheries	Percent of Subsistence Halibut Estimated Total Pounds Harvested Retained from Commercial Fisheries
Adak	none*	--	--	--	--	--	--	--	--	--	--
Akutan	1990	100.0%	80.0%	7,007	8,689	26,921	32.3%	47,397	18.3%	2,200	25.3%
Akutan	2008	86.1%	50.0%	3,794	4,216	18,636	22.6%	26,909	15.7%	no data	--
Atka	1994	85.7%	53.6%	3,576	3,704	15,152	24.4%	37,307	9.9%	321	8.7%
St. George	1994	100.0%	47.2%	3,320	4,611	5,444	84.7%	11,330	40.7%	906	19.6%
Unalaska	1994	90.8%	55.8%	no data	108,207	245,876	44.0%	355,081	0.0%	10,606	9.8%

*Indicates no halibut subsistence use or harvest was reported for any year.

Source:ADFG Community Subsistence Information System https://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=harvInfo.harvestCommSelComm accessed 5/7/2020.

As part of the AFSC's most recent compilation of baseline socioeconomic community profiles, researchers compiled subsistence data from ADFG Division of Subsistence reports, U.S. Fish and Wildlife Service reports, and other published quantitative data. AFSC researchers also elicited qualitative information from some civic leaders via a survey regarding their community's most important subsistence species.[82]

- In Adak, household participation is unavailable, but community leaders have stated that salmon (sockeye), halibut, crab, seal, sea lion, duck, and geese are important subsistence species. In 2009, 26 residents were registered with a SHARC to fish subsistence halibut, compared to only six residents with a SHARC in 2003. In 2009, an estimated 377 pounds of halibut was harvested on four SHARC cards, compared to 687 pounds harvested on six SHARC cards in 2003. The peak year for subsistence halibut use during the period of available information was in 2008 when 3,058 pounds were harvested on 12 SHARC cards. Between one and 12 subsistence salmon permits have been issued to Adak residents annually from 2000 through 2008; the total number of salmon harvested as reported on returned permits ranged from 75 fish to 465 fish. The number of seals, sea lions, and otters harvested annually from 2000 through 2010 ranged from five animals to 17 (all species combined).
- In Akutan, 2011 AFSC survey reported that according to community leaders the most important subsistence species are seals, ducks, and salmon. The most recent Alaska Department of Fish and Game general subsistence survey, in 2009, stated that 80 percent of the subsistence harvests in Akutan were comprised of salmon, non-salmon fish (including halibut), and marine invertebrates. The AFSC community profile with data through 2010 estimated that three or fewer subsistence salmon permits were issued in each year and that 30 or fewer salmon were harvested; this would suggest that non-salmon species are a key part of the marine subsistence harvest. Residents were issued 49 SHARC cards in 2018, which is close to the high point of 50 in 2003 during the life of the ADFG halibut subsistence survey. The issuance of 49 SHARCs in 2018 was a large increase over recent years when the total issued was fewer than 20 from 2008 through 2011 and fewer than 10 from 2012 through 2016. The number of individuals estimated to have fished subsistence halibut in 2018 was 21 – the highest estimate since 2006 (38) but less than half of the peak

[82] Although AFSC has done profiling work on communities in recent years, the information available for many communities is still dated as surveys and field research have not been newly conducted in all communities.

estimate in 2005 (47). Subsistence halibut catch was at a peak estimate of 15,000 pounds in 2005 but totaled only 3,973 pounds in 2018. The lowest estimate since 2003 occurred in 2016 (910 pounds). The 2009 ADFG general subsistence survey found that marine mammals accounted for 8 percent of subsistence harvests while land mammals, birds, eggs, and wild plants made up 12 percent. Marine mammal harvest consisted mainly of seals and sea lions, with the harvested number ranging from four to 30 in a year.

- In Atka, community leaders stated that fish, marine birds, terrestrial birds, terrestrial mammals, and local vegetation are the most important subsistence resources. The number of SHARC cards issued for halibut dropped from 13 in 2003 to 1 in 2010. Between four and nine of those SHARC holders reported fishing in 2003 through 2005, and no data were returned from 2006 through 2010. During those three reported years, SHARC harvest ranged from 795 pounds to 1,625 pounds. The data available in AFSC's most up-to-date profile indicate that subsistence salmon and marine mammal harvest either go unreported, only account for a small part of subsistence use, or are not a part of subsistence use. An important on-land source of wild food is a herd of several thousand reindeer.
- In St. George, community leaders stated that fur seals, halibut, and Pacific cod are the most important subsistence resources. The most recent AFSC profile noted that around 500 fur seals are harvested each year for subsistence purposes. Between 2003 and 2010, the number of SHARC cards issued decreased from 31 to four. In 2010, 14 of the 26 SHARC cards issued that year were reported as actively fished, for a total of 686 pounds of halibut harvested that year. In 2018, all seven SHARCs issued were used, yielding an estimated catch of 16 halibut or 401 pounds. The more recent totals represent a substantial decrease from 2007, when 3,736 pounds of halibut were harvested on 14 active SHARC cards.
- In Unalaska, community leaders stated that the most important subsistence resources included sockeye salmon, halibut, coho salmon, and crab, while the subsistence harvest of marine mammals has declined substantially over the past few decades (Himes-Cornell *et al.* 2013). In 2008, the most recent year for which data were available for salmon harvesting, there were 199 subsistence salmon permits issued to Unalaska/Dutch Harbor residents, a value which ranged from 172 subsistence salmon permits issued in 2007 to 226 permits issued in 2002. In 2008, 158 of the subsistence salmon permits were reported as fished. Subsistence harvest of all salmon species ranged between 3,000 and 7,000 fish, with sockeye salmon accounting for the vast majority. ADFG's halibut subsistence survey estimates show that 2018 participation and catch is similar to the first year in the survey in 2003 (Fall and Koster 2020). In 2018 it is estimated that 58 SHARC holders found 9,199 pounds of halibut, compared to 50 SHARC holders catching 10,860 pounds in 2003. These estimates are low relative to estimates from 2004 through 2010. Recent subsistence use peaked in 2009 when 76 SHARC holders were estimated to have caught 29,306 pounds. The largest number of participants estimated for a single year was 92 in 2010.

6.1.7 Engagement in the Commercial BSAI Groundfish Amendment 80 Sector Fishery

No direct participation in the BSAI groundfish Amendment 80 sector fishery through local vessel ownership address is shown for any APICDA region community for any year in the 2010-2019 dataset used for this analysis.

Engagement of some APICDA region communities in the BSAI groundfish fishery includes being a product transfer location for processed product offloaded from catcher/processors, including Amendment

80 catcher/processors. When these offloads occur, a Product Transfer Report is completed[83] and the transfer is subject to the state Fisheries Resource Landing Tax, with the resulting tax revenues shared by the state with the community. A more complete description of this sharing process is provided in Section 10.4 (SIA Attachment D, State of Alaska Shared Fishery Tax Revenues).[84]

Importantly for the purposes of this analysis, however, the data that are available do NOT differentiate between Amendment 80 catcher/processors and other catcher/processors; rather, all offloads/product transfers of all catcher/processors operating in different fisheries and different sectors of those fisheries are aggregated together. It is also important to recognize that Fisheries Resource Landing Tax data do not capture the location where the fish were caught that were ultimately processed into the product transferred in these ports. As a result, only BSAI ports are shown in Table 36, which provides the percentage contribution of state shared Fisheries Business Tax revenue (deriving from catcher vessels landings in the communities) and shared Fisheries Resource Landing Tax revenue (deriving from catcher/processor product transfers) to the combined Fisheries Business Tax and Fisheries Resource Landing Tax revenue total, for BSAI communities individually and all other Alaska communities as a group, on an annual average basis 2010-2019.

Table 36. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities within the BSAI Region with Resource Landing Tax Revenues and All Other Alaska Communities, Annual Average 2010-2019

Borough or City	Average of Combined FBT and FRLT Shared Revenue	Fisheries Business Tax (FBT) Shared Revenue		Fisheries Resource Landing Tax (FRLT) Shared Revenue	
		Average Shared FBT Revenue	Average Percent of FBT+FRLT	Average Shared FRLT Revenue	Average Percent of FBT+FRLT
Aleutians East Borough	$1,495,030	$1,468,494	98.2%	$26,536	1.8%
City of Adak	$193,885	$115,021	59.3%	$78,864	40.7%
City of Akutan	$545,251	$536,193	98.3%	$9,059	1.7%
City of Atka	$52,315	$27,539	52.6%	$24,776	47.4%
City of Saint Paul	$922,845	$902,759	97.8%	$20,086	2.2%
City of Sand Point*	$200,633	$187,895	93.7%	$12,738	6.3%
City of Togiak	$114,424	$78,355	68.5%	$36,069	31.5%
City of Unalaska	$8,320,919	$3,639,851	43.7%	$4,681,068	56.3%
Subtotal	$11,845,303	$6,956,108	58.7%	$4,889,195	41.3%
All Other AK Communities	$14,892,304	$14,785,538	99.3%	$106,766	0.7%
Grand Total	$26,528,761	$21,532,953	81.2%	$4,995,808	18.8%

*Considered a BSAI community due to its being a part of the Aleutians East Borough.
Source: Alaska Dept of Revenue, FY 2010-2019 Shared Taxes and Fees Annual Reports.
http://tax.alaska.gov/programs/sourcebook/index.aspx accessed 4/24/2020.

[83] As noted in Section 4.5.1, Product Transfer Report data were initially examined for potential direct use as a dataset to determine patterns of catcher/processors offloads and the relative importance of those offloads across and within port communities, but the usefulness of these data proved problematic.

[84] As noted in Section 10.4, the Alaska Department of Revenue and the Alaska Department of Commerce, Community and Economic Development administer two separate fisheries tax revenue sharing programs. The program administered by the Department of Revenue shares fish tax revenues collected from activities that took place inside municipal boundaries. The program administered by the Department of Commerce, Community and Economic Development provides for annual sharing of fish tax collected outside municipal boundaries to municipalities that can demonstrate they suffered significant effects from fisheries business activities. The data in this section, unless otherwise noted, are from the Department of Revenue as the Fishery Resource Landing Tax revenues distributed to communities under that program. as they are directly proportional to catcher/processor product transfers in the individual communities. Further, they, in turn, can be used as a rough/relative proxy for the potential occurrence of other port call related activities that may have accompanied product transfers.

As shown in Table 36, among APIDCA region communities, in Adak, Atka, and Unalaska, between 41 and 56 percent of shared state fisheries tax revenues derive from catcher/processors making local product transfers. It is important to note, however, that this percentage does not include community raw fish taxes, borough fish taxes (in the case of the Aleutians East Borough), or other local community or borough taxes and fees that may be applicable to shore-based processing activity that are not applicable to at-sea processing activities.

Beyond the revenue benefits directly resulting from tax revenues, catcher/processor port calls may foster other economic activities involving local support service providers, such as crew transfers, fuel purchases, cold storage facility use, stevedoring, and logistics support, among others. There are, however, no publicly available, systematically collected data on the amounts and locations of these types of expenditures (as noted in Section 4.5.3), but level of shared state Fishery Resource Landing Tax revenue may be taken as one rough proxy for the potential of this activity across the port communities involved.

Another rough proxy, and one specific to the Amendment 80 fishery, would be the number of Amendment 80 vessel port calls, which are shown in Table 8 (in Section 4.5.3). Clearly shown is the predominance of Unalaska/Dutch Harbor as a port of call, with the community accounting for 67 percent of all Amendment 80 port calls over the years 2010-2019 (with an annual average of 169 port calls per year), with marked secondary clusters seen in Adak (29 per year) and Togiak (18 per year)[85] among the remaining listed ports. Unalaska/Dutch Harbor has easily the most developed support service sector capacity in the BSAI region with multiple marine fueling options, substantial cold storage capacity, multiple provisioning options, administrative support, and multiple electrical, electronics, hydraulics, welding, and mechanical services providers among others; Adak has few support capabilities aside from its deep water port, a fueling station capable of accommodating large vessels, and the ability to support larger-scale aircraft operations at its airport than any other civilian community west of Cold Bay. Atka, with essentially no support services of a scale to capable of supporting Amendment 80 vessels or crew, averaged approximately two Amendment 80 port calls per year 2010-2019, with all the port calls during this time occurring in the four of the five most recent years covered by the data, and ranging from one to six port calls per year during those four years. There is also variability between ports with respect to the species targeted on the trips associated with the port calls in the individual communities with, for example, the western Aleutian communities of Adak- and Atka-based trips generally being used to target rockfish and/or Atka mackerel, while St. Paul- and Togiak-based trips are more likely to target a variety of species of sole, with Unalaska/Dutch Harbor-based trips being far more diversified in terms of target species than any of the other ports.

6.1.8 CDQ Group Direct BSAI/Area 4 Halibut and/or Groundfish Amendment 80 Sector Engagement

In addition to participating in the BSAI halibut and/or BSAI groundfish fisheries through use of CDQ quota ownership in direct and indirect ways, APICDA, like other CDQ entities, has also invested in capital assets in the catcher vessel and/or catcher/processor sectors as another avenue to meet the economic and social goals of the CDQ program. Among vessels shown in the dataset used for analysis as actively participating in the BSAI groundfish Amendment 80 sector fishery in at least one year 2010-2019, none were listed in the most recent CDQ ownership attribution Regulatory Impact Review (RIR) (NMFS 2017) as owned in whole or in part by APICDA, a situation that was confirmed by APICDA management as still accurate in 2020. APICDA does however, like some other CDQ groups, lease CDQ quota to entities in which it has no ownership or management interest, including leasing the harvest of

[85] All of Togiak's Amendment 80 port calls 2010-2019 occurred in the six most recent years covered by the data; in four of those six years, the number of port calls in Togiak equaled or exceeded those in Adak in those same years.

some or all of their BSAI multispecies groundfish CDQ[86] quota holdings to entities participating in the Amendment 80 sector fishery.

APICDA ownership interests the directed halibut fishery potentially relevant to the proposed action noted above include the following: (1) Atka Pride Seafoods, which owns and operates the shore-based processing plant in Atka, is a 50/50 partnership between APICDA Joint Ventures and the Atka Fishermen's Association;[87] (2) APICDA Joint Ventures has retained a 25 percent interested in False Pass Seafoods (formerly Bering Pacific Seafoods) and False Pass Fuel Services, which in previous years processed halibut; (3) ownership and maintenance of halibut tender vessels serving the community of St. George.

6.2 Central Bering Sea Fishermen's Association Region

6.2.1 Location

The CBSFA is a CDQ entity that represents the community of St. Paul, population 479 (Table 26), located in the Pribilof Islands (Figure 3). As identified through initial screening criteria, BSAI communities potentially substantially engaged in or dependent upon the BSAI/Area 4 halibut fishery include St. Paul. St. Paul is located within IPHC Regulatory Area 4C, as shown on Figure 1.

6.2.2 Historical Overview

Saint Paul's population is predominantly Unangan Aleut. Historically, the Aleuts traveled to the Pribilof Islands seasonally for hunting. Inspired by traditional Aleut stories, Gavriff Pribilof of the Russian fur trading company, Lebedov Lastochkin Co., went on a search for the legendary "Seal Islands." After three years, Pribilof landed on Saint George Island in 1786, and named the island after his vessel. The following year, Pribilof and his party landed on the larger island to the north, which was named 'Saint Peter and Saint Paul Island' in honor of the day they made landfall – the Feast of Saints Peter and Paul. It is now known simply as Saint Paul Island. In 1788, the Russian American Company enslaved and relocated Aleuts from Siberia, Atka, and Unalaska to the Pribilofs to hunt fur seals. Their descendants continue to live on these two islands today (Himes-Cornell *et al*. 2013).

After the United States purchased Alaska from Russia in 1867, the U.S. government leased sealing rights to private companies, ultimately taking direct control of the fur seal harvest in 1910. During World War II, Aleut residents in St. Paul (and St. George) were relocated to Funter Bay on Admiralty Island as part of the emergency evacuation of residents from the Bering Sea. Aleut residents returned post-war; however, the commercial fur seal harvest was ended in 1985 and the economy of St. Paul transitioned to focus on commercial seafood processing and support services for the commercial fishing fleet (Himes-

[86] Initial CDQ allocations of BSAI non-pollock groundfish were implemented and CDQ fishing for these "multispecies" groundfish began in 1998. This is a separate allocation from that of the CDQ pollock fishery, which was implemented in 1992.

[87] https://www.apicda.com/ accessed 7/31/2020.

Cornell *et al*. 2013, APIA 2019). [88] The local commercial halibut fishery got its start in 1981[89] and a Trident Seafoods crab processing plant was built in 1989 (EDAW/AECOM and Northern Economics 2008).

According to a survey conducted by the AFSC in 2011, Saint Paul community leaders reported that fisheries are the primary economic driver in Saint Paul and emphasized the importance of fish and crab processing to the local economy. Saint Paul is a port for the Central Bering Sea fishing fleet, and major harbor improvements have fueled economic growth. Several offshore processors are serviced out of Saint Paul, and shore-based processing operations include crab, cod, and halibut. The CBSFA operates a cooperative in conjunction with the F/V Saint Paul, Trident Seafoods, and American Seafoods. Trident Seafoods is one of the top local employers. A number of local residents are also involved in commercial fisheries as vessel owners, permit and quota share accountholders, and crew license holders (Himes-Cornell *et al*. 2013).

Saint Paul is incorporated as a 2nd Class City governed by a mayor and a city council and is not located within an organized borough (Table 37). Saint Paul was included under the ANCSA and is home to federally recognized Tribal entity. The traditional government is the Aleut Community of Saint Paul Island. The Tribe is combined with Saint George as the "Pribilof Islands Aleut Communities of Saint Paul and Saint George Islands." The Native village corporation for the Aleut Community of Saint Paul Island is the Tanadgusix Corporation (TDX), which manages land and owns several subsidiary companies that provide services to commercial, industrial, and public sectors. Many members of the Aleut Community of Saint Paul Island are also shareholders in the Aleut Corporation, the regional ANCSA corporation of the eastern Alaska Peninsula, Aleutian Islands, and Pribilof Islands (Himes-Cornell *et al*. 2013).

[88] In several ways, St. Paul may be seen as still under transition from a federal government institution-based community and economy to a more typical "civilian" community and economy, like Adak, but with the transition in St. Paul occurring over a longer period of time and with a continuously present local population experiencing the transition. In 1983, Congress passed the Fur Seal Act Amendments, which ended government control of the commercial seal harvest (which had effectively been the only local economic driver for over 100 years) and the effective federal domination of daily life on the island. Some transition funding was provided to promote the local development of a self-sufficient, enduring, and diversified economy not dependent on commercial sealing, and most of the funding was used to upgrade inadequate community infrastructure, including major investments in the harbor, but this funding proved inadequate over the longer term. Federal withdrawal took place without commercial sealing continuing at least for some time during a transitional phase-out period, state assumption of the harbor project, or substantial continuing funding available for economic development and diversification, all key assumptions for a self-sustaining local economy (EDAW/AECOM and Northern Economics 2008). It was during this time that the local commercial halibut fishery, which got its start in 1981, became a central focus of local fishery-based economic development efforts (which were later substantially bolstered by the CDQ program), a position it retains to date (along with local seafood processing capacity that is self-sustaining over the long term, materially aided by regionalization community protection measures incorporated into the BSAI crab rationalization program, which also serves to benefit the local halibut fleet as discussed in Section 6.2.4).

[89] While the 1981 date was established through interviews that took place soon thereafter, the earliest records of local commercial halibut harvests that could be located during this project date from 1983 (M. Fey, personal communication, 11/30/2019). Local subsistence use of halibut, however, has been a part of life in St. Paul since the establishment of the community.

Table 37. Community Institutional Summary (CBSFA CDQ Community of St. Paul)

Community	Alaska Native Community Name (Language)	Borough	Municipal Government	Incorporation Type (and Date)	ANCSA Community	ANCSA Regional Corporation	ANCSA Village Corporation	Federally Recognized Tribe	CDQ Community (Group)
St. Paul	Tanax̂ Amix̂ (Unangan Aleut)	Unorganized Borough	City of St. Paul	2nd Class City (1971)	Yes	Aleut Corporation	Tanadgusix Corporation (TDX)	Saint Paul Island (Pribilof Islands Aleut Communities of St. Paul & St. George Islands)	Yes (CBSFA)

Source: DCRA Community Database, https://dcra-cdo-dcced.opendata.arcgis.com/ Accessed 10/6/2020.

6.2.3 Demographics

Demographic and socioeconomic characteristics for St. Paul are presented in Table 38. With a predominantly Alaska Native population, St. Paul is geographically and socioculturally a part of the Aleutian Pribilof Islands region (and heavily involved in the regional Aleut Corporation and the Aleutian Pribilof Islands Association [APIA]). St. Paul has the largest number of Aleut residents of any community in the larger Aleutian Pribilof Islands region and is the only CDQ community in that larger region that is not a part of APICDA. Like several other communities in the Aleutian Pribilof Islands geographic region, St. Paul is home to shore-based processor and the total population can fluctuate substantially over the course of a year depending on the level of processing activity in the community.

Table 38. CBSFA Region BSAI Halibut Dependent Communities and State of Alaska Selected Demographic Indicators

	2010 Decennial Census Data				2019 American Community Survey Data				
Community	Total Population	Alaska Native/ Native American Residents (percent of total population)	Minority* Residents (percent of total population)	Residents Living in Group Quarters** (percent of total population)	Per Capita Income (dollars)	Median Household Income (dollars)	Number of Family House-holds	Median Family Income (dollars)	Low-Income*** Residents (percent of total population)
St. Paul	479	82.3%	89.4%	5.0%	$33,925	$59,063	69	$64,375	15.2%
State of Alaska	**626,932**	**14.1%**	**37.1%**	**1.8%**	**$36,787**	**$77,640**	**166,325**	**$92,588**	**10.7%**

*Defined as all persons other than those self-identied being in both "white" and "non-Hispanic" census categories.
**Defined as "other noninstitutional facilities," which excludes institutionalized populations, college/university student housing, and military quarters.
***Defined as those persons living below the poverty threshold by the U.S. Census Bureau in the 2015-2019 American Community Survey. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $26,246 in 2020.
Source: US Census 2010; US Census 2020.

Table 39 provides information on school enrollment, for both KG-12 and PK-12, for St. Paul for the 2019-2020 school year, the most recent year for which data are available.

Table 39. CBSFA Region School Total Enrollments, Kindergarten-Grade 12 and Pre-Kindergarten-Grade 12, by Community, 2019-2020 School Year (as of Oct 1, 2019)

Community	School District	School	Total KG-12	Total PK-12
St. Paul	Pribilof School District	St. Paul School	59	59

Source: https://education.alaska.gov/data-center, accessed 8/3/2020.

6.2.4 Local Economy

The primary economic sector in St. Paul is the commercial fishing industry. A major shore-based processor is active in St. Paul and many other businesses in the community provide services to the resident and visiting commercial fleets. The top employer in the community is Trident Seafoods (owners of shore-based seafood processing plant). Other major employers include city and tribal governments and Alaska Native corporations. The fur seal rookeries and more than 210 species of nesting birds attract some tourists to the island (Himes-Cornell *et al.* 2013).

The Trident plant has historically relied primarily on crab, including opilio and king crab, with some bairdi processed as well, including during times when it may fill in what would otherwise be gaps in processing activity. Trident has previously reported that cod was also processed, typically during opilio season, although the volume of cod processed per season varied from one year to another. More recently cod processing has not been common, reportedly for a combination of reasons including market conditions, the expense of shipping product from St. Paul, and seasonal processing plant outfall constraints. The local fleet does not participate directly in the crab fishery and is focused nearly exclusively on BSAI halibut (as described below). However, without heavy participation by the shore-based processor in the crab fisheries, there is a concern that the underpinning of processing for the local halibut fishery would be removed.

According to senior CBSFA personnel, to ensure predictable/sustainable processing and marketing of locally caught halibut, CBSFA and Trident have entered into an agreement that involves sharing of halibut processing and marketing costs in proportion to the volume of halibut received at the plant via CBSFA/the local fleet versus halibut delivered to the plant by other suppliers, ensuring the viability of the operation during what are otherwise slow months for the plant. CBSFA determines the local opening date for halibut processing, which typically has run from around June 20 through September, but with changing water temperatures has opened earlier in June in recent years. While the plant only employs an estimated 30-50 persons during halibut processing, depending on deliveries, (compared to an estimated 300-400 employees during crab processing) it does provide employment for at least some locals wishing to retain fisheries-related employment without going to sea.

The plant also provides services to the community through having a galley and a store that is open to the public and provides a processing option to non-CBSFA/non-local IFQ fishery vessels targeting halibut in the area. According to CBSFA management, Trident has partnered with the community to keep the plant open to support the local halibut fishery (and the community at large via the other services provided when the plant is open), while the custom processing and shared operating expense agreement with CBSFA allows them to do so on a more-or-less break-even basis. Given the relatively recent ability of CDQ fisheries to retain cod when targeting halibut, CBSFA had been planning on developing cod as a diversification opportunity, especially during times of low halibut abundance, but given the other current constraints on cod processing at the local plant, including the high cost of operation and startup expenses, has not pursued that option to date.

6.2.5 Engagement in the Commercial BSAI/Area 4 Halibut Fishery

6.2.5.1 Catcher Vessels with Local Ownership Addresses and Ex-Vessel Gross Revenues

Table 40 provides trend information on the number of vessels with local ownership addresses active in the BSAI/Area 4 commercial halibut fisheries. As shown, the number of vessels active in any one year has varied, but with a general trend of decreasing participation from 18 vessels in 2010-2011 to 12 vessels in 2016 and 2019 (with an uptick to 14 vessels in 2017-2018).

Table 40. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, CBSFA Region Community, 2008-2019 (number of vessels)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
CBSFA	Saint Paul Island	18	18	17	16	16	13	12	14	14	12	15.0	8.4%	24

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Information on BSAI halibut ex-vessel gross revenues of vessels with ownership addresses in the regional communities, to the extent possible within confidentiality constraints, is provided in Table 15. As shown, with an annual average BSAI halibut ex-vessel revenue of approximately $2.4 million over the period 2010-2019, the St. Paul halibut fleet was the highest producing halibut fleet of any community in any CDQ region (and was exceeded among all Alaska communities only by the GOA communities of Homer and Kodiak). For St. Paul vessels, however, the halibut ex-vessel revenues have been below the period average in each of the last seven years for which data are available, with 2019 revenues, the most recent year for which data are available, being about 63 percent of the period average. Information on BSAI halibut vessel diversity, as measured by relative dependency on halibut compared to all species, gear, and area fisheries pursued by those same vessels on an annual average basis 2010-2019, is provided in Table 16. As shown in that table, the St. Paul halibut fleet is 100 percent dependent upon BSAI halibut (i.e., the relevant vessels do not participate in any other fisheries).

For that same 2010-2019 period, Table 17 shows the annual average number of BSAI halibut catcher vessels with local ownership addresses, the annual average number all commercial fishing catcher vessels (all species, gear, and area fisheries) with local ownership addresses (i.e., the local "community commercial fishing fleet"), BSAI halibut ex-vessel gross revenues for the community commercial fishing fleet, total ex-vessel gross revenue for the commercial fishing fleet (from all species, gear, and area fisheries), and the percentage of halibut ex-vessel gross revenues as a percentage of the total ex-vessel gross revenues of the community commercial fishing fleet (i.e., the "dependency" of the community fleet on BSAI halibut as measured in the proportion of ex-vessel revenues derived from that fishery). As shown in that table, the St. Paul halibut fleet, while only making up only 50 percent of the St. Paul commercial fishing fleet as measured by vessel counts, accounts over 99 percent of all ex-vessel gross revenue (i.e., dependency, as measured in gross revenues, is essentially complete). In other words, the entire St. Paul commercial fishing fleet is focused exclusively on halibut, with virtually no revenue diversification.

This focus of the local fleet is consistent with the efforts of the CBSFA to use the development and maintenance of a local halibut fishery as a major source of employment, income, and subsistence for the community and its members. The CBSFA created a cooperative (the CBSFA Halibut Cooperative) in 2003 to purchase halibut from the local fleet at a competitive price and it also provides support services for the fishermen through its Local Fleet Support Program.[90] CBSFA additionally created three subsidiaries to market seafood products produced from CBSFA's fishery resources, including 170 Degrees West, LLC, which is the operating company for CBSFA's halibut and sablefish operations.[91]

According to CBSFA management, in 2020, local fishermen opted not to open the local processing plant during summer due to the COVID-19 pandemic and specific concerns for St. Paul's vulnerable elderly

[90] https://www.cbsfa.com/halibut.html accessed 2/17/2021.

[91] https://www.cbsfa.com/seafood.html accessed 2/17/2021.

and other at-high-risk residents. This, in turn, meant the local halibut fishery is not occurring in 2020. To help minimize economic impacts to local fishing families, CBSFA has leased out CDQ quota and provided for the harvest of locally held IFQ quota using the F/V St. Peter and three hired vessels, with revenue from lease fees returned to local fishermen as mitigation payments which, in the case of CDQ quota, were based on their historic performance in the fishery. According to CBSFA management, as of mid-August, the bulk of CBSFA's 2020 CDQ and local IFQ has been taken to the shore-based processor in Akutan, with some deliveries going to Unalaska/Dutch Harbor as well.

6.2.5.2 Other Measures of CDQ Community BSAI/Area 4 Halibut Harvest Engagement

Table 41 shows the 2019 and 2020 IFQ pounds of halibut by community of quota holder as calculated by community shareholding as described in the bullets that follow the table and relevant quota share units to IFQ pounds ratios shown in Table 31 and Table 32, respectively. As noted in the bulleted text below the table, halibut quota share holdings by residents are heavily focused on Area 4C.

Table 41. Halibut Quota Share Holders and Quota Share Units Held, CBSFA Region, 2019 and 2020

Community	Community Located in IPHC Area	Number of Unique Quota Share Holders	Total Quota Share Units Held	Percent of QS Units Held in Region	2019 IFQ Pounds	2020 IFQ Pounds
St Paul	4C	13	757,574	100.00%	85,762	72,201
Regional Total	**--**	**13**	**757,574**	**100.00%**	**85,762**	**72,201**

Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

All quota shares held by St. Paul residents are Area 4C shares, except for CDQ flagged quota.[92]

- St. Paul is one of two communities in Area 4C (see Figure 1). Area 4C has a 50 percent CDQ reserve that is allocated 85 percent to CBSFA and 15 percent to APICDA. St. George, the other community in Area 4C, is a member of the APICDA CDQ entity.
- 10 individuals in St. Paul hold quota shares in Area 4C exclusively.
- Two individuals in St. Paul hold quota shares in Area 4C plus CDQ flagged quota shares in Area 4A; another individual owns only CDQ flagged quota shares in Areas 3B and 4A (and no quota shares in Area 4C).

Another important way that communities are engaged in the commercial halibut fishery harvest sector, beyond local individuals owning vessels active in the fishery or holding halibut quota share units, is through employment of local residents as crew members on vessels participating in the fishery. However, as noted in Section 4.5.4, sources of systematically collected quantitative data on crew employment and earnings are not available for the halibut fishery in this or other regions.

[92] For more information on CDQ flagged shares, see the discussion contained in the footnote in Section 6.1.5.2.

6.2.5.3 Shore-Based Processors and First Wholesale Gross Revenues

The shore-based processor in St. Paul accepted BSAI halibut deliveries each year during the period 2010-2019. While more than one processor name appears in the data, only one unique physical plant was active in the community during these years. As noted in an earlier analysis (AECOM 2015), one entity in the data is a separate legal entity that used Trident's facility for processing activities. This entity, 170 Degrees West, is a subsidiary of the CBSFA and is the operating company of the CBSFA halibut cooperative. The organization is focused exclusively on halibut custom processing caught by CBSFA-affiliated vessels and is primarily focused on selling value-added products (CBSFA 2015).

According to the CBSFA website and public testimony before the Council, the CBSFA operates the local halibut fishery in conjunction with local fishermen, Saints Boats LLC (F/V Saint Paul and F/V Saint Peter), and Trident Seafoods. CBSFA purchases the halibut from the local fleet and partners with Trident to process and market the fish. During halibut processing, as noted above, CBSFA splits the cost of the shoreplant overhead and operating costs with Trident based on the proportion of CBSFA-purchased halibut and Trident-purchased halibut being processed in the plant, which facilitates the stability of a local halibut market that may not otherwise be economically sustainable by either party. Any halibut CDQ not able to be caught by the local St. Paul fleet is then leased to CBSFA's own boats, the F/V Saint Paul and F/V Saint Peter, if they are available at the end of the season.[93]

For the reporting of first wholesale gross revenues (or ex-vessel gross revenues for deliveries made to the plant in the absence of first wholesale gross revenue data), the shore-based processor in St. Paul was combined with those in Akutan and Unalaska due to confidentiality restrictions. Those data, available in Table 19 are presented in summary in Section 6.1.5.3.

6.2.6 Engagement in the Subsistence BSAI Halibut Fishery

As described in an earlier NPFMC analysis (AECOM 2015)[94] in St. Paul, subsistence data for the tribal village show that an average 14.3 fishermen were estimated to fish halibut from 2009-2012. The average number of halibut landed for 2009-2013 was 250.5, representing an estimated 4,985.5 pounds. Between 2003 and 2010, the number of St. Paul residents holding a SHARC card to harvest halibut declined from 250 to 41. Because the CBSFA region only includes St. Paul, more recent information on subsistence use can be gleaned from ADFG's most recent subsistence harvest report (Fall and Koster 2020). In 2018, 30 residents were issued SHARCs, and 26 are estimated to have fished for subsistence halibut. Based on returned surveys, total estimated catch in the community was 357 fish in 2018, estimated at 4,751 pounds. That poundage estimate is the highest since 2010 (10,139 pounds), and an increase over the most recent surveyed year (3,930 pounds in 2016). Total estimated subsistence harvest from 2003 through 2018 can be found in Table 6 of Fall and Koster, 2020.

Table 42 presents selected information from the ADFG Community Information System for the potentially substantially engaged or substantially dependent halibut community (as selected by initial screening criteria) of St. Paul in the CBSFA region. As discussed in Section 6.1.6, while these data are often dated (e.g., 1994 is the most recent year available for St. Paul), they still represent the most comprehensive data encompassing all subsistence resources available that is comparable across regions. As shown, over 90 percent of all households are reported as using subsistence halibut. The percentage of halibut of all subsistence fish harvested was approximately 87 percent, while the retention of subsistence halibut from commercial fishing was approximately 27 percent. The latter two figures are the highest for any community characterized in this analysis.

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[93] https://www.cbsfa.com/halibut.html accessed 2/17/2021.

[94] See Table 2-8 in that analysis (Proposed Bering Sea/Aleutian Islands Halibut PSC Limit Revisions Appendix C: Community Analysis)

Table 42. Selected CSIS Halibut, Fish, and All Resources Subsistence Harvest Information, CBSFA Region, 1994

Community	Year(s) Data Are Available	Percent Using Halibut	Percent Harvesting Halibut	Halibut Reported Pounds Harvested	Halibut Estimated Total Pounds Harvested	All Fish Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Fish Harvested	All Resources Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Resources Harvested	Estimated Pounds of Subsistence Halibut Harvested Retained from Commercial Fisheries	Subsistence Halibut Estimated Total Pounds Harvested Retained from Commercial Fisheries
St. Paul	1994	90.5%	54.8%	27,374	51,489	59,260	86.9%	131,814	39.1%	14,039	27.3%

Source:ADFG Community Subsistence Information System https://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=harvInfo.harvestCommSelComm accessed 5/7/2020.

Community leaders have stated that the most important subsistence species in the community include halibut, reindeer, fur seals, and sea lions (Himes-Cornell *et al.* 2013). Halibut is the primary fish species taken for subsistence. From 2000 through 2008 only one or two households held a subsistence salmon permit, and no data were available on the number fish harvested. Other species caught or gathered for subsistence include Pacific cod, rockfish, sablefish, sculpin, and flounder. Marine invertebrates included various crab species, octopus, clams, and sea urchins.

6.2.7 Engagement in the Commercial BSAI Groundfish Amendment 80 Sector Fishery

No St. Paul direct participation in the BSAI groundfish Amendment 80 sector fishery through local vessel ownership address is shown for any year in the 2010-2019 dataset used for this analysis.

St. Paul does serve as a product transfer location for catcher/processors engaged in BSAI groundfish fisheries, but shared state Fisheries Resource Landing tax revenue returns associated with these transfers are minor relative to other fishery sector local activities. As shown in Table 36, on an average annual basis 2010-2019, St. Paul received approximately $923,000 per year from the Alaska Department of Revenue in the form of shared state Fishery Business Tax and Fisheries Resource Landing Tax revenues combined. Of this amount about $903,000, or about 98 percent of the total, derived from Fishery Business Tax shared revenue and approximately $20,000, or about two percent of the total, derived from Fishery Resource Landing Tax shared revenue. To put these figures in perspective, total general fund revenues from local taxes and state and federal intergovernmental transfers for the City of Saint Paul in Calendar Year 2019 were approximately $2.9 million,[95] of which an average year of shared state fisheries tax revenues combined 2010-2019 ($923,000) would have accounted for roughly 32 percent of the total; shared state Fisheries Resource Landing Tax revenues alone for an average year 2010-2019 ($20,000) would have accounted for roughly 0.7 percent of calendar year 2019 total. It is also important to note that Fisheries Resources Landing tax revenue represents tax revenues received from all catcher/processor product transfers/offloads in all fisheries, not just those of Amendment 80 vessels participating in the BSAI groundfish fisheries, as no fishery specific data are available.[96]

[95] City of Saint Paul, Alaska, Basic Financial Statements, Required Supplemental Information, Supplemental Information, and Single Audit Reports, Year Ended December 31, 2019, available at: https://www.commerce.alaska.gov/dcra/DCRARepoExt/RepoPubs/FinDocs/SaintPaulCY2019Audit.pdf. Accessed 2/17/2021.

[96] As noted in the Amendment 80 fishery taxes discussion in economic analysis (Section 3.3.2.3) of the EIS to which this SIA is appended, much of the total Fisheries Resource Landing Tax revenue at the state level is likely generated

As shown in Table 8, over the period 2010-2019, St. Paul had an annual average of 5.5 Amendment 80 vessel port calls per year, making it the community with the fourth highest average of Amendment 80 port calls in the BSAI region, ranging from zero to 24 in any given year in that period. According to CBSFA management, however, private sector economic activity related to Amendment 80 port calls are modest, primarily consisting of services related to transportation to and from the island for crew changes and the like. Amendment 80 vessels are too large to enter the harbor, so no fuel sales or other direct vessel support activities take place.

6.2.8 CDQ Group Direct BSAI/Area 4 Halibut and/or Groundfish Amendment 80 Sector Engagement

In addition to participating in the BSAI halibut and/or BSAI groundfish fisheries through use of CDQ quota ownership in direct and indirect ways, CBSFA, like other CDQ entities, has also invested in capital assets in the catcher vessel and/or catcher/processor sectors as another avenue to meet the economic and social goals of the CDQ program. Among vessels shown in the dataset used for analysis as actively participating in the BSAI groundfish Amendment 80 sector fishery in at least one year 2010-2019, none were listed in the most recent CDQ ownership attribution Regulatory Impact Review (RIR) (NMFS 2017) as owned in whole or in part by CBSFA, a situation that was confirmed by CBSFA management as still accurate in 2020. CBSFA does however, like some other CDQ groups, lease CDQ quota to entities in which it has no ownership or management interest. According to CBSFA management, it has in several past years specifically avoided leasing its CDQ to the Amendment 80 sector over concerns with bycatch rates and have left quota in the water as a result, considering the decline in bycatch more valuable to the local fishery than the potential value that would be returned from lease fees. In recent years, CBSFA has coordinated its BSAI groundfish CDQ leasing with that of NSEDC which, according to CBSFA management, utilizes a catcher/processor (in this specific instance an AFA catcher/processor) with relatively favorable bycatch rates to harvest its BSAI CDQ groundfish quota in conjunction with CBSFA's quota.

As noted above, CBSFA and its subsidiaries are actively involved in the local commercial halibut fishery in multiple ways in the local harvest sector, the local processing sector, and in the marketing of fishery products, which underlines the local importance of the commercial halibut fishery.

6.3 Coastal Villages Region Fund Region

6.3.1 Location

CVRF is a CDQ entity that includes 20 communities in the western mainland coastal area of Alaska and on Nunivak Island (Figure 3) with a combined population of 8,570 (Table 26). Many communities are within the Yukon Delta National Wildlife Refuge, south of the Yukon River Delta, and around Kuskokwim Bay. As identified through initial screening criteria, BSAI communities potentially substantially engaged in or dependent upon the BSAI/Area 4 halibut fishery within the CVRF region include Chefornak, Hooper Bay, Kipnuk, Mekoryuk, Newtok, Nightmute, Quinhagak, Toksook Bay, and Tununak. Other communities in CVRF include Chevak, Eek, Goodnews Bay, Kongiganak, Kwigillingok, Napakiak, Napaskiak, Oscarville, Platinum, Scammon Bay, and Tuntutuliak, all of which are home to federally recognized Tribal entities. The coastline of the CVRF region is adjacent to IPHC Regulatory Area 4E, as shown on Figure 1.

in the at-sea sector of the AFA pollock fishery; that same section provides an estimate of total Amendment 80 sector Fishery Resource Tax revenue, which is not recapitulated here, but no estimates are available at the community level.

6.3.2 Historical Overview

The CVRF region has been a Yup'ik Eskimo traditional homeland for thousands of years. The Yup'ik were seasonally migratory, travelling throughout the region to secure game and fish resources. Small numbers of people were likely present at optimal coastal sites between 2,500 and 3,500 years ago (Shaw 1998). The presence of large coastal villages increased before 2,400 years ago as nets were introduced. These coastal locations gave quick access to sea mammals and fish and seasonal access upriver to inland resources such as caribou. These three resources (sea mammals, salmon, and caribou) made up the base of the broad subsistence economy (Shaw 1998). Prehistoric trade routes across the Bering Strait provided access to manufactured goods to native people in the region prior to the arrival of Russian explorers in the late 1700s and their establishment of trading posts in 1819. The economy of the region during the late 1800s was focused largely on fur trading and harvesting, with the community of Bethel emerging as a regional population and economic center. Through the 1900s, the economy transitioned to include commercial fishing, mining, and reindeer herding (Himes-Cornell *et al*. 2013).

A summary of the institutional structure of the contemporary CVRF region communities relevant to this SIA analysis is shown in Table 43. Narrative summaries of the historic context of each community listed are presented in the following sections.

Table 43. Community Institutional Summary (Selected CVRF CDQ Communities)

Community	Alaska Native Community Name (Language)	Borough	Municipal Government	Incorporation Type (and Date)	ANCSA Community	ANCSA Regional Corporation	ANCSA Village Corporation	Federally Recognized Tribe	CDQ Community (Group)
Chefornak	Cew'arneq (Central Yup'ik)	Unorganized Borough	City of Chefornak	2nd Class City (1974)	Yes	Calista Corporation	Chefarnrmute Incorporated	Village of Chefornak	Yes (CVRF)
Hooper Bay	Naparyaarmiut (Central Yup'ik)	Unorganized Borough	City of Hooper Bay	2nd Class City (1966)	Yes	Calista Corporation	Sea Lion Corporation	Native Village of Hooper Bay	Yes (CVRF)
Kipnuk	Qipnek (Central Yup'ik)	Unorganized Borough	none (unincorporated)	--	Yes	Calista Corporation	Kugkaktlik, Limited	Native Village of Kipnuk	Yes (CVRF)
Mekoryuk	Mikuryar (Cup'ig)	Unorganized Borough	City of Mekoryuk	2nd Class City (1969)	Yes	Calista Corporation	Nima Corporation	Native Village of Mekoryuk	Yes (CVRF)
Newtok	information unavailable	Unorganized Borough	none (unincorporated)	--	Yes	Calista Corporation	Newtok Native Corporation	Newtok Village	Yes (CVRF)
Nightmute	NegteMiut (Central Yup'ik)	Unorganized Borough	City of Nightmute	2nd Class City (1974)	Yes	Calista Corporation	Chinuruk Incorporated	Native Village of Nightmute	Yes (CVRF)
Quinhagak	Kuinerraq (Central Yup'ik)	Unorganized Borough	City of Quinhagak	2nd Class City (1969)	Yes	Calista Corporation	Qanirtuuq, Incorporated	Native Village of Kwinhagak	Yes (CVRF)
Toksook Bay	Nunakauyaq (Central Yup'ik)	Unorganized Borough	City of Toksook Bay	2nd Class City (1972)	Yes	Calista Corporation	Nunakauiak Yupik Corporation	Nunakauyarmiut Tribe	Yes (CVRF)
Tununak	Tununeq (Central Yup'ik)	Unorganized Borough	none (unincorporated)	--	Yes	Calista Corporation	Tununrmiut Rinit Corporation	Native Village of Tununak	Yes (CVRF)

Source: DCRA Community Database, https://dcra-cdo-dcced.opendata.arcgis.com/ Accessed 10/6/2020.

6.3.2.1 Chefornak

The village of Chefornak was not established in its current location until the mid-twentieth century, when Alexie Amagiqchik founded a small general store at the site. He had moved from a village on the Bering Sea to the new location one mainland to escape potential floodwaters. Others from the original village followed and settled in Chefornak, which was incorporated as a 2nd Class City in 1974. Chefornak is largely dependent on a subsistence economy, with employment opportunities limited to part time and seasonal work. Today, subsistence activities continue to be an important part of the community's identity; however, commercial fishing has also taken root as a driver of the local economy (Himes-Cornell *et al*. 2013). Chefarnrmute Incorporated is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Village of Chefornak.

6.3.2.2 Hooper Bay

The early Yup'ik names for Hooper Bay are "Askinuk" or "Askinaghamiut". E.W. Nelson of the U.S. Signal Service first reported the village in 1878. The name Hooper Bay came into common usage after a post office with this name was established in 1934. Hooper Bay is a large traditional Yup'ik Eskimo community. Commercial fishing and subsistence activities are the primary means of support (DCCED 2019). Hooper Bay was incorporated in 1966 as a 2nd Class City with a mayoral form of government. The Sea Lion Corporation is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Hooper Bay.

6.3.2.3 Kipnuk

Kipnuk is a traditional Yup’ik Eskimo community, maintaining a subsistence lifestyle. According to Bureau of Indian Affairs records, the village of Kipnuk was established around 1922. Today, commercial fishing is an important source of income in Kipnuk. Kipnuk is an unincorporated community, however local government and utilities provide a majority of wage employment in Kipnuk along with seasonal activities such as fishing and construction. Subsistence activities also provide a foundation for the local economy and lifestyle (Himes-Cornell *et al*. 2013). Kugkaktlik, Limited is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Kipnuk.

6.3.2.4 Mekoryuk

Historically, the Native Eskimo people present in the area of Mekoryuk have been the Yup’ik peoples, specifically the Nuniwarmiut people who are Cup’ig Eskimos. Nunivak Island itself has been peopled for at least 2,000 years. Prior to the arrival of Europeans, subsistence hunting and fishing was the basis of the economy for people living on Nunivak Island and surrounding areas of the Yukon-Kuskokwim Delta. In 1821, the first outside contact occurred with the Russian American Company. The Company documented 400 people living in 16 villages on the Island. In 1874 a summer village camp by the name of “Koot” was noted at the modern-day site of Mekoryuk. There was an epidemic in 1900 which decimated the population. Only four families in the village survived. An Eskimo missionary built the Evangelical Covenant Church in the 1930s in the village, and a BIA school was built in 1939. The school attracted people to relocate from other parts of the Island to the village. By 1957, the only permanent community left on the Island was Mekoryuk, and around this time many of the families moved to the community of Bethel to be closer to a high school. Families returned seasonally to Mekoryuk for fishing and sea mammal hunting in the late spring.

Mekoryuk was incorporated as a 2nd Class City in 1969. The City has a Strong Mayor form of government, which includes a seven-person city council, including the mayor, a nine-person advisory school board, and several municipal employees. Today almost all local families continue to engage in subsistence activities, and most have fish camps. In Mekoryuk, major employers include the school, local and regional government and non-profit organizations, commercial fishing, construction, and service industries. According to a survey conducted by the AFSC in 2011, community leaders reported that commercial fishing is the primary resource-based industry on which the economy depends. In addition, most families in Mekoryuk engage in subsistence fishing, and most have fish camps. Community leaders noted that halibut is also an important subsistence resource (Himes-Cornell *et al*. 2013). The Nima Corporation is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Mekoryuk.

6.3.2.5 Newtok

Newtok is a Yup'ik Eskimo village. The people of Newtok and Nelson Island are known as Qaluyaarmiut, or "dip net people." The name Newtok (Niugtagin Yup'ik) means "rustling of grass," appropriate for a village located on a sweeping bend of the Ninglick River. Only intermittent outside contact occurred until the 1920s. Newtok was first reported in 1949 by the U.S. Geologic Survey after residents of Old Kealavik, a site across the river, relocated to Newtok to escape seasonal flooding. A BIA school was built in 1958, and like many communities in rural Alaska, the village developed around the school (DCRA 2019). Harvest of marine resources has been important to residents of the Newtok area since prehistory. Subsistence fishing and hunting continue to be an important supplement to cash employment for Newtok residents (Himes-Cornell *et al*. 2013). Relative isolation from outside influences has allowed Newtok to retain traditions and customs to a greater degree than in other parts of Alaska. Residents of the village have an active subsistence lifestyle (DCCED 2019).

A city government incorporated in 1976 but was dissolved in 1997 in favor of the traditional village council government and Newtok remains an unincorporated community. Due to severe erosion and melting permafrost, the village is in the process of relocating to higher ground. Construction has begun in Mertarvik, the future site of Newtok. The Newtok Native Corporation is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is Newtok Village.

6.3.2.6 Nightmute

Nightmute is a Yup'ik Eskimo village. The people of Nelson Island are known as Qaluyaarmiut, or "dip net people." Harvest of marine resources has been important to residents of the Nightmute area since prehistory. The Qaluyaarmiut have lived on the Bering Sea coast for at least 2,000 years. In 1841-1842, a Russian naval officer, Lieutenant Lavrenty Zagoskin, was the first to explore the lower Yukon and briefly encountered the Qaluyaarmiut. Contact with outside people and customs became more consistent during the 1950s. The traditional fish camp for the people of Nightmute is called Umkumiut. In 1964, many residents relocated to the present site of Toksook Bay to access cost-effective goods more easily. Those who remained make up most of the current population of Nightmute. Nightmute was incorporated in 1974 as a 2nd Class City. Because of the village's relative isolation from outside influences, traditions and customs have been retained in Nightmute to a greater degree than in other parts of Alaska. Subsistence fishing and hunting continue to be an important supplement to commercial fishing and other cash employment for Nightmute residents (Himes-Cornell *et al*. 2013). Chinuruk Incorporated is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Nightmute.

6.3.2.7 Quinhagak

The Yup'ik name for Quinhagak is Kuinerraq, meaning "new river channel." Quinhagak, also known as Kwinhagak, is a long-established village whose origin has been dated to 1000 AD. It was the first village on the lower Kuskokwim to have sustained contact with Europeans. Gavril Sarichev reported the village on a map in 1826. After the purchase of Alaska in 1867, the Alaska Commercial Company sent annual supply ships to Quinhagak with goods for Kuskokwim River trading posts. Supplies were brought to shore from the ship and stored in a building on Warehouse Creek. A Moravian mission was built in 1893. There were many non-Natives in the village at that time; most were waiting for boats to go upriver. In 1904, a mission store opened, followed by a post office in 1905 and a school in 1909. Between 1906 and 1909, over 2,000 reindeer were brought in to the Quinhagak area. They were managed for a time by the Native-owned Kuskokwim Reindeer Company, but the herd had scattered by the 1950s. In 1915, the

Kuskokwim River was charted, so goods were barged directly upriver to Bethel. In 1928, the first electric plant opened; the first mail plane arrived in 1934. The community was incorporated as a 2nd Class City governed by a mayor and city council in 1975. The community is primarily Yup'ik Eskimos who fish commercially and are active in subsistence food gathering (Himes-Cornell *et al*. 2013). Qanirtuuq Incorporated is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Kwinhagak.

6.3.2.8 Toksook Bay

The Nelson Island area has been inhabited and utilized by Yup'iks for thousands of years. Toksook Bay, also known as Nunakauyak, was established in 1964 along the Tuqsuk River by residents of Nightmute. Toksook Bay was settled to be more accessible to the annual freighter ship, the North Star. Toksook Bay was incorporated in 1972 as a 2nd Class City. Today, Toksook Bay is a traditional Yup'ik Eskimo community with a reliance on fishing and subsistence activities. The Nunakauiak Yupik Corporation is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Nunakauyarmiut Tribe.

6.3.2.9 Tununak

In 1878, Nelson Island was named after Edward Nelson, a Smithsonian naturalist who noted six people, including one non-Native trader, living in Tununak. The city was incorporated in 1975, but it was dissolved on February 28, 1997, in favor of traditional council governance. Tununak remains an unincorporated community. Today, Tununak is a traditional Yup'ik village, with an active fishing and subsistence lifestyle. The Tununrmiut Rinit Corporation is the local ANCSA chartered village corporation, the Calista Corporation is the regional ANCSA chartered corporation, and the federally recognized tribal entity in the community is the Native Village of Tununak.

6.3.3 Demographics

Demographic and socioeconomic characteristics for the potentially substantially engaged or substantially dependent BSAI halibut communities as determined by use of initial screening criteria in this area are presented in Table 44. All communities in the CVRF region can be considered small, rural communities with a high percentage of Alaska Native residents. For those communities considered BSAI halibut-dependent, the largest communities are Hooper Bay, Quinhagak, and Kipnuk with total populations of 1,093; 669; and 639 people, respectively. The smallest BSAI community potentially substantially engaged or substantially dependent halibut community in terms of population was Mekoryuk with 191 residents. All nine of the potentially substantially engaged or substantially dependent BSAI halibut communities in the CVRF had a percentage of Alaska Native residents of at least 92.0 percent (Toksook Bay) during the 2010 U.S. Census, with Kipnuk exhibiting the highest percentage of Alaska Native residents (97.7 percent).

For all the potentially substantially engaged or substantially dependent BSAI halibut communities in the CVRF, the percentage of minority residents is similar to the percentage of Alaska Native residents, suggesting relatively homogenous communities. No residents were living in group quarters at the time of the U.S. Census in 2010. Overall, 2019 per capita incomes were far below that of the State of Alaska as a whole (and relatively low compared to most other communities identified as potentially substantially engaged in or dependent on the BSAI/Area 4 halibut fishery) ranging from approximately $9,000

(Tununak) to approximately $22,000 (Quinhagak).[97] Median household incomes ranged from approximately $29,000 (Mekoryuk) to approximately $52,000 (Chefornak), while median family incomes ranged from approximately $31,000 (Newtok) to approximately $54,000 (Chefornak). Of the nine communities listed in the table, 40 percent or more of the residents of two were considered low-income, as were more than a quarter of the residents of five of the other seven communities. All nine communities had higher percentages of their residents considered low-income than did the population of Alaska as a whole.

Table 44. CVRF Region BSAI Halibut Dependent Communities and State of Alaska Selected Demographic Indicators

	2010 Decennial Census Data				2019 American Community Survey Data				
Community	Total Population	Alaska Native/ Native American Residents (percent of total population)	Minority* Residents (percent of total population)	Residents Living in Group Quarters** (percent of total population)	Per Capita Income (dollars)	Median Household Income (dollars)	Number of Family House-holds	Median Family Income (dollars)	Low-Income*** Residents (percent of total population)
Chefornak	418	95.7%	96.7%	0.0%	$10,671	$52,083	77	$53,750	17.4%
Hooper Bay	1,093	94.6%	98.1%	0.0%	$11,494	$36,250	182	$36,346	40.9%
Kipnuk	639	97.7%	98.0%	0.0%	$11,111	$38,036	114	$40,833	30.1%
Mekoryuk	191	93.2%	96.9%	0.0%	$17,419	$28,958	66	$46,250	27.6%
Newtok	354	96.1%	97.2%	0.0%	$9,969	$37,083	50	$31,250	38.1%
Nightmute	280	94.6%	95.4%	0.0%	$9,723	$48,438	32	$48,125	20.8%
Quinhagak	669	93.4%	97.8%	0.0%	$21,871	$36,750	132	$45,500	29.7%
Toksook Bay	590	92.0%	95.6%	0.0%	$12,747	$41,875	104	$43,750	32.4%
Tununak	327	94.5%	96.0%	0.0%	$9,450	$32,500	75	$32,375	43.4%
State of Alaska	**626,932**	**14.1%**	**37.1%**	**1.8%**	**$36,787**	**$77,640**	**166,325**	**$92,588**	**10.7%**

*Defined as all persons other than those self-identied being in both "white" and "non-Hispanic" census categories.
**Defined as "other noninstitutional facilities," which excludes institutionalized populations, college/university student housing, and military quarters.
***Defined as those persons living below the poverty threshold by the U.S. Census Bureau in the 2015-2019 American Community Survey. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $26,246 in 2020.
Source: US Census 2010; US Census 2020.

Table 45 provides information on school enrollments, for both kindergarten through 12th grade (KG-12) and pre-kindergarten through 12th grade (PK-12), by CVRF community for the 2019-2020 school year, the most recent year for which data are available. The specific CVRF communities included in the table are those that directly participated in the BSAI/Area 4 halibut fishery, as measured by catcher vessels with local ownership addresses that were active in the fishery and/or locally operating shore-plants that accepted BSAI/Area 4 halibut deliveries during at least one year 2010-2019 as indicated in the dataset used for this analysis.

[97] Of the 17 communities identified in this SIA as potentially substantially engaged in or substantially dependent on the BSAI/Area 4 commercial halibut fishery, all had per capita incomes lower than that of the State of Alaska as a whole; the 2019 per capita incomes for each of the nine communities in the CVRF region shown in Table 44 were lower than seven of the eight other communities identified as potentially substantially engaged in or substantially dependent on the BSAI/Area 4 commercial halibut fishery, as shown in the analogous selected demographic indicators tables in the other regional discussions.

Table 45. Selected CVRF Region Schools Total Enrollments, Kindergarten-Grade 12 and Pre-Kindergarten-Grade 12, by Community, 2019-2020 School Year (as of Oct 1, 2019)

Community	School District	School	Total KG-12	Total PK-12
Chefornak	Lower Kuskokwim School District	Chaptnguak School	153	153
Chevak	Kashunamiut School District	Chevak School	302	313
Goodnews Bay	Lower Kuskokwim School District	Rocky Mountain School	72	73
Hooper Bay	Lower Yukon School District	Hooper Bay School	465	482
Kipnuk	Lower Kuskokwim School District	Chief Paul Memorial School	205	205
Kongiganak	Lower Kuskokwim School District	Ayagina'ar Elitnaurvik	152	163
Kwigillingok	Lower Kuskokwim School District	Kwigillingok School	121	138
Mekoryuk	Lower Kuskokwim School District	Nuniwarmiut School	39	42
Newtok	Lower Kuskokwim School District	Ayaprun School*	108	108
Nightmute	Lower Kuskokwim School District	Negtemiut Elitnaurviat	77	98
Platinum	Lower Kuskokwim School District	Arvik School	13	13
Quinhagak	Lower Kuskokwim School District	Kuinerrarmiut Elitnaurviat	215	218
Toksook Bay	Lower Kuskokwim School District	Nelson Island School	189	190
Tuntutuliak	Lower Kuskokwim School District	Lewis Angapak Memorial School	141	143
Tununak	Lower Kuskokwim School District	Paul T. Albert Memorial School	106	108

*Newtok is the process of relocating; Mertarvik Pioneer School opened for the first time in October 2019 with 10 students in temporary facilities at the new townsite.
Source: https://education.alaska.gov/data-center, accessed 8/3/2020.

6.3.4 Local Economy

The economy of the region is currently focused on commercial fisheries, but the nature of regional engagement in those fisheries has changed over time, particularly with the creation and evolution of the CDQ program and the CVRF group. Some tourism and sportfishing occurs in the region, with most services and amenities offered in the Bethel area. The use of natural resources for subsistence use is relatively high in this region compared to other areas, with over 2,000 households in the area annually harvesting salmon for subsistence use (Himes-Cornell *et al.* 2013).

6.3.5 Engagement in the Commercial BSAI/Area 4 Halibut Fishery

6.3.5.1 Catcher Vessels with Local Ownership Addresses and Ex-Vessel Gross Revenues

Table 46 provides trend information on the number of vessels with ownership addresses in CVRF region communities that were active in the BSAI/Area 4 commercial halibut fisheries 2010-2019. Unlike Table 13, which lists only those nine communities with an annual average of two or more active BSAI halibut catcher vessels on an annual average basis (one of the initial screening criteria for halibut dependency), this table shows all regional communities with even one vessel active in any one year during 2010-2019 (i.e., an additional six regional communities, plus Bethel which, while neither a member community of the CVRF CDQ group nor in the geographic region covered by the CDQ group, is nearby and serves as a regional hub). As shown, average annual participation ranged widely during the period 2010-2019: three regional communities (Kwigillingok, Platinum, and Tuntutuliak) participated with only one vessel and in only one year (2013) as did Bethel (2010) for an annual average of 0.1 vessels per year, while Mekoryuk, Toksook Bay, and Tununak each had an annual average of over 10 vessels participating in the fishery.

It is important to note that two of the communities shown in Table 46, Chevak and Goodnews Bay, averaged over 2.0 vessels active in the fishery, one of the initial screening criteria for potential community engagement in or dependency on the BSAI halibut fishery, over the years 2010-2013, i.e., before the regional discontinuation of direct participation in the fishery. Except for three years for Chevak (2011-2013) and one year for Goodnews Bay (2013), all ex-vessel gross revenue data associated with these vessels are confidential.

Table 46. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, CVRF Region Communities, 2008-2019 (number of vessels)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
CVRF	Bethel*	1	0	0	0	0	0	0	0	0	0	0.1	0.1%	1
CVRF	Chefornak	23	21	8	20	2	0	0	0	0	0	7.4	4.2%	34
CVRF	Chevak	2	5	6	4	0	0	0	0	0	0	1.7	1.0%	8
CVRF	Goodnews Bay	2	1	2	3	0	0	0	0	0	0	0.8	0.5%	4
CVRF	Hooper Bay	7	9	9	11	0	0	0	0	0	0	3.6	2.0%	14
CVRF	Kipnuk	20	24	20	19	0	0	0	0	0	0	8.3	4.7%	37
CVRF	Kongiganak	0	0	1	5	0	0	0	0	0	0	0.6	0.3%	5
CVRF	Kwigillingok	0	0	0	1	0	0	0	0	0	0	0.1	0.1%	1
CVRF	Mekoryuk	28	29	24	24	12	0	0	0	0	0	11.7	6.6%	34
CVRF	Newtok	8	8	8	10	1	0	0	0	0	0	3.5	2.0%	17
CVRF	Nightmute	5	8	7	4	2	0	0	0	0	0	2.6	1.5%	10
CVRF	Platinum	0	0	0	1	0	0	0	0	0	0	0.1	0.1%	1
CVRF	Quinhagak	2	8	9	16	0	0	0	0	0	0	3.5	2.0%	18
CVRF	Toksook Bay	33	39	30	31	8	0	0	0	0	0	14.1	7.9%	54
CVRF	Tuntutuliak	0	0	0	1	0	0	0	0	0	0	0.1	0.1%	1
CVRF	Tununak	27	29	26	28	2	0	0	0	0	0	11.2	6.3%	41
CVRF	**Regional Subtotal**	**158**	**181**	**150**	**178**	**27**	**0**	**0**	**0**	**0**	**0**	**69.4**	**39.1%**	**275**

*Bethel is not a CDQ community, nor is it within the CDQ region. It is listed, however, due to its function as a regional hub..

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Beyond these annual averages, however, the most striking pattern of participation seen in the CVRF region is the complete cessation of local vessel participation in BSAI halibut fishery that occurred during the 2010-2019 period. In the four years 2010-2013, between 150 and 181 catcher vessels with ownership addresses in communities in the CVRF region participated in the BSAI commercial halibut fishery in any given year. In 2014, a total of 27 vessels with CVRF region community ownership addresses participated in the fishery. During the years 2014-2019, the five most recent years for which data are available, no vessels with ownership addresses in the CVRF region participated in the BSAI commercial halibut fishery. This suspension of direct participation of multiple local communities in the commercial halibut fishery is attributable to a shift in CVRF strategy for its CDQ halibut fishery holdings (itself due to multiple factors, including limited halibut availability, the economics of in-region processing, and an assessment of equitability of distribution of CDQ program benefits among all of its residents and communities, as discussed in Section 6.3.5.3 and in Section 6.3.8).

Information on BSAI halibut ex-vessel gross revenues of vessels with ownership addresses in the regional communities, to the extent possible within confidentiality constraints, is provided in Table 15. Of the four

CVRF communities listed individually,[98] annual average BSAI halibut ex-vessel gross revenues in 2010-2019 ranged from $10,000 (Hooper Bay) to $205,000 (Toksook Bay), with the other two communities (Kipnuk and Mekoryuk) falling in between ($25,000 and $173,000, respectively). Importantly, however, these values would be substantially higher if calculated for only the years 2010-2013 when all four were still active in the fishery, or even for 2010-2014 when two of the four were still active in the fishery. Information on BSAI halibut vessel diversity, as measured by relative dependency on halibut compared to all species, gear, and area fisheries pursued by those same vessels on an annual average basis 2010-2019, is provided in Table 16. As shown in that table, dependency of the BSAI halibut vessel fleets in the four individual communities ranged between 98 percent and 100 percent (and the rest of the CVRF communities active at any level of participation in the fishery combined was 94 percent). In other words, vessels with CVRF community ownership addresses that were active in the halibut fishery focused virtually exclusively on (and were therefore virtually exclusively economically dependent upon) the BSAI halibut fishery, as they did not participate in other commercial fisheries as part of a diversified fishing portfolio.

For that same 2010-2019 period, Table 17 shows the annual average number of BSAI halibut catcher vessels with local ownership addresses, the annual average number all commercial fishing catcher vessels (all species, gear, and area fisheries) with local ownership addresses (i.e., the local "community commercial fishing fleet"), BSAI halibut ex-vessel gross revenues for the community commercial fishing fleet, total ex-vessel gross revenue for the commercial fishing fleet (from all species, gear, and area fisheries), and the percentage of halibut ex-vessel gross revenues as a percentage of the total ex-vessel gross revenues of the community commercial fishing fleet (i.e., the "dependency" of the community fleet on BSAI halibut as measured in the proportion of ex-vessel revenues derived from that fishery). As shown in that table, of the three communities that can, within the constraints of data confidentiality, be listed independently, the Mekoryuk community fleet was 86 percent dependent on the BSAI halibut fishery, while the Kipnuk and Toksook Bay community fleets were less dependent on that fishery (at nine percent and 26 percent dependency, respectively). For all other CVRF communities that had some level of direct participation in the BSAI halibut fishery 2010-2019 combined, the aggregate community fleet annual average dependency on the BSAI halibut fishery was 13 percent during this period. It is important to note, however, that these 2010-2019 annual dependency averages were depressed by zero direct participation in the BSAI halibut fishery in the years 2014-2019 for some CVRF communities and for all CVRF communities in the years 2015-2019.

6.3.5.2 Other Measures of CDQ Community BSAI/Area 4 Halibut Harvest Engagement

As shown in Table 47, communities in the CVRF region (or near the CVRF region, in the case of Bethel) whose residents hold halibut quota shares are located in Area 4E. Also shown are the 2019 and 2020 IFQ pounds of halibut by community of quota holder as calculated by community shareholding as described in the bullets that follow the table and relevant quota share units to IFQ pounds ratios shown in Table 31 and Table 32, respectively. As noted in the bulleted text, halibut quota share holding by local residents is heavily focused on Area 4E.

[98] The four communities listed had sufficient levels of participation to disclose data for each year they were active in the fishery 2010-2019. Other communities have been aggregated to preserve data confidentiality.

Table 47. Halibut Quota Share Holders and Quota Share Units Held, CVRF Region Communities, 2019 and 2020

Community	Community Located in IPHC Area	Number of Unique Quota Share Holders	Total Quota Share Units Held	Percent of QS Units Held in Region	2019 IFQ Pounds	2020 IFQ Pounds
Bethel*	4E	2	958	0.22%	0	0
Goodnews Bay	4E	1	5,155	1.19%	0	0
Mekoryuk	4E	18	374,106	86.09%	15,776	13,799
Toksook Bay	4E	21	49,901	11.48%	0	0
Tununak	4E	1	4,454	1.02%	0	0
Regional Total	**--**	**43**	**434,574**	**100.00%**	**15,776**	**13,799**

*Bethel is not a CDQ community, nor is it within the CDQ region. It is listed, however, due to its function as a regional hub.
Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

Except for the holdings of one individual in one community, halibut quota shares held by individuals in the CVRF region are Area 4E shares.

- All CVRF communities are in Area 4E (see Figure 1). Area 4E has a 100 percent CDQ reserve that is allocated 70 percent to CVRF and 30 percent to BBEDC (see Table 32).[99] (Also as shown in Table 32, of the 30 percent CDQ reserve in Area 4D: 24 percent is allocated to CVRF; 30 percent is allocated to NSEDC; 26 percent is allocated to BBEDC; and 20 percent is allocated to YDFDA.)
- Bethel is not a CDQ community (and is nearby, but not in the geographic area spanned by the CVRF) but is included in this analysis based on its function as a regional hub. Two individuals in Bethel hold quota shares in Area 4E exclusively.
- One individual in Goodnews Bay holds quota shares in Area 4E exclusively.
- 17 individuals in Mekoryuk hold quota shares in Area 4E exclusively. One individual in Mekoryuk holds quota shares in Area 4E and 3A.
- 21 individuals in Toksook Bay hold quota shares in Area 4E exclusively.
- One individual in Tununak holds quota shares in Area 4E exclusively.

Another important way that communities are engaged in the commercial halibut fishery harvest sector, beyond local individuals owning vessels active in the fishery or holding halibut quota share units, is through employment of local residents as crew members on vessels participating in the fishery. However, as noted in Section 4.5.4, sources of systematically collected quantitative data on crew employment and earnings are not available for the halibut fishery in this or other regions.

6.3.5.3 Shore-Based Processors and First Wholesale Gross Revenues

Shore-based processors in Chefornak, Hooper Bay, Kipnuk, Mekoryuk, Toksook Bay, and Tununak accepted BSAI halibut deliveries each year 2010-2013, as shown in Table 18. One unique processor

[99] As noted in the discussion contained in the footnote in Section 6.1.5.2, any individuals shown in the data as holding quota share units in Area 4E, which has a 100 percent CDQ reserve, did not qualify for compensatory shares. As there is no TAC set in 4E, those shares are not issued quota pounds (i.e., they cannot be fished and typically have no sale value).

appears in the data for each community over these years. No processors in any of these communities accepted BSAI halibut deliveries in any year 2014-2019.

Table 48 provides additional years of historic participation by shore-based processors in the CVRF region that accepted BSAI halibut deliveries (i.e., years not covered by the 2010-2019 dataset primarily used for this analysis). As shown, the plant in Mekoryuk appears in the data as early as 1991, with the number of single-plant communities increasing to six by 2003. This level of engagement, and the specific communities involved, remained unchanged through 2013.

Table 48. Shore-Based Processors in CVRF Region Accepting BSAI Halibut Deliveries by Community of Operation, 1991-2009 (number of processors)

Region	Community	1991	1992	1993	1994	1995	1996	1997	1998	1999	1990	2001	2002	2003	2004	2005	2006	2007	2008	2009
CVRF	Chefornak	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
CVRF	Hooper Bay	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
CVRF	Kipnuk	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
CVRF	Mekoryuk	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CVRF	Toksook Bay	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
CVRF	Tununak	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 49 provides additional years of historic participation by catcher vessels with CVRF community ownership addresses delivering BSAI halibut to the shore-based processors in the CVRF region shown in Table 48 (i.e., years not covered by the 2010-2019 dataset primarily used for this analysis). As shown, a total of 14 CVRF communities had at least one vessel that made at least one delivery in at least one year during the period shown. This includes Scammon Bay, which does not show up in the 2010-2019 data shown in Table 46 (but does not include two communities that began their engagement in the fishery through being the community of catcher vessel ownership address in later years, Platinum and Quinhagak, as shown in that same table).[100]

[100] Vessels with ownership addresses in seven non-CVRF member communities are shown in the data as having made at least one BSAI halibut delivery to shore-based processing plants in CVRF region communities during at least one year 1991-2013. These include communities that show up in the data for one year: Petersburg (2009) and Nome (2012), Alaska; South Bend, Oregon (2008); and Ilion, New York (2006). Anchorage appears in each of the 23 years 1991-2013, with more than one vessel making at least one delivery all years, with one exception (1998) and up to a maximum of five vessels per year (which occurred in five different years). Bethel and Kwethluk, approximately 10 miles apart and both outside of but near the inland boundary of the CVRF region, appear in the data for multiple years. Kwethluk appears in the data with one vessel in each of three years (1998, 2000, and 2001), while Bethel appears in the data 17 out of 23 years, with more than one vessel in 11 of those years (with a maximum of 6 vessels per year, which occurred in one year).

Table 49. BSAI Individual Halibut Vessels by CVRF Region Community of Vessel Historical Ownership Address, That Delivered to Shore-Based Processors in the CVRF Region, 1991-2009 (number of vessels)

Region	Community	1991	1992	1993	1994	1995	1996	1997	1998	1999	1990	2001	2002	2003	2004	2005	2006	2007	2008	2009
CVRF	Chefornak	0	0	0	0	1	3	9	8	0	8	21	15	8	15	14	18	29	28	20
CVRF	Chevak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1
CVRF	Goodnews Bay	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0
CVRF	Hooper Bay	0	0	0	0	1	0	1	0	0	0	1	1	13	1	6	4	5	5	10
CVRF	Kipnuk	0	0	0	0	0	0	3	9	0	7	0	1	23	16	9	14	22	21	23
CVRF	Kongiganak	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
CVRF	Kwigillingok	0	0	0	0	0	2	1	0	0	1	1	0	0	1	0	0	0	0	0
CVRF	Mekoryuk	14	13	22	15	13	18	26	2	30	33	28	30	25	29	28	27	29	26	27
CVRF	Newtok	0	0	0	1	0	4	8	3	0	9	8	8	5	6	4	6	14	9	6
CVRF	Nightmute	0	0	0	1	10	12	14	8	0	15	12	8	6	4	8	10	9	7	7
CVRF	Scammon Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1
CVRF	Toksook Bay	0	0	5	16	27	21	30	30	0	38	45	34	39	21	34	28	40	37	32
CVRF	Tuntutuliak	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
CVRF	Tununak	1	0	2	20	27	21	24	9	0	28	33	29	25	21	25	24	31	29	28

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

As noted in Section 4.5.2, first wholesale gross revenue data for shore-based processors sufficient to calculate processing diversity are not available. In the absence of first wholesale gross revenue information, ex-vessel gross revenue information for BSAI deliveries made at shore-based plants in presented in Table 19. As shown in that table, to preserve data confidentiality data from Chefornak, Kipnuk, and Toksook Bay are aggregated into a group, as are data from Hooper Bay, Mekoryuk, and Tununak. Annual average ex-vessel gross revenues of deliveries for the two groups of communities over the period 2010-2019 were $290,000 and $140,000, respectively, recognizing that these averages represent 10 years of data, six of which have a zero value for all communities. While there are modest values compared to some other regions, as shown in Table 21, these ex-vessel gross revenues associated with BSAI halibut deliveries are virtually the all the ex-vessel gross revenues associated with any deliveries from any fishery to any shore-based processor in these communities over the period 2010-2019. In other words, this illustrates essentially a complete dependency of all shore-based processing on BSAI halibut in these communities, even though no BSAI halibut has been processed there for the six most recent years covered by the data.

As stated in an earlier analysis for a different Council action (AECOM 2015), according to Coastal Villages Seafoods management, in 2012 it was Coastal Villages Seafoods' assessment that the halibut quota was too low to economically run plants in each of these communities, so halibut processing operations in the communities of Chefornak, Hooper Bay, Kipnuk, Mekoryuk, Toksook Bay, and Tununak were mothballed in favor of operating a buying station in each community. Further, as stated the 2015 analysis, (1) in 2012 and 2013, halibut were offloaded in these communities, put on ice, and shipped to the Goodnews Bay Regional Processing Plant in Platinum (which does not appear in the current [2010-2019] data set used for this analysis[101]); (2) in 2014, Coastal Villages Seafoods attempted to have some their local fishermen catch their halibut quota, but they were unable to catch it all and the operation proved uneconomical; (3) in 2015 Coastal Villages Seafoods leased out all of their CDQ halibut quota to a longliner; and (4) then-current plans were to keep the plants in these six communities mothballed until

[101] What appears to be this plant is shown in the data as being in Anchorage but has a port name of Quinhagak (rather than either Platinum or Goodnews Bay) in a separate field.

the availability of halibut increased sufficiently or economic conditions otherwise become more favorable.

Follow-up with Coastal Villages Seafoods management personnel for an earlier iteration (2019/2020) of the current analysis confirmed that the conditions described for the in-region halibut fishery in the earlier report had not changed. In addition, it was noted that salmon processing operations in Quinhagak were discontinued in 2009 when the Goodnews Bay Regional Processing Plant in Platinum came online; however, the plant in Platinum was subsequently closed, with 2015 being the most recent year of salmon production occurred at that facility (or elsewhere in the region) due to a combination of a relatively low volume of inputs and relatively high expenses of operation. In the absence of conditions that have been determined necessary to permit economically viable/sustainable in-region processing and local commercial fleet support initiatives for the BSAI halibut fishery in at least some of their member communities and in the absence of outside processing firms showing interest in stepping in to operate processing facilities within the region, the CVRF board made the decision to suspend direct in-region commercial halibut fisheries support initiatives in favor of programs designed to distribute the benefits gained from leasing out all CDQ fisheries quota among all of their constituent communities. While this shift away from targeted support of in-region halibut fisheries has unavoidably had adverse effects in communities most directly benefitting from previous fisheries initiatives (such as Mekoryuk, which is shown in the data as participating in the fishery for 28 straight years through both local catcher vessel ownership and being the location of an active shore-based processing plant[102]), the goal of the CVRF board's shift to focusing on programs funded by leasing out CDQ quota, such as the mechanics and welders program, which puts trained mechanics and welders and a CVRF shop in every community,[103] and the Ciuneq program, which helps young people get professional training and certifications for careers in the fishing and maritime industries, two programs that were specifically noted in public testimony at the April 2021 NPFMC meetings and designed to benefit all CVRF communities. As further elaborated in public testimony, this includes both the lesser number of CVRF communities that previously benefited from the earlier in-region fishery program initiatives as well as the greater number of CVRF communities that do not have direct access to fishery participation and did not benefit from the previous initiatives, which is consistent with the CVRF board's intent to provide a more fair and equitable distribution of benefits of the CDQ program among its communities (as discussed in more detail in Section 6.3.8). This situation illustrates the challenges of the types of difficult decisions that must be made especially in times of decreased resource abundance and in the context of a complex constituency.

6.3.6 Engagement in the Subsistence BSAI Halibut Fishery

As described in an earlier NPFMC analysis (AECOM 2015)[104] for those CVRF communities for which subsistence data are available, the potentially substantially engaged or substantially dependent BSAI halibut communities as determined by use of initial screening criteria with the largest number of estimated halibut subsistence fishermen were Kipnuk and Toksook Bay, both with an average of 8.3 fishermen from 2009-2012. The average numbers of halibut landed for 2009-2012 were 145.3 and 97.8, representing an estimated 1,091.0 and 705.8 pounds, respectively. For other CVRF communities, the average number of halibut fishermen from 2009-2012 was generally fewer than 10; however, the

[102] Mekoryuk was selected for characterization as a case study in a recent article on CDQs and non-economic factors in community well-being due to the social impact associated with the local plant closure and discontinuation of local fleet participation in the halibut fishery (Lyons, *et al*., 2019).

[103] It was noted in public testimony at the April 2021 Council meetings this program helps to fix and maintain boats and engines (and has begun providing certified warranty repairs for a common engine manufacturer), which is anticipated to substantially reduce the cost of maintaining access to subsistence opportunities.

[104] See Table 2-8 in that analysis (Proposed Bering Sea/Aleutian Islands Halibut PSC Limit Revisions Appendix C: Community Analysis)

estimated average number of halibut fishermen in Kwigillingok was 31.0, although no halibut were landed by these fishermen and data may not be completely accurate.

Table 50 presents selected information from the ADFG Community Information System for the potentially substantially engaged or substantially dependent halibut communities in the CVRF region as selected by initial screening criteria. As discussed in Section 6.1.6, while these data are often dated (e.g., 1986 is the most recent year available for Tununak), they still represent the most comprehensive data encompassing all subsistence resources available that is comparable across regions. As shown, however, CVRF region potentially halibut dependent communities are underrepresented in the data compared to potentially halibut dependent communities in other regions covered by this analysis. Of the five communities for which there are data, three had over 75 percent of households and one had 100 percent of households using subsistence halibut. The percentage of retention of subsistence halibut from commercial fishing is only available for one community in one year (Quinhagak, 2013, three percent), although each of the communities shown on the table were known to have engaged in commercial halibut fishing during multiple years for which subsistence data, including retention from commercial fishing, were not collected.

Table 50. Selected CSIS Halibut, Fish, and All Resources Subsistence Harvest Information, CVRF Region Communities, Various Years

Community	Year(s) Data Are Available	Percent Using Halibut	Percent Harvesting Halibut	Halibut Reported Pounds Harvested	Halibut Estimated Total Pounds Harvested	All Fish Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Fish Harvested	All Resources Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Resources Harvested	Estimated Pounds of Subsistence Halibut Harvested Retained from Commercial Fisheries	Percent of Subsistence Halibut Estimated Total Pounds Harvested Retained from Commercial Fisheries
Chefornak	none*	--	--	--	--	--	--	--	--	--	--
Hooper Bay	none*	--	--	--	--	--	--	--	--	--	--
Kipnuk	2017	77.6%	41.8%	7,972	11,877	107,991	11.0%	no data**	--	no data	--
Mekoryuk	2017	80.0%	48.0%	4,347	6,694	18,514	36.2%	no data**	--	no data	--
Newtok	none*	--	--	--	--	--	--	--	--	--	--
Nightmute	2017	76.5%	47.1%	3,492	5,545	57,387	9.7%	no data**	--	no data	--
Quinhagak	2013	68.8%	15.6%	5,118	7,606	108,422	7.0%	215,950	3.5%	233.5	3.1%
Quinhagak	2017	36.6%	16.1%	2,004	3,449	53,300	6.5%	no data**	--	no data	--
Toksook Bay	none*	--	--	--	--	--	--	--	--	--	--
Tununak	1986	100.0%	93.9%	15,800	30,643	254,651	12.0%	358,100	8.6%	no data	--

*Indicates no halibut subsistence use or harvest was reported for any year.
**Indicates no data was collected on overall non-fish subsistence use (as existing data was collected as part of the fishing-focused Central Yukon Kuskokwim Delta Non-Salmon project).
Source:ADFG Community Subsistence Information System https://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=harvInfo.harvestCommSelComm accessed 5/7/2020.

As part of the AFSC's most recent compilation of baseline socioeconomic community profiles, researchers compiled subsistence data from Alaska Department of Fish and Game Division of Subsistence reports, U.S. Fish and Wildlife Service reports, and other published quantitative data. AFSC researchers also elicited qualitative information from some civic leaders via a survey regarding their community's most important subsistence species. The following information is based in part on information published by the AFSC (Himes-Cornell *et al.* 2013). Additionally, both Hooper Bay and Tununak were the sites of community visits and in-person halibut subsistence harvest surveys by ADFG Subsistence Division staff working with local research assistants in 2019.

- In Chefornak, no information is available on household participation and limited records show 63 salmon taken in 2004 and four walruses taken between 2000-2010 for subsistence use.

- In Hooper Bay, SHARC records show that between 43 and 18 individuals were estimated to have fished for subsistence halibut from 2003 through 2007. Eleven or fewer fished from 2008 through 2018 (nine in 2018), and no participants were estimated from the 2012, 2014, and 2016 ADFG statewide harvest surveys. The largest estimated subsistence halibut harvests were around 3,500 pounds in 2005 and 2007. Estimated harvest in 2018 was 778 pounds. Other records suggest relatively high subsistence salmon (Chinook) harvests and subsistence take of ringed seals and other marine mammals.
- In Kipnuk, no Alaska Department of Fish and Game information is available on household participation in subsistence harvesting but other reports suggest that marine mammals are harvested throughout the year and that herring is also an important subsistence fishery within the larger region.
- In Mekoryuk, a 1990 Alaska Department of Fish and Game survey found that 100 percent of households used herring and herring sac roe as a subsistence resource; additionally, other records show an average of 1,062 salmon (chum) harvested per year between 2000-2008 and that a few marine mammals are harvested on an annual basis.
- In Newtok, a 1990 Alaska Department of Fish and Game survey found that 100 percent of households used herring and herring sac roe as a subsistence resource; additionally, other records show subsistence salmon (sockeye) harvesting and a limited amount of marine mammal harvesting between 2000 and 2010.
- In Nightmute, a 1990 Alaska Department of Fish and Game survey found that 100 percent of households used herring and herring sac roe as a subsistence resource; additionally, other records show subsistence salmon (sockeye) harvesting.
- In Quinhagak, community leaders stated that fur seals, salmon, and beluga whales were the three most important subsistence marine resources in the community; a 1982 Alaska Department of Fish and Game survey found that several different species of marine mammals were harvested for subsistence by community residents, including bearded seal, ringed seal, spotted seal, and Steller sea lion.
- In Toksook Bay, ADFG has estimated subsistence participation and harvest for 2003 through 2018. Participation is highly variable, ranging from 121 in 2014 to 5 in 2012. Participation was 10 or fewer individuals from 2008 through 2012 (estimated harvest between 300 and 2,100 pounds) but estimates were higher both before and after. In 2006, 113 individuals harvested over 36,000 pounds and in 2014, 121 individuals harvested 32,000 pounds. In 2018, 39 individuals harvested 6,900 pounds (Fall and Koster 2020). Records show that salmon (chum) are the harvested for subsistence in addition to beluga whales and walrus.
- In Tununak, ADFG's estimates of subsistence halibut participation for 2003 through 2018 range from 82 individuals in 2014 to 3 individuals in 2012 (Fall and Koster 2020). The greatest number of pounds harvested occurred from 2014 through 2018 (11,000 pounds to 28,000 pounds), but the smallest harvest estimates occurred in the preceding years from 2009 through 2012 (84 pounds to 576 pounds. Records suggest some salmon (coho) subsistence harvest, as well as marine mammal harvests of bearded seal, ribbon seal, ringed seal, spotted seal, and Steller sea lion.

As noted in Section 5.4.3 and shown in Table 24, CRVF fishery participants retained approximately 8,294 pounds of halibut from CDQ halibut commercial fishery operations for subsistence use under an Area 4E/4D exemption on an annual average basis during the years 1998-2014 (i.e., before the suspension of the in-region commercial halibut fishery). What impact, if any, the effective loss of the ability to retain U32 halibut from the commercial harvest for subsistence/personal use had on estimates of other types of subsistence halibut harvest and/or overall subsistence halibut harvest volume (e.g., the large increases subsistence halibut harvest seen in subsequent years .in Toksook Bay and Tununak) is an open question. While the U32 halibut previously retained were included in ADFG estimates of total halibut removals, they were not included in standard/ongoing ADFG subsistence estimates for communities.

6.3.7 Engagement in the Commercial BSAI Groundfish Amendment 80 Sector Fishery

No direct participation in the BSAI groundfish Amendment 80 sector fishery through local vessel ownership address is shown for any CVRF region community for any year in the 2010-2019 dataset used for this analysis. No CVRF region communities are shown in the Alaska Department of Revenue shared state Fisheries Resource Landing Tax revenue data as being a product transfer location for processed product offloaded from catcher/processors in any year 2010-2019.

6.3.8 CDQ Group Direct BSAI/Area 4 Halibut and/or Groundfish Amendment 80 Sector Engagement

In addition to participating in the BSAI halibut and/or BSAI groundfish fisheries through use of CDQ quota it owns in direct and indirect ways, CVRF, like other CDQ entities, has also invested in capital assets in the catcher vessel and/or catcher/processor sectors as another avenue to meet the economic and social goals of the CDQ program. Among vessels shown in the dataset used for analysis as actively participating in the BSAI groundfish Amendment 80 sector fishery in at least one year 2010-2019, none were listed in the most recent CDQ ownership attribution Regulatory Impact Review (RIR) (NMFS 2017) as owned in whole or in part by CVRF. CVRF management confirmed that this is still the case as of 2020, with CVRF not owning or managing any vessels in the Amendment 80 fishery. CVRF does however, like some other CDQ groups, lease CDQ quota to entities in which it has no ownership or management interest, including leasing the harvest of some or all of their BSAI multispecies groundfish CDQ quota holdings to entities participating in the Amendment 80 sector fishery.

As noted above, in the past CVRF has actively engaged in developing an in-region commercial halibut fishery, facilitating local entry into the harvest sector and establishing multiple shore-based processing locations to create local markets for landings. According to CVRF management, the CVRF in-region halibut fishery was a CDQ benefit program created by CVRF, not an organically generated, self-sustaining commercial fishery, was highly subsidized by CVRF's other revenues (including Amendment 80-derived income) and was constrained by a CDQ halibut allocation that was modest relative to the number of residents and communities served by CVRF. CVRF's experience in running the in-region fishery program was that halibut wholesale revenue generated was far below the logistics costs of getting fish to market and there was limited ability to defray program costs with external deliveries. Given a combination of geographic and regulatory circumstances, CVRF, unlike some other CDQ-based commercial halibut fisheries in other regions, was unable to supplement CDQ catch with locally and non-locally owned IFQ halibut (and other species) deliveries and thereby increase economies of scale in processing.[105] Overall, it was CVRF's assessment that during its operation, the in-region halibut fishery program served a minority of CVRF residents and a minority of CVRF communities, which resulted in a more imbalanced distribution of benefits across all CVRF residents and communities than was the case

[105] CVRF communities are located in Area 4E, which has a 100% of CDQ reserve (i.e., none is allocated to IFQ). Further, while Area 4D IFQ may be fished in Area 4E, it is still subject to Area 4E trip limitations, reducing the likelihood that Area 4D IFQ owned by non-community members would be delivered to Area 4E communities to supplement throughput at CVRF processing operations. Due to these factors, the only halibut available to the CVRF subsidized in-region halibut fishery program was CVRF's own CDQ halibut allocation.

with other CVRF programs. "In 2015, CVRF's democratically elected Board determined this was no longer rational in terms of both equity and equality."[106]

The CVRF example and experience illustrate the complexity of analyzing the sustained participation of fishing communities, as required under National Standard 8, in the context of a CDQ region where the CDQ entity plays an important mediating role in community engagement in and dependency on a given fishery. National Standard 8 guidelines read, in part, "economic impacts should be considered both for individual communities and for the group of all affected communities identified in the FMP." In the case of the group of CVRF communities, where access to a local halibut IFQ fishery is not an option and directed commercial halibut fishery engagement and dependency over the baseline period was limited to those participating in a CDQ benefits program. As the involved communities relied exclusively on the use of CDQ quota for harvesting and a CVRF subsidy for processing, the nature of community engagement and dependency on the directed halibut fishery during the baseline period was quite different than most other regions potentially affected by the proposed alternatives, and different from all other regions given the policy change implemented by the CVRF board in 2015, partway through the baseline period. By the initial screening methods used to determine community engagement in and dependency on the BSAI/Area 4 halibut fishery for this analysis, a total of nine CVRF communities were identified as potentially substantially engaged in or substantially dependent on the fishery over the period 2010-2019, based on catcher vessel historical ownership address information (Table 13). During the first five years of that period (2010-2014) a total of 15 CVRF communities participated in the fishery through local catcher vessel ownership; however, during the most recent five years of that period (2015-2019) none did so (Table 46). However, those historically participating communities, along with all other CVRF communities, continue to benefit through the present from CVRF programs funded by CDQ quota leasing royalties that after 2014 has included the entirety of CVRF BSAI/Area 4 halibut CDQ quota along with BSAI pollock, crab, and groundfish fishery derived revenues (including BSAI multispecies groundfish CDQ quota leasing to Amendment 80 industry partners).

6.4 Norton Sound Economic Development Corporation Region

6.4.1 Location

NSEDC is the northernmost CDQ entity and includes 15 communities located in the western coastal area of Alaska around Norton Sound and northward to the Bering Strait as well as on Little Diomede and St. Lawrence islands (Figure 3) with a total population of 9,731 (Table 26). As identified through initial screening criteria, BSAI communities potentially substantially engaged in or dependent upon the BSAI/Area 4 halibut fishery within NSEDC include Nome and Savoonga. Other NSEDC communities include Brevig Mission, Diomede (Inalik), Elim, Golovin, Gambell, Koyuk, Saint Michael, Shaktoolik, Stebbins, Teller, Unalakleet, Wales, and White Mountain, all of which are home to federally recognized Tribal entities. Nome (and rest of the mainland coastline of the NSEDC region) is adjacent to IPHC Regulatory Area 4E, while Savoonga (and its fellow St. Lawrence Island community of Gambell) and Diomede (on Little Diomede Island) are within Area 4D, as shown on Figure 1.

6.4.2 Historical Overview

The Bering Strait area was above water 10,000 to 25,000 years ago and the area formed a land bridge to the Asian continent that is thought to have been a primary route by which humans migrated to North America. Archaeological sites in the area date human occupation to 12,000 years ago, and evidence exists

[106] CVRF, personal communication, 4/23/2021 and 4/28/2021.

that Malemiut, Kauweramiut, and Unalikmiut Inupiat settled on the Seward Peninsula approximately 4,000 years ago (Himes-Cornell *et al*. 2013). Marine mammals were an important subsistence resource and the largest pre-contact settlements were located based to access this resource most easily (Harritt 2010). Numerous archaeological excavations in the region have found evidence of a focus on marine resources such as seal, walrus, and beluga bones as well as net sinkers and mollusk shells (Harritt 2010). Known for refined marine mammal hunting and fishing practices, the traditional subsistence economy is generally characterized as marine focused with an emphasis on mammals to the north and fish to the south (Tremayne, *et al*. 2018).

Inupiat in the region had existing trade relationships with villages in Siberia. Some coastal towns, including St. Michael and Unalakleet, became regional trade centers. Russians were active in the area starting in the mid-late 1800s. A large-scale fur trade was developed, and support services for whaling and trading ships increased trade activity in the Bering Strait region. The arrival of Russian explorers and a series of disease outbreaks changed trade networks and reduced the population of the region. In the 1950s, the U.S. Bureau of Indian Affairs built schools at seasonal fish camp sites to encourage a more sedentary lifestyle (Himes-Cornell *et al*. 2013).

A summary of the institutional structure of the contemporary NSEDC region communities relevant to this SIA analysis is shown in Table 51. Narrative summaries of the historic context of the communities listed are presented in the following sections.

Table 51. Community Institutional Summary (Selected NSEDC CDQ Communities)

Community	Alaska Native Community Name (Language)	Borough	Municipal Government	Incorporation Type (and Date)	ANCSA Community	ANCSA Regional Corporation	ANCSA Village Corporation	Federally Recognized Tribe	CDQ Community (Group)
Nome	Sitŋasuaq / Sitnasuaq (Iñupiaq)	Unorganized Borough	City of Nome	1st Class City (1901)	No	Bering Straits Native Corporation	Sitnasuak Native Corporation	Nome Eskimo Community*	Yes (NSEDC)
Savoonga	Sivunga (St. Lawrence Island Yupik [Siberian Yupik])	Unorganized Borough	City of Savoonga	2nd Class City (1969)	Yes	Bering Straits Native Corporation	Kukulget, Incorporated	Native Village of Savoonga	Yes (NSEDC)

*There are three federally recognized tribes located in the contemporary community of Nome. In addition to the tribe noted above, Native Village of Council and King Island Native Community are also present in the community.
Source: DCRA Community Database, https://dcra-cdo-dcced.opendata.arcgis.com/ Accessed 10/6/2020.

6.4.2.1 Nome

Today, many Alaska Native residents of Nome trace their ancestry to original settlers of the Seward peninsula and currently identify with Inupiat culture. Until recently, Nome was not thought to have been a settlement site prior to Western contact and the discovery of gold in the area in the late 1800s. However, the 2005 discovery of the remains of a 300-year-old semi-subterranean house on the Snake River Sandspit in Nome provides evidence that the Native people lived here before the arrival of Westerners. A second semi-subterranean house and trash midden were discovered in 2006. Radiocarbon dating of animal bones from the midden suggest that Inupiat peoples may have lived at the site as early as 1700 AD (Himes-Cornell *et al*. 2013).

The City of Nome was incorporated in 1901. By 1902, the more easily reached gold claims were exhausted and large mining companies with better equipment took over the mining operations. Since the first strike on tiny Anvil Creek, Nome's gold fields have yielded a total of $136 million. The gradual depletion of gold, a major influenza epidemic in 1918, the Great Depression, and World War II each influenced Nome's population. Nome's role in war history was to serve as a station for troops and supplies during World War II.

The population of Nome is home to Inupiat and non-Native residents. Although some employment opportunities are available, subsistence activities are prevalent in the community. Former villagers from

King Island[107] also live in Nome. Nome is the finish line for the 1,100-mile Iditarod Trail Sled Dog Race from Anchorage, held each March.

Nome was incorporated in 1901 and is organized as a 1st Class City. Three federally recognized Tribes, the Nome Eskimo Community, King Island Native Community, and the Native Village of Council[108] have their Tribal government offices in the community and members residing in Nome. The self-governing Tribe for Nome itself, recognized by the Bureau of Indian Affairs, is the Nome Eskimo Community (NEC). In addition to acting as the local tribal governing body, NEC offers social services and programs, including family services, tribal services, tribal youth programs, a tribal housing program, and a tribal resources program, which seeks to educate tribal members about local and broader environmental issues. Tribes in Nome are also member villages of Kawerak Inc., a tribal non-profit organization with a mission of "Advancing the capacity of our People and Tribes for the benefit of the region." Kawerak, Inc. is one of the 12 regional Alaska Native 501(c)(3) nonprofit organizations that were identified under ANCSA and charged with naming incorporators to create regional for-profit corporations. The Sitnasuak Native Corporation is the local ANCSA chartered village corporation for Nome and the Bering Straits Native Corporation is the regional ANCSA chartered corporation.

6.4.2.2 Savoonga

St. Lawrence Island has been inhabited intermittently for the past 2,000 years by Yup'ik Eskimos. In the 1800s, numerous villages were located on the island with a population totaling about 4,000 people. The population was dramatically reduced when a famine swept across the island between 1878 and 1880. Given its strategic location, the island was an important defense site during World War II and maintained that role throughout the Cold War due to its proximity to the former Soviet Union. The U.S. Army and U.S. Navy built radar, sonar, and communication installations, and an airstrip was constructed by the Civil Aeronautics Commission along with lodgings and support buildings. (Himes-Cornell *et al*. 2013).

In the years leading up to the 1971 passage of ANCSA, St. Lawrence Island's status as a federal reserve meant that Savoonga and the neighboring community of Gambell underwent a different process during land claims settlement than other Alaska Native villages. Under ANCSA, most Alaska Native villages received a combination of money and land entitlement. In addition, previous federal reserves were granted land ownership under ANCSA and controlled by Native corporations. Because Savoonga and Gambell were located within the St. Lawrence Island Reserve, they had the option to choose a larger land entitlement in lieu of the monetary portion of the ANCSA settlement. Together, the communities of Gambell and Savoonga received title to the entire 1.136-million acres of land that made up the former St. Lawrence Island Reserve. Today, St. Lawrence Island remains jointly owned by Savoonga and Gambell (Himes-Cornell *et al*. 2013).

Savoonga is a traditional St. Lawrence Yup'ik village with a subsistence lifestyle based on walrus and whale hunting. Due to the island's isolation, most residents are bilingual – Siberian Yup'ik is still the first language, with English as the second language (Himes-Cornell *et al*. 2013). Subsistence harvest of marine mammals and fish provides a foundation for Savoonga's local economy. Important subsistence species include walrus, seal, fish, and bowhead and gray whales (Himes-Cornell *et al*. 2013).

[107] The 1960 census showed 49 residents of King Island; by the time of the 1970 census the population was zero as residents of the island at least some of whom would previously typically spend summers in Nome and winter on King Island became year-round residents of Nome (https://dcced.maps.arcgis.com/apps/MapJournal/index.html?appid=2d2fac3050df42b38377ba96e129c6b0#, accessed 2/17/2021)

[108] Council, about 60 miles northeast of Nome and approximately 15 miles northwest of White Mountain, traditionally a summer fish camp area, became a townsite in the Gold Rush era. While the town itself is now abandoned, the area is now primarily used as a fish camp site by residents of Nome and for recreation by Nome and White Mountain residents.

Savoonga was incorporated in 1969 as a 2nd Class City. The federally recognized tribal entity in Savoonga is the Native Village of Savoonga. The local ANCSA village corporation, Kukulget, Incorporated, runs businesses in tourism and gravel sales, and the regional ANCSA Corporation is the Bering Straits Native Corporation. Savoonga is also a member village of Kawerak Inc.

6.4.3 Demographics

Demographic and socioeconomic characteristics for the communities in the region identified as potentially BSAI halibut-dependent are presented in Table 52. Most of the communities in NSEDC can be considered small, rural communities with a high percentage of Alaska Native residents. However, the city of Nome is a regional economic center and has different demographic and socioeconomic characteristics compared to other coastal communities in the NSEDC.

Nome, with a population of approximately 3,600 in 2010, is the largest community in the region and has a relatively even split between Alaska Native and non-Native residents. In contrast, Savoonga is a much smaller community with a total population of less than 700 in 2010, with approximately 95 percent of those residents indicating they were Alaska Native. The population in Nome is also more diverse than in Savoonga: the percentage of minority residents in Savoonga is similar to its percentage of Alaska Native residents while Nome's percentage of minority residents is almost 15 percent higher than its percentage of Alaska Native residents.

Socioeconomic indicators are quite different between the two communities as well. As shown in Table 52, in 2019, Nome had a much higher per capita income, median household income, and median family income than Savoonga. The percentage of low-income residents in Nome was approximately eight percent, while approximately 37 percent of Savoonga residents were considered low-income.

Neither Nome nor Savoonga (or any of the other three NSEDC communities that appear in the database used for this analysis as directly participating in the BSAI/Area 4 halibut fishery in any year 2010-2019 – Gambell, Unalakleet, and White Mountain) have school enrollments anywhere near low enough to risk the loss of state school funding, which could lead to school closings. The White Mountain school had the lowest total enrollments of the five communities with 48 and 54 students Kindergarten through Grade 12 and Pre-Kindergarten through Grade 12, respectively, for the 2019-2020 school year; the enrollment for threshold for qualifying for state funding is 10 students.

Table 52. NSEDC Region BSAI Halibut Dependent Communities and State of Alaska Selected Demographic Indicators

	2010 Decennial Census Data				2019 American Community Survey Data				
Community	Total Population	Alaska Native/ Native American Residents (percent of total population)	Minority* Residents (percent of total population)	Residents Living in Group Quarters** (percent of total population)	Per Capita Income (dollars)	Median Household Income (dollars)	Number of Family House-holds	Median Family Income (dollars)	Low-Income*** Residents (percent of total population)
Nome	3,598	54.8%	70.5%	5.3%	$35,583	$84,574	880	$91,154	7.5%
Savoonga	671	94.5%	95.1%	0.0%	$11,111	$45,750	172	$46,250	37.1%
State of Alaska	**626,932**	**14.1%**	**37.1%**	**1.8%**	**$36,787**	**$77,640**	**166,325**	**$92,588**	**10.7%**

*Defined as all persons other than those self-identied being in both "white" and "non-Hispanic" census categories.

**Defined as "other noninstitutional facilities," which excludes institutionalized populations, college/university student housing, and military quarters.

***Defined as those persons living below the poverty threshold by the U.S. Census Bureau in the 2015-2019 American Community Survey. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $26,246 in 2020.

Source: US Census 2010; US Census 2020.

Table 53 provides information on school enrollments, for both kindergarten through 12th grade (KG-12) and pre-kindergarten through 12th grade (PK-12), by community for the 2019-2020 school year, the most recent year for which data are available. The NSEDC communities included in the table are those that directly participated in the BSAI/Area 4 halibut fishery, as measured by catcher vessels with local ownership addresses that were active in the fishery and/or locally operating shore-plants that accepted BSAI/Area 4 halibut deliveries during at least one year 2010-2019 as indicated in the dataset used for this analysis.

Table 53. Selected NSEDC Region Schools Total Enrollments, Kindergarten-Grade 12 and Pre-Kindergarten-Grade 12, by Community, 2019-2020 School Year (as of Oct 1, 2019)

Community	School District	School	Total KG-12	Total PK-12
Gambell	Bering Strait School District	Gambell School	166	178
Savoonga	Bering Strait School District	Hogarth Kingeekuk Sr. Memorial School	230	250
Unalakleet	Bering Strait School District	Unalakleet School	173	200
White Mountain	Bering Strait School District	White Mountain School	48	54
Nome	Nome Public Schools*	Nome Elementary	373	376
Nome	Nome Public Schools*	Nome-Beltz Jr/Sr High	264	264

*Also known as the Nome City School District.
Source: https://education.alaska.gov/data-center, accessed 8/3/2020.

6.4.4 Local Economy

The main driver of the local economy in the region is commercial salmon fishing and other commercial fishing along the Yukon River. The establishment of shore-based processors in the region has resulted in growth of commercial fishing in the area, despite its relative remoteness. Mining is another economic driver in the region, with some tin and polymetallic resources found in the area and several small gold mines in operation around Nome. Some tourism occurs in conjunction with the Iditarod, the last third of which runs from Unalakleet to Nome within the NSEDC region. Sportfishing in the region, however, is not as prevalent as it is in other several other areas of the state (Himes-Cornell *et al.* 2013).

According to the NSEDC website, NSEDC began supporting regional fisheries in 1993 through joint ventures with Glacier Fish Company for buying and processing pink salmon and herring, and NSEDC-run operations for buying, processing, and marketing other species of salmon, red king crab, halibut, and bait. In 1995, NSEDC established Norton Sound Seafood Products, which manages NSEDC's commercial seafood activities in the region. Norton Sound Seafood Products operates multiple facilities in the region including processing plants in Unalakleet, Savoonga, and Nome, as well as buying stations at Elim, Golovin, and Shaktoolik.[109]

According to senior NSEDC management, the plant in Unalakleet focuses almost exclusively on processing salmon, although a modest volume of herring is processed for use as bait in the local crab and halibut fisheries. In contrast, the plant in Savoonga has in the past focused exclusively on halibut processing but has recently run "a little cod" as well, as there is interest in diversifying the Savoonga community fisheries. The plant in Nome includes halibut as well as salmon and crab processing among its primary activities and processes saffron cod (locally known as tomcod) for bait. The Nome plant has also run some Pacific cod and has recently made investments in capacity (e.g., the acquisition of a fillet machine) to do more, but the Pacific cod fishery is described by senior NSEDC management as still being

[109] https://www.nsedc.com/fisheries/nssp/ accessed 2/17/2021.

in its infancy at the plant. NSEDC is similarly interested in developing a local, small boat directed Pacific cod fishery and has reportedly taken initial steps toward that end.

6.4.5 Engagement in the Commercial BSAI/Area 4 Halibut Fishery

6.4.5.1 Catcher Vessels with Local Ownership Addresses and Ex-Vessel Gross Revenues

Table 54 provides trend information on the number of vessels with ownership addresses in NSEDC region communities that were active in the BSAI/Area 4 commercial halibut fisheries 2010-2019. Unlike Table 13, which lists only those two NSEDC region communities with an annual average of two or more active BSAI halibut catcher vessels on an annual average basis (Nome and Savoonga), this table shows all regional communities with even one vessel active in any one year during 2010-2019 (i.e., an additional three regional communities). As shown, average annual participation ranged widely during the period 2010-2019. Two regional communities (Gambell and White Mountain) participated with only one vessel and in only one year (2013 and 2012 Gambell and White Mountain, respectively) for an annual average of 0.1 vessels per year; a third community (Unalakleet), participated with only one vessel in each of two years (2012 and 2019) for an annual average of 0.2 vessels per year. In contrast, Savoonga had an annual average of 11 vessels and Nome had an annual average of six vessels participating in the fishery 2010-2019.

Table 54. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, NSEDC Region Communities, 2008-2019 (number of vessels)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
NSEDC	Gambell	0	0	0	0	1	0	0	0	0	0	0.1	0.1%	1
NSEDC	Nome	8	8	7	4	5	5	5	7	6	5	6.0	3.4%	13
NSEDC	Savoonga	11	10	14	13	13	13	10	10	7	10	11.1	6.2%	34
NSEDC	Unalakleet	0	0	1	0	0	0	0	0	0	1	0.2	0.1%	2
NSEDC	White Mountain	0	0	1	0	0	0	0	0	0	0	0.1	0.1%	1
NSEDC	**Regional Subtotal**	**19**	**18**	**23**	**17**	**19**	**18**	**15**	**17**	**13**	**16**	**17.5**	**9.8%**	**51**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Information on BSAI halibut ex-vessel gross revenues of vessels with ownership addresses in the regional communities, to the extent possible within confidentiality constraints, is provided in Table 15. If a regional total is to be calculated, only Savoonga or Nome but not both could be broken out separately. Given the larger number of vessels associated with Savoonga, information for that community is presented. As shown, BSAI halibut ex-vessel gross revenues for Savoonga ranged from $53,000 to $347,000 per year during 2010-2019, averaging $193,000 per year. Nome and the other active NSEDC communities combined averaged $286,000 per year during that same period (and except for 2012, 2014, and 2019, all ex-vessel gross revenues for the period were associated with vessels with Nome ownership addresses. Information on BSAI halibut vessel diversity, as measured by relative dependency on BSAI halibut ex-vessel gross revenues compared to total ex-vessel gross revenues for all species, gear, and area fisheries pursued by those same vessels on an annual average basis 2010-2019, is provided in Table 16. As shown, the Savoonga halibut fleet was 100 percent dependent on the halibut fishery (i.e., those vessels did not participate in any other commercial fisheries), while the analogous dependency figure for the

Nome/all other NSEDC communities (except Savoonga) halibut fleet was 27 percent (in other words, vessels with Nome, Gambell, Unalakleet, and White Mountain ownership addresses that participated in the BSAI halibut fishery had ex-vessel gross revenues from other fisheries that were, on average, about 2.8 times higher than the ex-vessel gross revenues from the halibut fishery itself).

For that same 2010-2019 period, Table 17 shows the annual average number of BSAI halibut catcher vessels with local ownership addresses, the annual average number all commercial fishing catcher vessels (all species, gear, and area fisheries) with local ownership addresses (i.e., the local "community commercial fishing fleet"), BSAI halibut ex-vessel gross revenues for the community commercial fishing fleet, total ex-vessel gross revenue for the commercial fishing fleet (from all species, gear, and area fisheries), and the percentage of halibut ex-vessel gross revenues as a percentage of the total ex-vessel gross revenues of the community commercial fishing fleet (i.e., the "dependency" of the community fleet on BSAI halibut as measured in the proportion of ex-vessel revenues derived from that fishery). For Savoonga, the community fleet dependency on BSAI halibut was virtually 100 percent for the period. In other words, no vessels with Savoonga ownership addresses pursued any commercial fisheries other than the BSAI halibut fishery. For Nome, Gambell, Unalakleet, and White Mountain community commercial fishing fleets combined, the level dependency on BSAI halibut compared to total ex-vessel gross revenues from all fisheries combined was 14 percent for the period 2010-2019.

It is important to note that from the NSEDC perspective, engagement in the BSAI/Area 4 halibut fishery (and development of a local Pacific cod fishery) is not taking place in a vacuum. Specific to evolving conditions in 2020, NSEDC management has noted that the local halibut fishery is taking on increased importance given the concurrent decline of the Norton Sound red king crab fishery, which is of both commercial and subsistence importance to multiple NSEDC communities. Of more general concern to all fisheries in the region is the northern movement of fish stocks due to changes in ocean temperatures and the related lack of knowledge of changes in behaviors of species of commercial (and subsistence) importance in response to the changing environment. NSEDC senior management noted that they are actively involved in the pursuit of that type of data, having recently worked with the IPHC on a regional halibut pop-up satellite tagging project.

Another challenge facing NSEDC in terms of local halibut fishery management is accommodating the needs of two quite different local halibut fleets and their associated processing operations in the region. Savoonga has a much smaller scale (16- to 24-foot aluminum skiff-based) catcher vessel fleet that hauls skates by hand whereas Nome has a larger vessel, hydraulics equipped, higher capacity fleet. To accommodate the two fleets, local harvests are staggered, with Savoonga getting a "head start" on halibut harvest, given the ability of Nome vessels to catch higher volumes of halibut in a shorter period of time, and NSEDC has leased additional A-share halibut IFQ and pursued leasing additional CDQ halibut for the benefit of the Savoonga fleet, but the opportunities to do so have proven to be limited. In short, the potential for competing interests between the two fleets and local processing operations is an acknowledged issue that NSEDC routinely seeks to address as a part of their ongoing in-region fishery management role, according to senior NSEDC staff.[110]

With respect to impacts of the COVID-19 pandemic on 2020 fishery conditions, unlike the experience of some other BSAI communities, the local halibut fishery has continued unabated in both Savoonga and Nome. NSEDC processing operations are fully staffed with local residents which, according to NSEDC management, in combination with COVID-19 safety protocols established through NSEDC's Community & Workforce Protection Program, has helped the communities feel somewhat more comfortable in moving forward with fishery operations. As in past years, NSEDC has leased additional quota in 2020 to supplement their allocation of Area 4D CDQ.

[110] Savoonga was selected for characterization as a case study in a recent article on CDQs and non-economic factors in community well-being due to the complexities of its relationship with Nome and the NSEDC in the regional halibut fishery (Lyons, *et al*., 2019).

6.4.5.2 Other Measures of CDQ Community BSAI/Area 4 Halibut Harvest Engagement

As shown in Table 55, the only community in the NSEDC region with any residents who hold halibut quota shares is Nome. Also shown are the 2019 and 2020 IFQ pounds of halibut by community of quota holder as calculated by community shareholding as described in the bullets that follow the table and relevant quota share units to IFQ pounds ratios shown in Table 31 and Table 32, respectively.

Table 55. Halibut Quota Share Holders and Quota Share Units Held, NSEDC Region Communities, 2019 and 2020

Community	Community Located in IPHC Area	Number of Unique Quota Share Holders	Total Quota Share Units Held	Percent of QS Units Held in Region	2019 IFQ Pounds	2020 IFQ Pounds
Nome	4E	2	238,250	100.00%	10,338	9,477
Regional Total	**--**	**2**	**238,250**	**100.00%**	**10,338**	**9,477**

Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

NSEDC region community halibut quota share holding is exclusively concentrated in Nome, but participation in the commercial halibut fishery is not.

- Communities in the NSEDC region span two different IPHC regulatory areas. Nome and Savoonga, the two communities shown as directly active in the BSAI halibut fishery in the 2010-2019 dataset used for this analysis, are located in the two different areas (see Figure 1).
    - Nome and all other NSEDC communities except Savoonga, Gambell, and Diomede, are in Area 4E. Area 4E has a 100 percent CDQ reserve that is allocated 70 percent to CVRF and 30 percent to BBEDC (see Table 32).
    - Savoonga and Gambell, located on St. Lawrence Island, and Diomede, located on Little Diomede Island, are the only communities in Area 4D. Area 4D has a 30 percent CDQ reserve that is allocated 30 percent to NSEDC, 26 percent to BBEDC, 24 percent to CVRF, and 20 percent to the Yukon Delta Fisheries Development Association (YDFDA) CDQ group (Table 32).
- One individual in Nome holds quota shares in Area 4E[111] exclusively; another holds quota shares in Areas 3A and 3B (but none in 4E).
- Savoonga, where no residents hold halibut quota shares, actively participates in the commercial halibut fishery exclusively by accessing CDQ quota.

Another important way that communities are engaged in the commercial halibut fishery harvest sector, beyond local individuals owning vessels active in the fishery or holding halibut quota share units, is through employment of local residents as crew members on vessels participating in the fishery. However, as noted in Section 4.5.4, sources of systematically collected quantitative data on crew employment and earnings are not available for the halibut fishery in this or other regions.

[111] As noted in the discussion contained in the footnote in Section 6.1.5.2, any individuals shown in the data as holding quota share units in Area 4E, which has a 100 percent CDQ reserve, did not qualify for compensatory shares. As there is no TAC set in 4E, those shares are not issued quota pounds (i.e., they cannot be fished and typically have no sale value).

6.4.5.3 Shore-Based Processors and First Wholesale Gross Revenues

As shown in Table 18, one shore-based processor in Nome and one in Savoonga appear in the dataset used for this analysis as having accepted BSAI halibut deliveries each year during the period 2010-2019. All revenue data for these processors individually or combined are confidential. As a result, Table 19 combines revenue data for the two processors in the NSEDC region with the data from processors in the BBEDC region communities of Togiak and Twin Hills that would also otherwise be confidential. As noted in Section 4.5.2, first wholesale gross revenue data for shore-based processors are not available, so ex-vessel values associated with deliveries of BSAI halibut at these plants are used as a rough proxy. As shown in Table 19 annual average ex-vessel value of landings for the four communities was approximately $640,000. This represented approximately seven percent of all ex-vessel values associated with all deliveries of all species at the involved plants (Table 20) as well as all of the plants operating in those communities combined (Table 21), as the plants that were involved in halibut processing were the only plants active in those communities. Caution, however, is warranted in the interpretation of these relative economic dependency data, however, as the relative reliance of processing activity on halibut in these four communities is known to vary widely. For example, halibut is the only local commercial fishery in Savoonga, while a general knowledge of the industry would suggest that the plants Togiak and Twin Hills are primarily focused on herring and salmon.

6.4.6 Engagement in the Subsistence BSAI Halibut Fishery

As described in an earlier NPFMC analysis (AECOM 2015)[112] for those NSEDC communities for which subsistence data are available, the community with the largest number of estimated halibut subsistence fishermen was Nome, with the statistics for the Nome Eskimo Community and the City of Nome combined. For these, the average estimated numbers of halibut fishermen for 2009-2012 were 5.8 and 6.3, with 49.5 and 34.0 estimated average halibut caught, representing 1,146.3 and 685.3 pounds, respectively. Savoonga has an average of 7.3 fishermen reported from 2009-2011. The average number of halibut landed for 2009-2011 was 35.0, representing an estimated 905.0 pounds.[113]

Table 56 presents selected information from the ADFG Community Information System for the potentially substantially engaged or substantially dependent halibut communities in the NSEDC region as selected by initial screening criteria. As discussed in Section 6.1.6, while these data are often dated (e.g., 2006 is the most recent year available for Savoonga), they still represent the most comprehensive data encompassing all subsistence resources available that is comparable across regions. As shown, however, only one of the two NSEDC region potentially halibut dependent communities (Savoonga) is represented in the data. In Savoonga, half of all households are reported as using subsistence halibut, while the percentage of halibut of all subsistence fish harvested is eight percent and the percentage of retention of subsistence halibut from commercial fishing is approximately 11 percent.

[112] See Table 2-8 in that analysis (Proposed Bering Sea/Aleutian Islands Halibut PSC Limit Revisions Appendix C: Community Analysis).

[113] Data for Savoonga for 2012 are confidential and are not included in the average.

Table 56. Selected CSIS Halibut, Fish, and All Resources Subsistence Harvest Information, NSEDC Region Communities, 2006

Community	Year(s) Data Are Available	Percent Using Halibut	Percent Harvesting Halibut	Halibut Reported Pounds Harvested	Halibut Estimated Total Pounds Harvested	All Fish Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Fish Harvested	All Resources Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Resources Harvested	Estimated Pounds of Subsistence Halibut Harvested Retained from Commercial Fisheries	Percent of Subsistence Halibut Estimated Total Pounds Harvested Retained from Commercial Fisheries
Nome	none*	--	--	--	--	--	--	--	--	--	--
Savoonga	2006	49.6%	48.9%	6,014	6,269	76,422	8.2%	1,474,291	0.4%	660	10.5%

*Indicates no halibut subsistence use or harvest was reported for any year.

Source:ADFG Community Subsistence Information System https://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=harvInfo.harvestCommSelComm accessed 5/7/2020.

Nome community leaders have stated that residents rely on salmon (chum and coho), seal, walrus, crab, whale, halibut, and herring for subsistence (Himes-Cornell *et al.* 2013). Much of the subsistence salmon harvest that occurs in the community is done at seasonal fish camps outside of the community itself. For the 2000 through 2010 period, between 134 and 877 Nome households per year were issued subsistence salmon permits. Of harvests that were reported, pink was the most heavily harvested salmon species over time, with an average harvest of 7,567 fish per year. Sockeye, coho, and chum salmon were the next most heavily harvested species, with an average of 3,133 sockeye, 1,723 coho, and 1,570 chum harvested per year. A small number of Chinook were also harvested by Nome residents each year.

Nome residents were issued between 10 and 25 SHARC cards each year between 2003 and 2010. In 2010, 23 SHARC cards were issued, seven were fished, and 941 pounds of halibut were harvested. The only other years during that period when subsistence halibut harvest was reported on SHARCs were 2008 and 2009, when 1,145 pounds. and 1,281 pounds were harvested, respectively. In 2018, 18 SHARCs were issued. ADFG estimated that six SWHS respondents fished, harvesting 19 halibut for a total of 450 pounds (Fall and Koster 2020).

Subsistence harvest of land and marine mammals is also a consistent part of the community's wild food source. From 2000 through 2010, AFSC was able to report harvest of walrus, polar bears, and beluga whales. Walrus harvests were reported from 2000 through 2007, ranging from four to 56 animals. Three total polar bear harvests were reported – two animals in 2001 and one in 2007. Between two and 11 beluga whales were harvested in the years reported during this period; the report notes that 2007 through 2010 harvest were part of a combined harvest total for the communities of Nome and Brevik.

In Savoonga, subsistence harvests are focused on marine mammals (including whale, seal, and walrus) and reindeer (Himes-Cornell *et al.* 2013). From 2000 to 2010, average harvest was available for walrus (546) and polar bears (six). Harvest information on beluga whale, sea otter, sea lion, and seal were not reported during that period. Data for annual subsistence halibut harvest show a substantial decline in the number of residents holding SHARC cards as well as a decline in the number of SHARC cards reported as fished and the number of pounds of halibut harvested per year. ADFG reports that the number of SHARCs held have declined in the following pattern: 43 SHARCs in 2007 (estimate of 15 fished); 17 SHARCs in 2009 (seven fished); 17 SHARCs in 2010 (six fished); 17 SHARCs in 2011 (nine fished); six SHARCs in 2012 (five fished); six SHARCs in 2014 (one fished); and one SHARC holder in 2016 and 2018 that did not fish (Fall and Koster 2020). ADFG states that Savoonga is the principal halibut harvesting community in Area 4D.

As noted in Section 5.4.3 and shown in Table 24, NSEDC region fishery participants also retained an annual average of approximately 3,447 pounds of U32 halibut from CDQ halibut commercial fishery operations for subsistence/personal use under an Area 4E/4D exemption during the years 2002-2019.

While U32 halibut retained are included in ADFG estimates of total halibut removals, they are not included in standard/ongoing ADFG subsistence estimates for communities.

6.4.7 Engagement in the Commercial BSAI Groundfish Amendment 80 Sector Fishery

No direct participation in the BSAI groundfish Amendment 80 sector fishery through local vessel ownership address is shown for any NSEDC region community for any year in the 2010-2019 dataset used for this analysis. No NSEDC region communities are shown in the Alaska Department of Revenue shared state Fisheries Resource Landing Tax revenue data as being a product transfer location for processed product offloaded from catcher/processors in any year 2010-2019. Additionally, no Amendment 80 port calls are shown for any NSEDC community in the 2010-2019 port call data used for this analysis.

6.4.8 CDQ Group Direct BSAI/Area 4 Halibut and/or Groundfish Amendment 80 Sector Engagement

In addition to participating in the BSAI halibut and/or BSAI groundfish fisheries through use of CDQ quota ownership direct and indirect ways, NSEDC, like other CDQ entities, has also invested in capital assets in the catcher vessel and/or catcher/processor sectors as another avenue to meet the economic and social goals of the CDQ program. Among vessels shown in the dataset used for analysis as actively participating in the Amendment 80 of the BSAI groundfish fishery in at least one year 2010-2019, four of those were listed in the most recent CDQ ownership attribution RIR (NMFS 2017) as owned at least in part by NSEDC. These vessels are listed in Table 57.

Table 57. CDQ Ownership of Vessels Participating in BSAI Groundfish Amendment 80 Sector, NSEDC, 2010-2019

	ADFG Number	Vessel Name	Groundfish Sector	CDQ Group	CDQ Ownership
1	57228	ARICA	A80	NSEDC	9%
2	55921	CAPE HORN	A80, CDQ	NSEDC	9%
3	51873	REBECCA IRENE	A80, CDQ	NSEDC	9%
4	57211	UNIMAK	A80	NSEDC	9%

Note (1): Vessel ownership addresses are all listed as Seattle WA.
Note (2): Each of the listed vessels participated in the BSAI groundfish Amendment 80 catcher/processor sector during at least one year 2010-2019.
Source: NOAA 2017, AKFIN 2019.

According to NSEDC management, NSEDC does not lease CDQ quota directly to entities participating in the Amendment 80 sector fishery, instead using an AFA catcher/processor operated by a firm that has been a long-term industry partner with NSEDC. NSEDC-owned quota is, however, sometimes harvested in at least modest amounts by Amendment 80 vessels when quota swaps between BSAI groundfish fishery participants occur as they attempt to fill out their harvest plans over the course of a season. As noted in Section 6.2.8, NSEDC manages the coordinated leasing of both its own and CBSFA's BSAI groundfish CDQ.

As noted above, NSEDC is directly involved with in-region management of the local commercial halibut fishery, in part to mitigate the potential for competition between NSEDC communities for halibut, with the specific aim of protecting the ability of Savoonga, which is essentially fully dependent halibut as their only commercial fishery at present, while balancing that protection with the needs of the larger Nome-based fleet. NSEDC and its subsidiaries have been actively engaged in developing in-region processing capacity for halibut landings and directly involved in the marketing of halibut (along with other regionally caught and processed species).

6.5 Other CDQ Regional Engagement in the BSAI Groundfish Amendment 80 and/or the BSAI/Area 4 Halibut Fisheries

6.5.1 Overview

BBEDC is a CDQ entity that includes 17 communities with a total population of 5,417 (Table 26) on the mainland Alaska and eastern Alaska Peninsula coastal region of Bristol Bay (Figure 3). YDFDA is a CDQ entity that includes six communities with a total population of 3,210 (Table 26) in the western mainland coastal region of Alaska between the NSEDC region to the north and the CVRF region to the south (Figure 3). No direct participation in the BSAI groundfish Amendment 80 sector fishery through local vessel ownership address is shown for any BBEDC and/or YDFDA region community for any year in the 2010-2019 dataset used for this analysis.

As identified through initial screening criteria, communities in the BBEDC region potentially substantially engaged in or dependent upon the BSAI/Area 4 halibut fishery include Dillingham, Togiak, and Twin Hills, but further analysis of catcher vessel and shore-based processor diversity suggests that none of these communities would be considered substantially dependent on the fishery. As a result, regional and community characterization is briefer in this section than for previously described CDQ groups. BBEDC communities in addition to those already mentioned include Aleknagik, Clarks Point, Egegik, Ekuk, Ekwok, King Salmon, Levelock, Manokotak, Naknek, Pilot Point, Portage Creek, Port Heiden (Meschick), South Naknek, and Ugashik, all of which are home to federally recognized Tribal entities. The coastline of the BBEDC region is adjacent to IPHC Regulatory Area 4E, as shown on Figure 1.

A summary of the institutional structure of the contemporary BBEDC region communities relevant to this SIA analysis is shown in Table 58. Demographic and socioeconomic characteristics for these same communities are presented in Table 59.

Table 58. Community Institutional Summary (Selected BBEDC CDQ Communities)

Community	Alaska Native Community Name (Language)	Borough	Municipal Government	Incorporation Type (and Date)	ANCSA Community	ANCSA Regional Corporation	ANCSA Village Corporation	Federally Recognized Tribe	CDQ Community (Group)
Dillingham	Curyung (Central Yupik)	Unorganized Borough	City of Dillingham	1st Class City (1963)	Yes	Bristol Bay Native Corporation	Choggiung Limited	Curyung Tribal Council	Yes (BBEDC)
Togiak	Tuyuryaq (Central Yupik)	Unorganized Borough	City of Togiak	2nd Class City (1969)	Yes	Bristol Bay Native Corporation	Togiak Natives Limited	Tradtional Village of Togiak	Yes (BBEDC)
Twin Hills	information unavailable	Unorganized Borough	none (unincorporated)	--	Yes	Bristol Bay Native Corporation	Twin Hills Native Corporation	Twin Hills Village	Yes (BBEDC)

Source: DCRA Community Database, https://dcra-cdo-dcced.opendata.arcgis.com/ Accessed 2/19/2021.

Table 59. Selected BBEDC Communities and State of Alaska Demographic Indicators

Community	2010 Decennial Census Data				2019 American Community Survey Data				
	Total Population	Alaska Native/ Native American Residents (percent of total population)	Minority* Residents (percent of total population)	Residents Living in Group Quarters** (percent of total population)	Per Capita Income (dollars)	Median Household Income (dollars)	Number of Family House-holds	Median Family Income (dollars)	Low-Income*** Residents (percent of total population)
Dillingham	2,329	55.9%	70.2%	1.8%	$34,960	$74,524	500	$76,944	11.9%
Togiak	817	78.0%	94.6%	0.0%	$21,687	$43,214	173	$44,107	24.0%
Twin Hills	74	94.6%	97.3%	0.0%	$15,510	$20,833	15	$20,625	58.2%
State of Alaska	**626,932**	**14.1%**	**37.1%**	**1.8%**	**$36,787**	**$77,640**	**166,325**	**$92,588**	**10.7%**

*Defined as all persons other than those self-identied being in both "white" and "non-Hispanic" census categories.
**Defined as "other noninstitutional facilities," which excludes institutionalized populations, college/university student housing, and military quarters.
***Defined as those persons living below the poverty threshold by the U.S. Census Bureau in the 2015-2019 American Community Survey. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $26,246 in 2020.
Source: US Census 2010; US Census 2020.

Table 60 provides information on school enrollments, for both kindergarten through 12th grade (KG-12) and pre-kindergarten through 12th grade (PK-12), by BBEDC community for the 2019-2020 school year, the most recent year for which data are available. The specific BBEDC communities included in the table are those that directly participated in the BSAI/Area 4 halibut fishery, as measured by catcher vessels with local ownership addresses that were active in the fishery and/or locally operating shore-plants that accepted BSAI/Area 4 halibut deliveries during at least one year 2010-2019 as indicated in the dataset used for this analysis.

Table 60. Selected BBEDC Region Schools Total Enrollments, Kindergarten-Grade 12 and Pre-Kindergarten-Grade 12, by Community, 2019-2020 School Year (as of Oct 1, 2019)

Community	School District	School	Total KG-12	Total PK-12
Aleknagik	Southwest Region School District	Aleknagik School	30	37
Clarks Point	Southwest Region School District	Clarks Point School	13	13
Dillingham	Dillingham City Schools	Dillingham Elementary	213	216
Dillingham	Dillingham City Schools	Dillingham Middle/High School	226	226
King Salmon	Bristol Bay Borough School District	*See notes below.	na	na
Manokotak	Southwest Region School District	Manokotak School	111	120
Naknek	Bristol Bay Borough School District	Naknek Elementary	59	61
Naknek	Bristol Bay Borough School District	Bristol Bay Middle/High School	45	45
South Naknek	Bristol Bay Borough School District	*See notes below.	na	na
Togiak	Southwest Region School District	Togiak School	209	222
Twin Hills	Southwest Region School District	Twin Hills School	27	32

*Notes: Students from King Salmon and South Naknek attend school in Naknek and are included in the student enrollment totals for Naknek, where the BBBSD school is located (with the elementary and middle/high schools in the same building). District bus service is available for students living in King Salmon, which is located 15 miles from Naknek on the Alaska Peninsula Highway; daily flights are available to fly students (and parents) living in South Naknek across the Naknek River to Naknek (http://www.bbbsd.net/ accessed 8/13/2020). In the 2019-2020 school year, a total of seven KG-12 (and PK-12) students district-wide were enrolled in Bristol Bay Correspondence School.
Source: https://education.alaska.gov/data-center, accessed 8/3/2020.

No CDQ member communities of YDFDA are shown in the 2010-2019 dataset as having directly participated in the BSAI/Area 4 halibut commercial fishery as indicated by active vessels with local ownership addresses or locally operating shore-based processors. Additionally, no halibut quota shares are held by any individuals in YDFDA communities in 2019. YDFDA communities include Alakanuk, Emmonak, Grayling, Kotlik, Mountain Village, and Nunam Iqua (formerly Sheldon Point), all of which are home to federally recognized Tribal entities and all of which are in Area 4E. Given the lack of direct engagement in the BSAI/Area 4 directed halibut fishery, YDFDA regional and community characterization has not been included section. The coastline of the YDFDA region is adjacent to IPHC Regulatory Area 4E, as shown on Figure 1.

6.5.2 Engagement in the Commercial BSAI/Area 4 Halibut Fishery

6.5.2.1 Harvester Engagement

6.5.2.1.1 Catcher Vessels with Local Ownership Addresses and Ex-Vessel Gross Revenues

Table 61 provides trend information on the number of vessels with ownership addresses in BBEDC region communities that were active in the BSAI/Area 4 commercial halibut fisheries 2010-2019. Unlike Table 13, which lists only those two communities (Dillingham and Togiak) with an annual average of two or more active BSAI halibut catcher vessels on an annual average basis (one of the initial screening criteria for halibut dependency), this table shows all regional communities with even one vessel active in any one year during 2010-2019 (i.e., an additional six regional communities). As shown, average annual participation ranged widely during the period 2010-2019: one community (King Salmon) participated with only one vessel and in only one year (2010) for an annual average of 0.1 vessel per year, while Dillingham and Togiak had annual averages of two and 12 vessels, respectively, participating in the fishery. The remaining communities (Aleknagik, Clark's Point, Manokotak, Naknek, and South Naknek) averaged between 0.2 and 0.8 vessels active per year during the 2010-2019 period with no clear pattern of entering and exiting the fishery, although the region as a whole saw a general increase in vessels with BBEDC community ownership addresses becoming active in the BSAI halibut fishery over the period.

Table 61. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, BBEDC Region Communities, 2008-2019 (number of vessels)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
BBEDC	Aleknagik	0	0	1	0	0	0	0	0	0	1	0.2	0.1%	2
BBEDC	Clarks Point	0	0	1	0	0	0	0	1	0	1	0.3	0.2%	3
BBEDC	Dillingham	0	1	2	3	2	2	2	3	4	4	2.3	1.3%	10
BBEDC	King Salmon	1	0	0	0	0	0	0	0	0	0	0.1	0.1%	1
BBEDC	Manokotak	0	0	0	0	0	1	2	2	1	1	0.7	0.4%	4
BBEDC	Naknek	1	0	1	1	0	0	0	1	2	2	0.8	0.5%	4
BBEDC	South Naknek	0	0	0	0	0	0	1	1	1	1	0.4	0.2%	2
BBEDC	Togiak	8	12	16	10	13	13	14	13	12	13	12.4	7.0%	31
BBEDC	**Regional Subtotal**	**10**	**13**	**21**	**14**	**15**	**16**	**19**	**21**	**20**	**23**	**17.2**	**9.7%**	**56**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Information on BSAI halibut ex-vessel gross revenues of vessels with ownership addresses in the regional communities, to the extent possible within confidentiality constraints, is provided in Table 15. If a regional total is to be calculated, only Togiak or Dillingham but not both could be broken out separately.

Given the larger number of vessels associated with Togiak, information for that community is presented. As shown, BSAI halibut ex-vessel gross revenues for Togiak ranged from $106,000 to $270,000 per year during 2010-2019, averaging $170,000 per year. Dillingham and the other active BBEDC communities combined averaged $87,000 per year during that same period. Information on BSAI halibut vessel diversity, as measured by relative dependency on halibut compared to all species, gear, and area fisheries pursued by those same vessels on an annual average basis 2010-2019, is provided in Table 16. As shown, the Togiak BSAI halibut fleet was 17 percent dependent on the halibut fishery (i.e., those vessels derived about 83 percent of their total ex-vessel gross revenues from fisheries other than the BSAI halibut fishery), while the analogous dependency figure for the Dillingham/all other BBEDC communities (except Togiak) halibut fleet was 15 percent (in other words, vessels with Dillingham, Aleknagik, Clark's Point, King Salmon, Manokotak, Naknek, and South Naknek ownership addresses that participated in the BSAI halibut fishery had ex-vessel gross revenues from other fisheries that amounted to approximately 85 percent of their total ex-vessel revenues).

For that same 2010-2019 period, Table 17 shows the annual average number of BSAI halibut catcher vessels with local ownership addresses, the annual average number all commercial fishing catcher vessels (all species, gear, and area fisheries) with local ownership addresses (i.e., the local "community commercial fishing fleet"), BSAI halibut ex-vessel gross revenues for the community commercial fishing fleet, total ex-vessel gross revenue for the commercial fishing fleet (from all species, gear, and area fisheries), and the percentage of halibut ex-vessel gross revenues as a percentage of the total ex-vessel gross revenues of the community commercial fishing fleet (i.e., the "dependency" of the community fleet on BSAI halibut as measured in the proportion of ex-vessel revenues derived from that fishery). For Togiak, the community fleet dependency on BSAI halibut was seven percent for the period. For Dillingham, Aleknagik, Clark's Point, King Salmon, Manokotak, Naknek, and South Naknek community commercial fishing fleets combined, the level dependency on BSAI halibut compared to total ex-vessel gross revenues from all fisheries combined was 0.5 percent for the period 2010-2019, which points to the overwhelming importance of the salmon fisheries to the communities of the Bristol Bay region.

It is important to note that verified residents of BBEDC CDQ communities are eligible to participate in BBEDC's 4E Halibut Program. That program makes halibut CDQ available at no cost to fishers participating in a near-shore small boat halibut fishery in the southern portion of Area 4E east of Cape Newenham that is managed by BBEDC. Vessels used in the fishery must also be owned by CDQ community residents, are limited to 32-feet or less in length and, in cases where the fisher does not own the boat to be used, both the fisher and boat owner must meet residency requirements. Eligibility for the program also predicated on meeting relevant state vessel licensing and longline permit requirements otherwise necessary to participate in the 4E commercial halibut fishery.[114]

According to BBEDC management, this program allows residents to participate in the fishery at a lower cost than would otherwise be possible, with the focus of effort concentrated in May and early June as fishers are preparing for salmon season. Participants often sell to shore-based processors operating in the Togiak/Twin Hills area, but dockside/direct marketing sales are also reported to occur in Dillingham and Naknek, with some sales direct to markets in Anchorage (Cline, personal communication 2020). While BBEDC in-region fisheries strongly focus on the fundamentally important salmon fisheries, the BSAI/Area 4 halibut fishery program importantly represents a relatively low-cost fisheries employment and income diversification opportunity, with the potential to increase economic resilience for

[114] Persons wishing to be direct marketers must meet additional requirements, including registering with the state as a catcher-seller and with NMFS as a registered buyer. They are also required to register with the State of Alaska's eLandings website and provide BBEDC with log-in information; in turn, BBEDC assists participants with eLandings reporting to ensure avoidance of problems that could put future individual and/or program access to the fishery at risk. Additional details of the program are available at http://www.bbedc.com/?page_id=183, accessed 2/17/2021).

participating fishermen in years when salmon and/or other income and employment opportunities are in a down cycle.

6.5.2.1.2 Other Measures of CDQ Community BSAI/Area 4 Halibut Harvest Engagement

As shown in Table 62, communities in the BBEDC region whose residents hold halibut quota shares are in Area 4E. Also shown are the 2019 and 2020 IFQ pounds of halibut by community of quota holder as calculated by community shareholding as described in the bullets that follow the table and relevant quota share units to IFQ pounds ratios shown in Table 31 and Table 32, respectively. As detailed in the bulleted notes, halibut quota share holding by local residents is heavily focused on Area 4E.

Table 62. Halibut Quota Share Holders and Quota Share Units Held, BBEDC Region Communities, 2019 and 2020

Community	Community Located in IPHC Area	Number of Unique Quota Share Holders	Total Quota Share Units Held	Percent of QS Units Held in Region	2019 IFQ Pounds	2020 IFQ Pounds
Dillingham	4E	5	1,508,315	99.34%	98,404	88,975
King Salmon	4E	1	798	0.05%	24	23
Naknek	4E	5	6,655	0.44%	111	102
South Naknek	4E	2	1,416	0.09%	0	0
Togiak	4E	5	892	0.06%	22	20
Twin Hills	4E	1	270	0.02%	11	10
Regional Total	**--**	**19**	**1,518,346**	**100.00%**	**98,572**	**89,130**

Source: Adapted from https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-fisheries-management-reports accessed 4/22/2020

Except for the holdings of CDQ flagged[115] quota shares, halibut quota shares held by individuals in BBEDC region communities are exclusively Area 4E shares. [116] Ownership of CDQ flagged quota shares is more common in the BBEDC region than in other regions, but still involve only six individuals in five communities.

- All BBEDC communities are in Area 4E (see Figure 1). Area 4E has a 100 percent CDQ reserve that is allocated 30 percent to BBEDC and 70 percent to CVRF (see Table 32). (Also as shown in Table 32, of the 30 percent CDQ reserve in Area 4D: 26 percent is allocated to BBEDC; 30 percent is allocated to NSEDC; 24 percent is allocated to CVRF; and 20 percent is allocated to YDFDA.).
- BBEDC itself owns 99.95 percent of all the halibut quota share units held in Dillingham, with none of those being Area 4E quota shares.
- Individuals hold 811 of the 1.5 million quota share units held in Dillingham. Three individuals hold quota shares in Area 4E exclusively. Another individual holds quota shares in Area 4E plus CDQ flagged quota shares in Areas 2C, 3B, and 4A.

[115]For more information on CDQ flagged shares, see the discussion contained in the footnote in Section 6.1.5.2.

[116] As noted in the discussion contained in the footnote in Section 6.1.5.2, any individuals shown in the data as holding quota share units in Area 4E, which has a 100 percent CDQ reserve, did not qualify for compensatory shares. As there is no TAC set in 4E, those shares are not issued quota pounds (i.e., they cannot be fished and typically have no sale value).

- One individual in King Salmon holds quota shares in Area 4E plus CDQ flagged quota shares in Areas 3B and 4A.
- Four individuals in Naknek hold quota shares in Area 4E exclusively. Another individual holds quota shares in Area 4E plus CDQ flagged quota shares in Areas 2C, 3A, 3B and 4A.
- Two individuals in South Naknek hold quota shares in Area 4E exclusively.
- Two individuals in Togiak hold quota shares in Area 4E exclusively. Two individuals hold quota shares in Area 4E plus CDQ flagged quota shares in Areas 2C and 4A.
- One individual in Twin Hills holds quota shares in Area 4E plus CDQ flagged quota shares in Areas 2C, 3A, 3B and 4A.

Another important way that communities are engaged in the commercial halibut fishery harvest sector, beyond local individuals owning vessels active in the fishery or holding halibut quota share units, is through employment of local residents as crew members on vessels participating in the fishery. However, as noted in Section 4.5.4, sources of systematically collected quantitative data on crew employment and earnings are not available for the halibut fishery in this or other regions.

6.5.2.2 Shore-Based Processors and First Wholesale Gross Revenues

As shown in Table 18, during 2010-2019, one shore-based processor operating in Twin Hills accepted BSAI/Area 4 halibut deliveries each year and one shore-based processor operating in nearby Togiak accepted deliveries each of the four most recent years covered by the data (2016-2019) only. All revenue information associated with BSAI halibut processing in these communities is confidential. To allow reporting on a regional (or combined regions) basis, data from these BBEDC region plants have been aggregated with data from plants in the NSEDC region and are presented in detail in Table 19, Table 20, and Table 21, and summarized in Section 6.4.5.3. As noted in Section 4.5.2, first wholesale gross revenue data for shore-based processors sufficient to calculate processing diversity are not available.

6.5.3 Engagement in the Subsistence BSAI Halibut Fishery

Table 63 presents selected information from the ADFG Community Information System for the potentially substantially engaged or substantially dependent halibut communities in the BBEDC region as selected by initial screening criteria. As discussed in Section 6.1.6, while these data are often dated (e.g., 1999 is the most recent year available for Twin Hills), they still represent the most comprehensive data encompassing all subsistence resources available that is comparable across regions. For all three communities shown (Dillingham, Togiak, and Twin Hills), in the most recent year for which data are available (2010, 2008, and 1999 respectively) estimated subsistence harvest of halibut is less than 120 pounds, and no retention of subsistence halibut from commercial fisheries is reported. For all three communities for all reporting years, halibut accounts for less than one percent of all subsistence fish harvest by weight (and accounts one-tenth of one percent or less in three of the five reporting years of the three communities combined).

Table 63. Selected CSIS Halibut, Fish, and All Resources Subsistence Harvest Information, BBEDC Region Communities, Various Years

Community	Year(s) Data Are Available	Percent Using Halibut	Percent Harvesting Halibut	Halibut Reported Pounds Harvested	Halibut Estimated Total Pounds Harvested	All Fish Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Fish Harvested	All Resources Estimated Total Pounds Harvested	Halibut as a Percentage of Estimated Total Pounds of All Resources Harvested	Estimated Pounds of Subsistence Halibut Harvested Retained from Commercial Fisheries	Percent of Subsistence Halibut Estimated Total Pounds Harvested Retained from Commercial Fisheries
Dillingham	1984	no data	0	0	0	393,781	0.0%	597,394	0.0%	0	--
Dillingham	2010	19.0%	1.0%	17	88	316,260	0.0%	486,532	0.0%	0	0.0%
Togiak	1999	15.6%	9.4%	no data	702	77,617	0.9%	179,005	0.4%	no data	--
Togiak	2008	32.5%	7.5%	36	85	135,782	0.1%	243,208	0.0%	no data	--
Twin Hills	1999	25.0%	16.7%	60	115	18,833	0.6%	34,398	0.3%	no data	--

Source:ADFG Community Subsistence Information System https://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=harvInfo.harvestCommSelComm accessed 5/7/2020.

As noted in Section 5.4.3 and shown in Table 24, BBEDC region fishery participants also retained an annual average of approximately 4,221 pounds of U32 halibut from CDQ halibut commercial fishery operations for subsistence/personal use under an Area 4E/4D exemption during the years 1998-2019. While U32 halibut retained are included in ADFG estimates of total halibut removals, they are not included in standard/ongoing ADFG subsistence estimates for communities.

6.5.4 Engagement in the Commercial BSAI Groundfish Amendment 80 Sector Fishery

No direct participation in the BSAI groundfish Amendment 80 sector fishery through local vessel ownership address is shown for any BBEDC or YDFDA region communities for any year in the 2010-2019 dataset used for this analysis.

Togiak, in the BBEDC region, is notable as a product transfer location for catcher/processors engaged in BSAI groundfish fisheries. As shown in Table 36, on an average annual basis 2010-2019, Togiak received approximately $114,000 per year from the Alaska Department of Revenue in the form of shared state Fishery Business Tax and Fisheries Resource Landing Tax revenues combined. Of this amount about $78,000, or about 68.5 percent of the total, derived from Fishery Business Tax shared revenue and approximately $36,000, or about 31.5 percent of the total, derived from Fishery Resource Landing Tax shared revenue. To put these figures in perspective, total revenues for the City of Togiak in Fiscal Year 2019 were approximately $1.3 million,[117] of which an average year of shared state fisheries tax revenues combined 2010-2019 ($114,000) would have accounted for roughly 9.1 percent of the total; shared state Fisheries Resource Landing Tax revenues alone for an average year 2010-2019 ($36,000) would have accounted for roughly 2.9 percent of fiscal year 2019 total. It is also important to note that Fisheries Resources Landing tax revenue represents tax revenues received from all catcher/processor product transfers/offloads in all fisheries, not just those of Amendment 80 vessels participating in the BSAI groundfish fisheries, as no fishery specific data are available.[118]

[117] City of Togiak, Certified Financial Statement for the Year Ending June 30, 2019, available at: https://www.commerce.alaska.gov/dcra/DCRARepoExt/RepoPubs/FinDocs/TogiakFY2019CertifiedFinancialStatement.pdf. Accessed 2/17/2021.

[118] As noted in the Amendment 80 fishery taxes discussion in economic analysis (Section 3.3.2.3) of the EIS to which this SIA is appended, much of the total Fisheries Resource Landing Tax revenue at the state level is likely generated

As shown in Table 8, over the period 2010-2019, Togiak had an annual average of approximately 18 Amendment 80 vessel port calls per year, making it the community with the third highest average of Amendment 80 port calls in the BSAI region (behind Unalaska/Dutch Harbor and Adak) over this period. All these port calls occurred in the most recent six years covered by the data, ranging between 16 to 40 port calls in any given year in that six-year span, with the number of Amendment 80 port calls in Togiak equaling or exceeding the number of port calls in Adak in four of those six years. According to BBEDC management, however, private sector economic activity in Togiak related to Amendment 80 port calls is modest, primarily due to a lack of support facilities and service providers of a scale that could routinely accommodate such relatively large vessels. According to city of Togiak personnel, the city dock can accommodate barges under favorable tidal conditions, but not deep draft vessels. Typically, larger vessels come in Togiak Bay as far as Anchor Point (approximately eight miles from the main potion of the community) and transfer product while at anchor (Thompson, personal communication, 8/7/2020).

No other BBEDC region communities and no YDFDA region communities are shown in the Alaska Department of Revenue shared state Fisheries Resource Landing Tax revenue data as being a product transfer location for processed product offloaded from catcher/processors in any year 2010-2019.[119] Similarly, no other BBEDC or YDFDA region communities are shown in Table 8 as Amendment 80 vessel ports of call in any year 2010-2019.

6.5.5 CDQ Group Direct BSAI/Area 4 Halibut and/or Groundfish Amendment 80 Sector Engagement

In addition to participating in the BSAI halibut and/or BSAI groundfish fisheries through use of CDQ quota ownership in direct and indirect ways, BBEDC and YDFDA, like other CDQ entities, have also invested in capital assets in the catcher vessel and/or catcher/processor sectors as another avenue to meet the economic and social goals of the CDQ program. Among vessels shown in the dataset used for analysis as actively participating in the BSAI groundfish Amendment 80 sector fishery in at least one year 2010-2019, none were listed in the most recent CDQ ownership attribution Regulatory Impact Review (RIR) (NMFS 2017) as owned in whole or in part by BBEDC and/or YDFDA. Contacts with BBEDC management and YDFDA management confirmed that is still the case as of 2020. Both BBEDC and YDFDA do, however, like some other CDQ groups, lease CDQ quota to entities in which they have no ownership or management interest, including, in both cases, leasing the harvest of some or all of their BSAI multispecies groundfish CDQ quota holdings to entities participating in the Amendment 80 sector fishery.

6.6 Alaska Communities Outside of the CDQ Regions

6.6.1 Engagement in the Commercial BSAI/Area 4 Halibut Fishery

Table 64 provides trend information on the number of vessels with Alaska ownership addresses outside of the CDQ regions that were active in the BSAI/Area 4 commercial halibut fisheries 2010-2019. Unlike Table 13, which lists only those six communities with an annual average of two or more active BSAI halibut catcher vessels on an annual average basis (one of the initial screening criteria for halibut

in the at-sea sector of the AFA pollock fishery; that same section provides an estimate of total Amendment 80 sector Fishery Resource Tax revenue, which is not recapitulated here, but no estimates are available at the community level.

[119] One other BBEDC community, the City of Aleknagik, shows up in the Alaska Department of Revenue data as having received shared Fisheries Resource Landing Tax revenue during the 2010-2019 period. However, this occurred in only one year (2013) and the negligible amount of revenue involved suggests this was a reporting anomaly rather than the result of an actual product transfer.

dependency), this table shows all communities CDQ regions with even one vessel active in any one year during 2010-2019 (i.e., an additional seven communities).

Table 64. Individual BSAI Halibut Catcher Vessels by Community of Vessel Historical Ownership Address, Alaska Communities Outside of the CDQ Regions, 2008-2019 (number of vessels)

Region	Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2010-2019 (number)	Annual Average 2010-2019 (percent)	Unique Vessels 2010-2019 (number)
GOA	Anchorage	2	2	3	2	1	3	2	2	2	2	2.1	1.2%	6
GOA	Cordova	2	1	1	1	1	2	2	2	1	1	1.4	0.8%	3
GOA	Homer	12	14	15	13	11	11	12	15	15	14	13.2	7.4%	30
GOA	Kodiak	16	12	13	11	10	10	13	11	10	11	11.7	6.6%	24
GOA	Nikolaevsk	0	1	1	0	0	0	0	0	0	0	0.2	0.1%	1
GOA	Palmer	0	0	0	1	1	0	0	0	0	0	0.2	0.1%	2
GOA	Petersburg	1	0	2	0	0	0	0	0	0	0	0.3	0.2%	4
GOA	Port Lions	1	1	1	1	1	1	0	0	0	0	0.6	0.3%	4
GOA	Seward	1	2	1	1	1	1	1	1	2	1	1.2	0.7%	5
GOA	Sitka	7	8	5	2	2	3	3	3	3	3	3.9	2.2%	9
GOA	Wasilla	1	3	3	2	2	2	2	2	2	2	2.1	1.2%	4
GOA	Yakutat	0	0	0	0	0	0	0	0	1	1	0.2	0.1%	1
GOA	Juneau/Douglas	5	5	4	4	4	4	4	1	1	0	3.2	1.8%	7
GOA	**Regional Subtotal**	**48**	**49**	**49**	**38**	**34**	**37**	**39**	**37**	**37**	**35**	**40.3**	**22.7%**	**97**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

As shown in Table 16, as measured by economic diversity, BSAI/Area 4 halibut vessels from these communities (or groups of these communities where aggregation of data is dictated by data confidentiality considerations), range from approximately 16 to 60 percent dependent on the BSAI/Area 4 halibut fishery as an annual average percentage of total ex-vessel gross revenues, 2010-2019. However, as shown in Table 17, BSAI/Area 4 annual average 2010-2019 halibut ex-vessel gross revenues account for between 0.8 percent and 3.5 percent of the total ex-vessel gross revenues for all commercial fishing vessels in those same communities or groups of communities.

As shown in Table 18, shore-based processors in King Cove, Kodiak, Sand Point, and Seward accepted deliveries of BSAI/Area 4 halibut each year 2010-2019. Additionally, shore-based processors in Anchorage and Homer accepted deliveries of BSAI/Area 4 halibut in nine of the 10 years during this same period. However, the combined ex-vessel values paid for these deliveries was approximately 1.5 percent of total ex-vessel values paid for all deliveries (from all fisheries occurring in all areas) at these same plants (Table 20) and approximately one percent of total ex-vessel values paid for all deliveries at all of the shore-based processors in these same communities (not just the processors participating in the BSAI/Area 4 halibut fishery) during this same time period (Table 21).

6.6.2 Engagement in the Commercial BSAI Groundfish Amendment 80 Sector Fishery

Sand Point, located in the Western GOA region, does serve as a product transfer location for catcher/processors, but the origin (BSAI or GOA) of the fish processed into the product transferred is not discernable from the available data and the level of local activity or local economic returns associated with these transfers is/are minor relative to other fishery sector local activities. As shown in Table 36, on an average annual basis 2010-2019, Sand Point received approximately $201,000 per year from the Alaska Department of Revenue in the form of shared state Fishery Business Tax and Fisheries Resource Landing Tax revenues combined. Of this amount about $188,000, or about 94 percent of the total, derived from Fishery Business Tax shared revenue and approximately $13,000, or about six percent of the total, derived from Fishery Resource Landing Tax shared revenue. To put these figures in perspective, total general revenues and transfers for the City of Sand Point in Fiscal Year 2018 (the most recent year for which data are available) were approximately $2.1 million,[120] of which an average year of shared state fisheries tax revenues combined 2010-2019 ($201,000) would have accounted for roughly 9.6 percent of the total; shared state Fisheries Resource Landing Tax revenues alone for an average year 2010-2019 ($13,000) would have accounted for roughly 0.6 percent of fiscal year 2018 total. It is also important to note that Fisheries Resources Landing tax revenue represents tax revenues received from all catcher/processor product transfers/offloads in all fisheries, not just those of Amendment 80 vessels participating in the BSAI groundfish fisheries, as no fishery specific data are available.[121]

As shown in Table 8, Sand Point experienced only three Amendment 80 port calls during the years 2010-2019, one each year in 2011, 2012, and 2015. Given the modest size and scale of local support services businesses, which do not have the capacity to accommodate large vessels on a routine basis, and the infrequent nature of Amendment 80 port calls, it is unlikely that Sand Point derives substantial economic returns from the Amendment 80 fleet on an ongoing basis. The only other community outside of the CDQ regions that experienced Amendment 80 port calls 2010-2019 was Kodiak, which is shown in Table 8 as having one port call in 2011.

6.7 The Pacific Northwest Region

Among communities outside of Alaska, engagement in the BSAI groundfish Amendment 80 sector most directly affected by the proposed action alternatives is highly concentrated in the Pacific Northwest and specifically in the Seattle MSA.

The Seattle MSA, with a population of over 3.4 million persons in 2010, is at once the community most substantially engaged in many of the important North Pacific fisheries in general and the BSAI groundfish fishery in particular (as measured by absolute participation numbers of vessels and crew, as well as volume and value of landings from those vessels). Conversely, this area is among the least substantially dependent of the engaged communities on those fisheries based on the relative number of fishing jobs and economic value of those fisheries when compared to the size of the overall Seattle metropolitan labor pool and the scale, diversity, and resilience of its economy. For many of the fisheries off Alaska, especially the industrial-scale fisheries such as the BSAI groundfish fishery, it could be stated, paradoxically perhaps, that the major BSAI fisheries in their present configurations are more dependent upon Seattle than Seattle is dependent upon the fisheries. Regardless, a central part of Seattle's identity has always been as a fishing community, and there are still distinct areas within the Seattle MSA where concentrations of businesses and infrastructure are focused on the area's large and wide-ranging fleet and the support of that fleet and of the fishing industry in general. From an outside perspective, the Seattle fleet(s) and support operations might be considered components of interest-based rather than place-based

[120] City of Sand Point, Alaska, Basic Financial Statements, Required Supplementary Information, Supplementary Information, and Government Auditing Standards Reports, Year Ended June 30, 2018, available at: https://www.commerce.alaska.gov/dcra/DCRARepoExt/RepoPubs/FinDocs/SandPointFY2018Audit.pdf. Accessed 2/17/2021.

[121] As noted in the Amendment 80 fishery taxes discussion in economic analysis (Section 3.3.2.3) of the EIS to which this SIA is appended, much of the total Fisheries Resource Landing Tax revenue at the state level is likely generated in the at-sea sector of the AFA pollock fishery; that same section provides an estimate of total Amendment 80 sector Fishery Resource Tax revenue, which is not recapitulated here, but no estimates are available at the community level.

communities; from the Seattle perspective, however, Seattle has been and remains a place-based North Pacific fishing community (NOAA 2014).

While community-level dependence on the BSAI groundfish fishery sectors relevant to this analysis is not a salient issue for the Seattle MSA, the scale of engagement is profound, as is the importance to some individual operations.

- In the BSAI groundfish Amendment 80 catcher/processor sector, for the years 2010-2019, on an average annual basis, Seattle MSA ownership address vessels accounted for approximately 80 percent of all the vessels in the sector (Table 9) and for about 80 percent of all sector first wholesale gross revenues (Table 10).
- In terms of vessel dependency as measured by percentage of total first wholesale gross revenues, among Seattle MSA ownership address BSAI groundfish Amendment 80 catcher/processors, relevant BSAI groundfish first wholesale gross revenues accounted for about 80 percent of the total first wholesale gross revenues for these same vessels for all area, species, and gear fisheries combined (Table 11); the analogous figure for the Seattle MSA “community commercial catcher/processor fleet” as a whole was 24.5 percent (Table 12).

The Seattle MSA is also substantially engaged in the BSAI/Area 4 halibut fishery as measured by ownership address of actively participating catcher vessels, among other indicators of engagement. Specifically:

- In the BSAI/Area 4 halibut catcher vessel sector, for the years 2010-2019, on an average annual basis, Seattle MSA ownership address vessels accounted for about 10 percent of all vessels in the sector (Table 14).
- Seattle MSA ownership address vessels alone accounted for 24 percent of all ex-vessel gross revenues of all BSAI/Area 4 halibut catcher vessels on an annual average basis during this period (Table 15).
- Seattle MSA ownership address BSAI/Area 4 halibut vessels were 19.4 percent dependent on relevant BSAI halibut harvest as measured by a percentage of all ex-vessel gross revenues for these same vessels (Table 16); the analogous figure for the Seattle MSA “community commercial catcher vessel fleet” as a whole was 1.9 percent (Table 17).

Additionally, the Seattle MSA is the location of regional or company headquarters for several the processing firms engaged in the BSAI/Area 4 halibut fishery through ownership of shore-based processing plants operating in Alaska. Further, the Seattle MSA has extensive fishery support services available, including some types or scale of services unavailable anywhere in Alaska. The region is an important supplier of logistical services to the fleet, including corporate headquarters support, shipyard services, other repairs and maintenance, and supplies, as well as other services support, including the provision of financial, legal, and other services; marketing; and product shipment and storage (NOAA 2014).

6.8 Cross-Cutting Community Engagement Ties

Communities, of course, are not engaged in the relevant BSAI groundfish and halibut fisheries in isolation. Rather, they often have multiple interconnections or cross-cutting ties.

6.8.1 Communities Engaged in the BSAI Amendment 80 Fishery

In this section data are presented or referenced to illustrate the correspondence between: (1) community of ownership address of BSAI groundfish Amendment 80 sector catcher/processors and the homeport of those vessels; (2) community of ownership address of BSAI groundfish Amendment 80 sector catcher/processors and the community of ownership LLPs used on those vessels for the relevant fisheries; (3) levels of employment aboard Amendment 80 catcher/processors and the communities where crew members on those vessels reside.

Data from 2019, the most recent data available, are used in the tables in this section. These data should be taken as illustrating patterns of interactions between communities, rather than an exact representation on the individual entity level. Not illustrated due to the lack of useable product transfer report data (noted in Section 4.5.1) is the nevertheless important relationship of community of catcher/processor ownership address and the communities where processed product is offloaded/transshipped. These landings from catcher/processors can and typically do confer a range of benefits to coastal Alaska communities, including tax revenues tied to those landings and demand for support services and related income and employment, among others.

Table 65 provides information on the correspondence between community of vessel ownership address and homeport community for BSAI groundfish Amendment 80 sector catcher/processors. As shown vessel ownership addresses are concentrated in Seattle and Maine as are homeport designations although there is more variability in the latter. Specifically:

- Among the 15 Amendment 80 vessels with Seattle MSA ownership addresses, 80 percent (12 out of 15 vessels) have Washington (Seattle or Anacortes) homeport designations, while the remaining vessels have Alaska (Dutch Harbor or Kodiak) homeport designations.
- For those vessels with ownership addresses outside the states of Alaska, Washington, and Oregon, 80 percent (4 out of 5 vessels) also have homeport community designations outside of Alaska, Washington, and Oregon, while the remaining vessel has a Washington (Seattle) homeport designation.

Table 65. Correspondence of Community of Vessel Ownership Address and Homeport of BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2019 (most recent data year)

Vessel Ownership Address Community	Vessel Homeport					Total
	Dutch Harbor Alaska	Kodiak Alaska	Anacortes Washington	Seattle* Washington	States Other Than AK/WA/OR	
Seattle MSA, Washington	1	2	1	11		**15**
All States other than AK, WA, and OR				1	4	**5**
All Communities Total	**1**	**2**	**1**	**12**	**4**	**20**

*denotes community in the Seattle MSA

Table 66 illustrates the correspondence between community of vessel ownership address and community of LLP license ownership address for those same Amendment 80 catcher/processors in 2019. As shown, LLP license ownership addresses more highly concentrated than vessel ownership or vessel homeport.

Table 66. Correspondence of Community of Vessel Ownership Address and Community of LLP License Ownership Address of BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2019 (most recent data year)

Vessel Ownership Address Community	Community of LLP License Ownership Address		Total
	Seattle* Washington	States Other Than AK/WA/OR	
Seattle MSA, Washington	15		**15**
All States other than AK, WA, and OR		5	**5**
All Communities Total	**15**	**5**	**20**

*denotes community in the Seattle MSA

Table 67 provides a summary of the average number of positions and total number of employees aboard Amendment 80 catcher/processors for 2019.[122] Table 68 provides information on state of residence of Amendment 80 catcher/processors crew members by state for 2019 (with more detailed information by crew residence by community by state provided in Table 83 in Attachment B [Section 10.2]). As shown, most crew members hold crew licenses with Washington addresses. Among crew members designating Alaska addresses on their crew licenses, 11 designated Unalaska/Dutch Harbor, eight designated Anchorage, and there was one each from Barrow, Kotzebue, Ninilchik, Ouzinkie, and Wasilla. Table 84 and Table 85 (in Attachment C [Section 10.3]) provide some BSAI groundfish Amendment 80 sector catcher/processor crew demographic information for 2014 and 2019, respectively, as supplied directly by industry.

Table 67. Summary Number of Positions and Employees Onboard BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2019 (most recent data year)

Community of Vessel Ownership Address	No. of CPs	Average Number of Positions Onboard				Number of Employees Onboard			
		Fishing (Deck Crew)	Processing	All Other*	Total	Fishing (Deck Crew)	Processing	All Other*	Total
Seattle MSA	15	5.5	28.7	8.9	43.1	180	1,184	340	1,704
Other WA and Other States	5	4.2	25.4	8.2	37.8	31	406	86	523
All Geographies	**20**	**5.2**	**27.9**	**8.7**	**41.8**	**211**	**1,590**	**426**	**2,227**

*Includes officers, engineers, cooks, etc.
Source: Amendment 80 EDR Data

[122] Analogous data for 2015-2018 are presented in Section 10.2 (Attachment B).

Table 68. State or Territory of Crew License Address of BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2019 (most recent data year)

State or Territory of Crew Member Residence	Number of Crew Licenses	Number of Communities
Washington	443	51
Alaska	24	8
California	20	15
Maine	15	14
Oregon	10	7
Idaho	8	6
Texas	8	5
Arizona	6	3
Florida	4	4
Utah	4	4
Hawaii	3	2
Minnesota	3	2
Georgia	2	2
Michigan	2	2
Missouri	2	2
New Hampshire	2	1
Puerto Rico	2	1
Connecticut	1	1
Illinois	1	1
Indiana	1	1
Iowa	1	1
Louisiana	1	1
Massachusetts	1	1
Mississippi	1	1
Montana	1	1
Nebraska	1	1
Nevada	1	1
Tennessee	1	1
Virginia	1	1
TOTAL	**570**	**141**

Source: Amendment 80 EDR Data

6.8.2 Communities Engaged in the Commercial BSAI/Area 4 Halibut Fishery

Quantitative indicators of community engagement in and dependency on the commercial BSAI/Area 4 halibut fishery presented in Section 5.2 include ex-vessel revenue information by community of ownership of catcher vessels engaged in the fishery. As shown in Table 15, over the period 2010-2019, BSAI/Area 4 halibut catcher vessels with Alaska ownership addresses accounted for approximately 65 percent of all Area 4 halibut ex-vessel gross revenues on annual average basis, with Washington ownership address vessels accounting for approximately 31 percent, with the remaining approximately four percent accounted for by catcher vessels from Oregon and all other states combined.

Another indicator of participation in the fishery relevant to potential revenue generation is halibut quota share (QS) ownership. BSAI/Area 4 halibut QS ownership information by community is provided for Alaska fishing communities potentially substantially engaged in or substantially dependent on the BSAI/Area 4 halibut fishery in each of the CDQ regional discussions in Sections 6.1 through 6.5. QS ownership patterns by state are described in this section.

According to the 20-year review of the Pacific halibut and sablefish IFQ program, for halibut, Alaskans are the majority QS holders in Areas 4A and 4C. In Areas 4B and 4D, residents of other states are the majority QS holders, with Washington residents being the predominant shareholders. From initial allocation to 2015, Alaskans increased their halibut QS holdings in Areas 4A, 4B, and 4D, and their shareholdings slightly decreased in Area 4C (NPFMC and NMFS, 2016). Table 69 provides percentage of QS by ownership address state for 2020.

Table 69. Percentage of Halibut QS Ownership by Area 4 Region, by State, 2020 (most recent data year)

Ownership Address State	IPHC Regulatory Area				
	4A	4B	4C	4D	4E
Alaska	61.6%	50.8%	55.8%	42.2%	84.3%
Washington	24.8%	38.2%	24.1%	37.8%	15.5%
Oregon and Other States	13.6%	10.9%	20.1%	20.0%	0.2%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: https://www.fisheries.noaa.gov/alaska/commercial-fishing/permits-and-licenses-issued-alaska accessed 10/24/2020.

7 Regional and Community-Level Social Impacts by Alternative

The following subsections focus on community engagement, dependence, vulnerability, resilience, and risks to fishing community sustained participation in the relevant BSAI groundfish (Section 0) and halibut (Section 7.2) fisheries, for Alaska communities and Pacific Northwest communities, under the no action alternative and the action alternatives as a group.[123] While these discussions focus primarily on a range of potential socioeconomic impacts, Section 7.2.6 provides an analysis of potential cumulative small/rural community and cultural context issues involving some of the non-economic social and cultural aspects of halibut fishing for coastal Bering Sea communities for which secondary data are available.

7.1 Community Engagement, Dependence, Vulnerability, Resilience, and Risks to Fishing Community Sustained Participation in the BSAI Groundfish Fisheries

The proposed action alternatives for abundance-based management of halibut PSC in the BSAI groundfish fisheries are focused exclusively on the Amendment 80 sector. No direct impacts to communities exclusively engaged in and/or dependent upon other sectors within the commercial BSAI groundfish fisheries (e.g., AFA groundfish catcher/processors operating in the BSAI groundfish fisheries, BSAI groundfish catcher vessels of any size and gear type, and/or shore-based processors that accept deliveries from those catcher vessels) are anticipated.

Community engagement (participation) in the BSAI groundfish Amendment 80 sector fisheries was detailed in terms of the distribution of sectors across communities in Section 5 and within the context of regions and communities in Section 6. Vulnerability of communities to adverse community-level impacts from the proposed action alternatives is in part a function of dependence of the community on the potentially affected BSAI groundfish Amendment 80 sector fisheries and the economic resiliency and diversity of the community. Dependency is influenced by the relative importance of the relevant BSAI groundfish Amendment 80 fisheries to vessels participating directly in the fisheries in comparison to all area, species, and gear fisheries in which those same vessels participate (community Amendment 80 sector vessel diversity); the relative importance of the relevant BSAI groundfish fisheries to all local ownership address catcher/processor vessels participating in all area, species, and gear fisheries combined (community catcher/processor fleet diversity); and the relative importance of the overall community fishery sector(s) within the larger community economic base both in terms of private sector business activity and public revenues (community economic diversity). Also important to adverse community-level impact outcomes and community resilience is the specific nature of local engagement in the potentially affected BSAI groundfish Amendment 80 fishery sector and alternative employment, income, business, and public revenue opportunities available within the community because of the location, scale, and relative economic diversity of the community.

[123] Net benefits to the Nation are not analyzed in this SIA but are analyzed in DEIS Section 5.7. That analysis is qualitative in nature and concludes that, due to several factors enumerated in that discussion and depending on the size of the halibut PSC mortality limit reduction to the Amendment 80 sector, overall producer surplus is expected to be negative (because expected reductions in the Amendment 80 fishery would not be offset by equivalent increases in the directed halibut fisheries). The analysis concludes that consumer surplus would likely be little changed, depending on the relative cost and availability of substitutes in the world whitefish market. Overall, the DEIS concludes that net benefits to the Nation are expected to be negative. While the magnitude of the change cannot be quantified with existing information, it is expected to be progressively more negative as halibut mortality limit reductions reduce the amount of Amendment 80 species catch taken on an annual basis and increase costs associated with the harvest of those species.

Importantly, all the Alaska communities engaged in or dependent upon the BSAI Amendment 80 groundfish fishery are also engaged in or dependent upon the BSAI/Area 4 commercial halibut fishery. The nature, direction, and order of magnitude of potential impacts of the proposed alternatives based on relevant engagement in and/or dependency on the Amendment 80 fishery and the BSAI/Area 4 halibut fishery is described in this section for those Alaska communities engaged in both fisheries. The nature, direction, and order of magnitude of potential impacts of the proposed alternatives based on relevant community engagement in and dependency on the BSAI/Area 4 halibut fishery is described for those communities engaged in that fishery but not in the Amendment 80 fishery in Section 7.2.

7.1.1 BSAI Groundfish Amendment 80 Fishery Dependency and Vulnerability to Community-Level Impacts of the Proposed Action Alternatives among Alaska Communities

The relative importance of the BSAI groundfish Amendment 80 sector fishery likely to be affected by the proposed alternatives within the larger local fisheries sector and within the larger local economic base varies widely among the engaged Alaska communities. Similarly, the socioeconomic structure of the engaged communities varies widely along with the relative diversity of their respective local economies.

7.1.1.1 Unalaska/Dutch Harbor

Unalaska, unique in scale among Alaska communities, derives substantial public benefit in the form of state shared Fishery Resource Landing Tax revenue from BSAI groundfish catcher/processors, including Amendment 80 sector vessels, making processed-at-sea product transfers in port either for immediate shipping or into cold storage for subsequent shipping. As shown Table 36, on an average annual basis 2010-2019, Unalaska received approximately $8.3 million per year from the Alaska Department of Revenue in the form of shared state Fishery Business Tax (associated with shore-based processing) and Fisheries Resource Landing Tax (associated with product transfers from at-sea processing) revenues combined. Of this amount, about $3.6 million, or about 44 percent of the total, derived from Fishery Business Tax shared revenue and approximately $4.7 million, or about 56 percent of the total, derived from Fishery Resource Landing Tax shared revenue. To put these figures in perspective, general fund revenues for the City of Unalaska in Fiscal Year 2019 were approximately $36 million, of which an average year of shared state fisheries tax revenues combined 2010-2019 ($8.3 million) would have accounted for roughly 22.8 percent of the total; shared state Fisheries Resource Landing Tax revenues alone for an average year 2010-2019 ($4.7 million) would have accounted for roughly 12.9 percent of fiscal year 2019 total. It is also important to note that Fisheries Resources Landing tax revenue represents tax revenues received from all catcher/processor product transfers/offloads in all fisheries, not just those of Amendment 80 vessels participating in the BSAI groundfish fisheries, as no fishery specific data are available.[124]

Table 70 provides information on City of Unalaska tax revenues deriving from direct fishery revenue sources (the city raw seafood tax, the state shared fisheries business tax, and the state shared fisheries resource landing tax) compared to all general fund revenues received by the city for fiscal years 2010-2019.[125] As shown, for the City of Unalaska, between roughly 37 percent and 50 percent of all general

[124] As noted in the Amendment 80 fishery taxes discussion in economic analysis (Section 3.3.2.3) of the EIS to which this SIA is appended, much of the total Fisheries Resource Landing Tax revenue at the state level is likely generated in the at-sea sector of the AFA pollock fishery; that same section provides an estimate of total Amendment 80 sector Fishery Resource Tax revenue, which is not recapitulated here, but no estimates are available at the community level.

[125] Note that the data in Table 70 (and/or in the analogous tables for Atka [Table 71] and Adak [Table 72] later in this section) are derived from community financial documents and thus may differ from other data sources. Specifically, state shared fisheries revenue may be categorized differently in community documents than in state documents, e.g.,

fund revenues in any given year derive from direct fishery revenue sources, which does not take into account revenues from other taxes and fees from activities in the community that are fishing related (e.g. property taxes paid by fisheries businesses, fuel transfer tax revenues, and harbor fund fee revenues, among others).

Table 70. City of Unalaska Selected Fisheries-Related General Fund Revenues, Fiscal Years 2010-2019

Fiscal Year	Revenue (dollars) by Direct Fishery Revenue Source				All General Fund Revenue	Direct Fishery Revenue Source Total as a Percent of All General Fund Revenue
	Direct Fishery Revenue Source			Direct Fishery Revenue Source Total		
	City Raw Seafood Tax	Shared State Fisheries Business Tax	Shared State Fisheries Resource Landing Tax			
FY 2010	$3,594,173	$4,547,084	$4,676,603	$12,817,860	$29,604,371	43.3%
FY 2011	$5,371,768	$3,199,290	$3,531,739	$12,102,797	$29,152,912	41.5%
FY 2012	$5,260,999	$4,143,777	$3,469,263	$12,874,039	$31,634,417	40.7%
FY 2013	$4,784,198	$4,398,441	$4,898,543	$14,081,182	$32,609,892	43.2%
FY 2014	$4,449,921	$4,377,934	$6,974,887	$15,802,742	$34,376,971	46.0%
FY 2015	$4,981,770	$3,639,448	$5,014,309	$13,635,527	$34,525,170	39.5%
FY 2016	$5,123,372	$4,099,315	$3,034,438	$12,257,125	$30,723,626	39.9%
FY 2017	$4,657,385	$4,276,287	$8,272,661	$17,206,333	$34,371,441	50.1%
FY 2018	$4,475,150	$4,014,323	$4,532,106	$13,021,579	$30,300,957	43.0%
FY 2019	$4,761,506	$3,528,499	$5,220,958	$13,510,963	$36,419,248	37.1%

Source: City of Unalaska, Alaska. Comprehensive Annual Financial Reports, Fiscal Years 2010-2019. https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/FinancialDocumentsLibrary.aspx. Accessed 4/25/2020.

In terms of support services, Unalaska, with its relatively well-developed fishery support service sector, as noted in Section 6.1.7, and its role as the major shipping port of the BSAI area, could experience indirect impacts from the proposed action alternatives through a decline in economic activity related to the Amendment 80 catcher/processor fleet if product transfers and/or other port calls were to decline because of implementation of a proposed action; however, there is no straightforward way to quantitatively estimate these impacts.

It is important to note that Unalaska, unlike other ports in the region, has seen the development of a considerable amount of business activity related specifically to the BSAI groundfish catcher/processor fleets, including investment in the local support infrastructure (AECOM 2010). As noted in Table 8 (in Section 4.5.3), Unalaska/Dutch Harbor accounted for two-thirds of all Amendment 80 Alaska port calls during the years 2010-2019, averaging 169 port calls per year by Amendment 80 vessels during that span.[126]

As noted in Table 83, based on EDR data, in 2019 (the most recent year for which data are available), 11 persons listing Unalaska/Dutch Harbor as their residence address served as crew aboard Amendment 80

DOR and DCCED administered revenues may be lumped or split or revenue may be recognized during different reporting periods. The datasets are internally consistent and should be used as indicators of relative scale rather than compared dollar for dollar across the different datasets.

[126] Also, as shown on Table 65 (in Section 6.8) Dutch Harbor is the only BSAI community currently (as of 2019) listed as the homeport for any Amendment 80 vessels, and only one of two Alaska ports so listed (Dutch Harbor is listed as the homeport for one vessel; Kodiak for two). However, as noted in that section, there is no known information available that correlates homeport designation with expenditures in the community (or even time spent in the community) compared to other vessels in the Amendment 80 fleet that also make port calls in Unalaska/Dutch Harbor.

vessels, which accounted for 46 percent of all Amendment 80 sector crew members providing Alaska addresses that year. All other Alaska residence address Amendment 80 crew in that same year came from communities outside of the BSAI region.[127]

While Unalaska/Dutch Harbor is clearly the Alaska community most closely associated with activity of the Amendment 80 fleet and therefore potentially the most vulnerable to adverse impacts under the proposed action alternatives, it is also substantially engaged in the commercial directed BSAI/Area 4 halibut fishery, both in terms of its local catcher vessel fleet and local shore-based processing operations and therefore potentially vulnerable to adverse impacts under the no-action alternative. BSAI halibut is a mainstay of the local small vessel fleet, which over the period 2010-2019 generated higher annual average ex-vessel gross revenue from BSAI/Area 4 halibut landings than any other local community fleet in the BSAI region except St. Paul (which was the only community besides Unalaska/Dutch Harbor in the BSAI region with annual average BSAI halibut ex-vessel gross revenue for the local fleet of over $1 million).

Unalaska/Dutch Harbor was also the only community in the BSAI region with multiple shore-based processors accepting deliveries of BSAI/Area 4 halibut on an annual average basis 2010-2019 and, in combination with the shore-based processor in nearby Akutan, these shore-based processors accounted for more than half of all ex-vessel gross revenue paid to catcher vessels (from all communities combined) participating in the BSAI/Area 4 halibut fishery. In summary, Unalaska/Dutch Harbor could potentially experience adverse impacts under the no-action alternative (in halibut low abundance conditions) or the action alternatives, if Amendment 80 product transfers and/or port calls were to decline, but the local economic sectors, and the individuals participating in those sections, would be different.

No systematically collected information on the demographics of ownership and employment at support services businesses in Unalaska/Dutch Harbor is known to exist. However, a general knowledge of the community would suggest that the individuals working in the support sector are broadly reflective of the general/residential population of the community.

Although it is an ANCSA village and has a federally recognized tribe, Unalaska did not qualify for CDQ membership based in part on having previously developed harvesting or processing capability sufficient to support substantial groundfish participation in the BSAI. It is, however, an *ex-officio* member of the Aleutian Pribilof Island Community Development Association (APICDA) CDQ group, a status that facilitates the participation of Unalaska residents in a range of APICDA programs. While the Unalaska/Dutch Harbor local commercial fishing fleet is typically represented in the Council and other regulatory processes by the Unalaska Native Fishermen's Association which, according to tribal leadership has a close working relationship with the Qawalangin Tribe of Unalaska, membership is not limited to those residents of Alaska Native descent. The demographics of the owners and crew of the specific halibut vessels that would potentially be most likely to experience adverse impacts under the no-action alternative in low abundance conditions are unknown, but a general knowledge of the fleet would suggest that its demographics are largely reflective of the general/residential population of the community.

In contrast, processing workers in Unalaska/Dutch Harbor have tended to be relatively distinct demographically in relation to the rest of the local population. Processing workers are overwhelmingly recruited from a labor pool from outside the community, have lived in group quarters supplied on-site by the locally operating processing companies, and have tended to include a high proportion of non-White (and non-Alaska Native) minority workers. Due to the almost exclusive use of group quarters by processing workers (other than some management personnel) in the community, it is possible to estimate the minority component of this workforce population. As of 2010, based on a combination of race and

[127] Other Amendment 80 crew members listing Alaska residence addresses in 2019 were from Anchorage (eight individuals), along with Barrow, Kotzebue, Ninilchik, Ouzinkie, and Wasilla (one each). None of communities were otherwise considered substantially engaged in or dependent on the Amendment 80 fishery or the BSAI/Area 4 commercial halibut fishery for the purposes of this analysis.

ethnicity, 78.1 percent of Unalaska's group quarters population consisted of minority residents. As of 2018, 7.2 percent of Unalaska's residents were considered low-income, compared to 10.8 percent of Alaska's general population (Table 28 and Section 4.4).

7.1.1.1.1 Potential Environmental Justice Concerns

In terms of the potential for high and adverse impacts accruing disproportionately to minority populations or low-income populations (which would trigger environmental justice concerns under EO 12898), direct adverse impacts to Unalaska/Dutch Harbor, if any, from the action alternatives would primarily accrue to those portions of the support sector that focus on the Amendment 80 fleet, while adverse impacts of the no-action alternative that would potentially occur under low abundance conditions would be focused on the local halibut catcher vessel fleet and/or locally operating processors accepting halibut deliveries.

Unalaska, while the largest fishing port in the nation in terms of volume and second largest in terms of value of commercial fishery landings, has a small resident-owned commercial fishing fleet, both in terms of numbers of vessels and the size of those vessels. It is also not a CDQ community, despite having a greater number of Alaska Native residents than any of the APICDA member communities.[128] As a result, the local fleet does not have direct access to CDQ quota to use as a stable underpinning of the fleet or a hedge against their vulnerability to potential adverse impacts under the no-action alternative.

Impacts to processing workers could occur as the result of implementation of the no-action alternative in the form of reduced income or employment opportunities, depending on how specific plants and, importantly, their delivering fleets, adapt to changing conditions. While the dependency of these plants on BSAI/Area 4 halibut deliveries is not high compared to other high value species (or other high volume but relatively low value per unit volume species), it is not insignificant and an absolute level of economic dependency as measured by ex-vessel value of landings does not capture the importance a particular fishery may have in the overall annual cycle of the plant (e.g., these landings may occur during otherwise slow times when processing work availability may be down) or the labor hour effort that may be needed, as how labor-intensive processing a particular species or a given product form produced from that species may be varies widely. It is not likely, however, that implementation of the no-action alternative would result high and adverse impacts to processing workers in the form of substantial processor workforce reductions, given the relatively modest level of dependency of the shore-based processing plants in Unalaska/Dutch Harbor on BSAI/Area 4 halibut deliveries compared to those from other BSAI fisheries in which these plants are engaged (although a reduction in processing worker earnings through the loss of labor hours, including overtime hours, may occur).

7.1.1.2 Atka and Adak

7.1.1.2.1 Atka

Atka serves as a product transfer location for catcher/processors. As shown Table 36, on an average annual basis 2010-2019, Atka received approximately $52,000 per year from the Alaska Department of Revenue in the form of shared state Fishery Business Tax and Fisheries Resource Landing Tax revenues combined. Of this amount about $28,000, or about 53 percent of the total, derived from Fishery Business Tax shared revenue and approximately $25,000, or about 47 percent of the total, derived from Fishery Resource Landing Tax shared revenue.

[128]As noted in Section 6.1.1, in 2010, Unalaska's Aleut population was larger than the Aleut populations of the potentially BSAI halibut dependent APICDA member communities (Akutan, Atka, and St. George) combined, and it was only about seven percent smaller than the Aleut populations of all APICDA member communities combined.

To put these figures in perspective, total general fund revenue for the City of Atka in Fiscal Year 2019 was approximately $319,000, of which an average year of shared state fisheries tax revenues combined 2010-2019 ($52,000) would have accounted for roughly 16.4 percent of the total; shared state Fisheries Resource Landing Tax revenues alone for an average year 2010-2019 ($25,000) would have accounted for roughly 7.8 percent of fiscal year 2019 total. It is also important to note that Fisheries Resources Landing tax revenue represents tax revenues received from all catcher/processor product transfers/offloads in all fisheries, not just those of Amendment 80 vessels participating in the BSAI groundfish fisheries, as no fishery specific data are available.[129]

Table 71 provides information on City of Atka tax revenues deriving from direct fishery revenue sources (the city raw seafood tax, the state shared fisheries business tax, and the state shared fisheries resource landing tax) compared to all general fund revenues received by the city for fiscal years 2010-2019. As shown, for the City of Atka, between roughly 37 percent and 65 percent of all general fund revenue in any given year in this period derived from direct fishery revenue sources, which does not consider revenues from other taxes and fees from activities in the community that are fishing related.

Table 71. City of Atka Selected Fisheries-Related General Fund Revenues, Fiscal Years 2010-2019

	Revenue (dollars) by Direct Fishery Revenue Source						
	Direct Fishery Revenue Source						
Fiscal Year	City Raw Seafood Tax	Shared Raw Fish Tax	Shared State Fisheries Business Tax*	Shared State Fisheries Resource Landing Tax*	Direct Fishery Revenue Source Total	All General Fund Revenue	Direct Fishery Revenue Source Total as a Percent of All General Fund Revenue
FY 2010	$26,000	na	$382,458		$408,458	$698,370	58.5%
FY 2011	$41,640	na	$190,217		$231,857	$625,289	37.1%
FY 2012	$66,860	na	$319,859		$386,719	$993,645	38.9%
FY 2013	$72,224	na	$296,627		$368,851	$891,192	41.4%
FY 2014	$64,395	na	$276,489	$90,162	$431,046	$662,577	65.1%
FY 2015	$61,168	$29,615	$133,931	$21,349	$246,063	$433,073	56.8%
FY 2016	$69,619	$34,706	$113,826	$13,411	$231,562	$392,360	59.0%
FY 2017	$49,392	na	$248,632	$53,611	$351,635	$634,547	55.4%
FY 2018	$23,051	$15,479	$177,100	$23,950	$239,580	$508,597	47.1%
FY 2019	$21,656	$11,318	$171,137	$0	$204,110	$318,642	64.1%

if Atka recieved only state shared fisheries business tax revenues in fiscal year 2010 and 2011 or whether these two categories were combined for those years as well.

Source: City of Atka, Alaska.Certified Financial Statements, Fiscal Years 2014-2019; Certified Financial Audits Fiscal Years 2010-2013. https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/FinancialDocumentsLibrary.aspx. Accessed 4/25/2020.

In terms of support services, Atka has little in the way of a fishery support service sector aside from what is necessary to support its small local fleet. As shown in Table 8 (and noted in Section 4.5.3), Atka averaged approximately two Amendment 80 vessel port calls per year 2010-2019; between one and six of these port calls occurred per year 2015-2018, but none occurred in 2010-2014 or in 2019. While Atka does not have the infrastructure to provide routine support services for larger vessels, it could experience indirect impacts from implementation of the proposed action alternatives through a decline in tax

[129] As noted in the Amendment 80 fishery taxes discussion in economic analysis (Section 3.3.2.3) of the EIS to which this SIA is appended, much of the total Fisheries Resource Landing Tax revenue at the state level is likely generated in the at-sea sector of the AFA pollock fishery; that same section provides an estimate of total Amendment 80 sector Fishery Resource Tax revenue, which is not recapitulated here, but no estimates are available at the community level.

revenues and/or other economic activity related to the Amendment 80 catcher/processor fleet if product transfers and/or other port calls were to decline because of the proposed action. While it is assumed that the magnitude of these impacts, particularly in the private sector, would likely be modest, there is no straightforward way to quantitatively estimate these impacts.

Additionally, as Atka is an APICDA CDQ community, its residents benefit at least indirectly from Amendment 80 operations to the extent that APICDA leases out CDQ quota to the Amendment 80 sector, which it does on a regular basis. Like four of the six CDQ groups, APICDA works with Amendment 80 industry partners to have its BSAI multispecies groundfish quota harvested. These operations are dependent on access to some level of BSAI/Area 4 halibut PSC to pursue the groundfish fisheries; if an action alternative is implemented that constrains the harvest of APICDA's CDQ to levels substantially below full utilization, residents of the CDQ communities, including Atka, would potentially be adversely impacted. The quantification of those impacts, however, are not possible with existing information at present, given the range of potential adaptive responses to the situation.

While Atka is potentially vulnerable to adverse impacts under the proposed action alternatives, at least to a modest degree, it has historically been substantially engaged in and substantially dependent on the commercial directed BSAI/Area 4 halibut fishery, both in terms of its local catcher vessel fleet and the local shore-based processing operation and therefore potentially vulnerable to adverse impacts under the no-action alternative in halibut low abundance conditions. As discussed in Section 6.1.5, however, the shore-based processing plant in Atka was closed in 2018, 2019, and 2020 (and has remained closed as of February 2021), although mitigation measures put in place by APICDA has offset some of the direct economic impacts to local fishermen of this closure. Under the no-action alternative, adverse impacts to the BSAI/Area 4 directed halibut fishery under low abundance conditions could make the restart of the Atka plant and the reestablishment of an active local fleet more challenging than would otherwise be the case.

The community is particularly vulnerable to adverse community level impacts under the no action alternative under low halibut abundance conditions as the local halibut fishery has been one of the few private sector sources of employment and income in the community and thereby potentially a key factor in retaining working age residents. As shown in Table 29, there were a total of 10 students enrolled in the Atka school for the 2019-2020 school year, the minimum number of students required for state funding. The loss of any families with school age children from the community raises concerns about the ability to keep the school open which, in turn, would make retention of families with school age children in the community even more difficult. [130]

7.1.1.2.2 Adak

Adak, like Atka, serves as a product transfer location for catcher/processors. As shown in Table 36, on an average annual basis 2010-2019, Adak received approximately $194,000 per year from the Alaska Department of Revenue in the form of shared state Fishery Business Tax and Fisheries Resource Landing Tax revenues combined. Of this amount about $115,000, or about 59 percent of the total, derived from Fishery Business Tax shared revenue and approximately $79,000, or about 41 percent of the total, derived from Fishery Resource Landing Tax shared revenue.

To put these figures in perspective, total operating revenue for the City of Adak in Fiscal Year 2019 was approximately $1.5 million, of which an average year of shared state fisheries tax revenues combined 2010-2019 ($194,000) would have accounted for roughly 13.1 percent of the total; shared state Fisheries

[130] Not obtaining state funding may not mean the immediate closure of a local school, as local school districts can choose to fully fund schools if they are able to do so. The experience of school districts in the region, however, would suggest that this is at best a temporary measure and one that is not sustainable over the longer term.

Resource Landing Tax revenues alone for an average year 2010-2019 ($79,000) would have accounted for roughly 5.3 percent of fiscal year 2019 total. It is also important to note that Fisheries Resources Landing tax revenue represents tax revenues received from all catcher/processor product transfers/offloads in all fisheries, not just those of Amendment 80 vessels participating in the BSAI groundfish fisheries, as no fishery specific data are available. [131]

Table 72 provides information on City of Adak tax revenues deriving from direct fishery revenue sources (the city raw seafood tax, the state shared fisheries business tax, and the state shared fisheries resource landing tax) compared to all general fund revenues received by the city for fiscal years 2010-2019. As shown, for the City of Adak, between roughly 25 percent and 49 percent of all general fund revenue in any given year during this period derived from direct fishery revenue sources, which does not consider revenues from other taxes and fees from activities in the community that are fishing related.

Table 72. City of Adak Selected Fisheries-Related General Fund Revenues, Fiscal Years 2010-2019

	Revenue (dollars) by Direct Fishery Revenue Source							
	Direct Fishery Revenue Source							
Fiscal Year	City Raw Seafood Tax	State Fisheries Business Tax from DOR	State Fisheries Resource Landing Tax from DOR	State Fisheries Business Tax from DCCED	State Fisheries Resource Landing Tax from DCCED	Direct Fishery Revenue Source Total	All General Fund Revenue	Direct Fishery Revenue Source Total as a Percent of All General Fund Revenue
FY 2010	na	$311,439	$97,736	$308,178	$0	$717,353	$1,464,483	49.0%
FY 2011	na	$13,567	$54,949	$98,973	$92,919	$260,408	$1,015,485	25.6%
FY 2012	na	$143,848	$40,219	$122,743	$165,964	$472,774	$1,916,341	24.7%
FY 2013	$108,094	$75,469	$61,035	$145,816	$115,360	$505,774	$1,507,930	33.5%
FY 2014	$140,193	$168,370	$86,452	$139,135	$111,999	$646,149	$1,410,574	45.8%
FY 2015	$65,349	$122,489	$54,660	$108,405	$40,443	$391,346	$1,310,497	29.9%
FY 2016	$76,313	$67,968	$1,683	$110,149	$14,351	$270,465	$1,084,898	24.9%
FY 2017	$108,602	$44,636	$103,209	$82,413	$158,858	$497,718	$1,208,202	41.2%
FY 2018	$290,839	$34,908	$74,247	$121,121	$79,832	$600,947	$1,549,197	38.8%
FY 2019	$330,883	$34,131	$161,256	$73,844	$121,952	$722,066	$1,478,153	48.8%

Source: City of Adak, Alaska. Annual Consolidated Financial Statements Fiscal Years 2010-2019. https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/FinancialDocumentsLibrary.aspx. Accessed 9/15/2020.

In terms of fishery support services, Adak has few capabilities aside from its deep-water port, a fueling station capable of accommodating large vessels, available housing stock that can support crew changes, and the ability to support large-scale aircraft operations at its airport. However, within its equally modest local economy, marine fuel sales and other support service activity associated with the Amendment 80 port calls that do occur are important to the community. As noted in Table 8 (in Section 4.5.3), with an annual average of 29 port calls per year 2010-2019, Adak was second only to Unalaska/Dutch Harbor within the BSAI region. Adak could experience indirect impacts from implementation of the proposed action alternatives through a decline in tax revenues and/or other economic activity related to the Amendment 80 catcher/processor fleet if product transfers and/or other port calls were to decline because of the proposed action, but there is no straightforward way to quantitatively estimate these impacts.

[131] As noted in the Amendment 80 fishery taxes discussion in economic analysis (Section 3.3.2.3) of the EIS to which this SIA is appended, much of the total Fisheries Resource Landing Tax revenue at the state level is likely generated in the at-sea sector of the AFA pollock fishery; that same section provides an estimate of total Amendment 80 sector Fishery Resource Tax revenue, which is not recapitulated here, but no estimates are available at the community level.

While Adak is potentially vulnerable to impacts under the proposed action alternatives, at least to a modest degree, it has historically been engaged in the commercial directed BSAI/Area 4 halibut fishery, both in terms of its local catcher vessel fleet and the local shore-based processing operation and therefore potentially vulnerable to adverse impacts under low halibut abundance conditions under the no-action alternative as well. Adak has historically had difficulty attracting and keeping a residential catcher vessel fleet and, as discussed in Section 6.1.5, there has been instability in the management of the shore-based processing plant in Adak over the period 2010-2019, which included intermittent closures. Adak shore-based processing has faced, from the local perspective, several fishery management related challenges over the years, compounded by the basic logistical and economic challenges of operating in a local economy that remains in transition from that of relatively large military community to a small civilian community. The plant most recently shut down in June 2020 (and has remained closed as of February 2021). Under the no-action alternative, adverse impacts to the BSAI/Area 4 directed halibut fishery under low abundance conditions could make the restart of the Adak plant and the establishment of an active residential fleet more challenging than would otherwise be the case.

Adak, like Atka, is particularly vulnerable to adverse community level impacts resulting from challenges in retaining working age residents, especially those with families. As shown in Table 29, there were a total of 18 kindergarten through 12th grade students (and 19 pre-kindergarten through 12th grade students) enrolled in the Adak school for the 2019-2020 school year, but it is known that following the closure of the local processing plant a family with four school age children has left the community (Minor, personal communication, 8/6/2020). With a minimum of 10 students required for state funding, the potential for additional loss of families with school age children raises concerns about the ability to keep the school open which, in turn, would make retention of families with school age children in the community even more difficult.

7.1.1.2.3 <u>Potential Environmental Justice Concerns</u>

As shown in Table 28, as of 2010, 95.1 percent of Atka's population was considered minority, which is the same proportion of Alaska Native residents in the community's population. As of 2019, 14.0 percent of Atka's residents were considered low-income, which was well above the proportion of low-income residents in Alaska's general population (10.7 percent). Atka is a small, predominantly Alaska Native community, an ANCSA village, has a federally recognized tribe, and is a CDQ community (and member of APICDA). Given the nature of potential impacts to the community of Atka summarized above, disproportionate high and adverse impacts to either minority or low-income populations and/or tribal-related entities in Atka are theoretically possible, under both the action alternatives and, under halibut low abundance conditions, the no-action alternative.

Also as shown in Table 28, as of 2010, 81.9 percent of Adak's population was considered minority, with Alaska Native residents making up about 5.5 percent the community's population. As of 2019, 16.4 percent of Adak's residents were considered low-income, which was well above the proportion of low-income residents in Alaska's general population (10.7 percent).

Approximately two-thirds of Adak's population lived in group quarters in 2010 as, like in Unalaska/Dutch Harbor, processing workers in Adak have tended to live in processor-supplied housing; to be relatively distinct demographically in relation to the rest of the local population; to have been overwhelmingly recruited from a labor pool from outside the community; and to include a high proportion of non-White (and non-Alaska Native) minority workers. Due to the almost exclusive use of group quarters by processing workers in Adak (other than some management personnel), it is possible to estimate the minority component of this workforce population. As of 2010, based on a combination of race and ethnicity, 95.9 percent of Adak's group quarters population consisted of minority residents. However, it is important to recognize with the locally operating shore-based processor shut down, the processing crew component of the population is not currently (as of February 2021) in the community.

While not an ANCSA community, a CDQ community, or the location of a federally recognized tribe, Adak, as noted earlier, does have strong ties to the Aleut Corporation, the regional ANCSA corporation, and its subsidiaries.

If baseline conditions are assumed to end in 2019, given the nature of potential impacts to the community of Adak summarized above, disproportionate high and adverse impacts to minority populations, low-income populations, and/or tribal-related entities in Adak are theoretically possible, under both the action alternatives and, under halibut low abundance conditions, the no-action alternative. If, however, the baseline condition for the assessment of impacts includes conditions extant at the time of the implementation of the ultimately selected alternative, both the minority population and the low-income population of Adak may more closely resemble that of the general population of Alaska, meaning that environmental justice concerns may be a non-issue for minority populations or low-income populations in general, although impacts to tribal-related entities could still occur.

7.1.1.3 Other Alaska Communities

7.1.1.3.1 Togiak

Togiak, as described in Section 6.5.4, is notable as a product transfer location for catcher/processors and while revenues show considerable variability over time, the level of contribution of Fishery Resource Landing Tax revenues relative to total general fund revenues received by the city is relatively modest, with the average annual contribution 2010-2019 ($36,000) accounting for about 2.9 percent of total general fund revenues ($1.3 million) in fiscal year 2019. Additionally, as noted in that section, Fisheries Resources Landing tax revenue represents tax revenues received from all catcher/processor product transfers/offloads in all fisheries, not just those of Amendment 80 vessels participating in the BSAI groundfish fisheries, as no fishery specific data are available.

As shown in Table 8 (and discussed in Section 6.5.4), over the period 2010-2019, Togiak had an annual average of approximately 18 Amendment 80 vessel port calls per year, making it the community with the third highest average of Amendment 80 port calls in the BSAI region over this period. Private sector economic activity related to Amendment 80 port calls has been modest, however, due to a lack of support facilities and service providers of a scale that could routinely accommodate such relatively large vessels. Taken together with the tax revenue data, this information would suggest that Togiak is not particularly vulnerable to adverse community level impacts under the proposed action alternatives if Amendment 80 product transfers and/or the number port calls of those vessels were to decline somewhat under those alternatives.

With respect to engagement in and dependency on the BSAI/Area 4 commercial halibut fishery, as shown in Table 16, catcher vessels with Togiak ownership addresses active in the BSAI/Area 4 halibut fishery derived about 83 percent of their total ex-vessel gross revenues 2010-2019 from fisheries other than the BSAI/Area 4 halibut fishery; Table 17 shows that all commercial fishing vessels with Togiak ownership addresses derived approximately 93 percent of their total ex-vessel gross revenues from fisheries other than the BSAI halibut fishery during this same time period.

While potential loss of these levels of halibut revenue is not trivial, Togiak as not as acutely vulnerable in economic terms to community level adverse impacts under the no-action alternative during periods of low halibut abundance as are several other halibut communities. This is not to say that the BSAI/Area 4 halibut fishery is unimportant to Togiak harvesters and/or the shore-based processors in Togiak (and nearby Twin Hills) as resource that is available during an otherwise slow time and a diversification opportunity in an area that has otherwise been largely dependent on the herring and salmon fisheries.

7.1.1.3.2 Other CDQ Communities

CDQ entities and their constituent communities could be impacted by potential changes to the BSAI groundfish Amendment 80 sector fisheries related to the proposed action alternatives in multiple ways, two of the most direct of which are (1) through revenues generated by leasing the harvest of their BSAI multispecies groundfish CDQ quota holdings to potentially affected Amendment 80 industry partners and (2) through CDQ group investments in direct participation in the potentially affected Amendment 80 sector.

Four of the six CDQ groups (APICDA, BBEDC, CVRF, and YDFDA) routinely have their BSAI multispecies groundfish CDQ quota harvested in whole or in part by industry partners in the Amendment 80 sector. None of these four groups has ownership interest in any of the Amendment 80 entities. These groups vary in the number of communities and residents represent, the composition of the CDQ fishery portfolios they hold, and the relative scale of the fishery and non-fishery portions of their local economies, among other attributes. To the extent that the proposed action alternatives have the potential to reduce royalty payments by Amendment 80 entities to CDQ groups due to increased harvest expenses and/or leaving CDQ fish in the water, the harvest of which has been contracted to Amendment 80 entities, CDQ groups and their constituent communities are at potential risk of adverse impacts under these alternatives. How effectively these risks would be mitigated by adaptive fishing behaviors on the part of the Amendment 80 partners is unknown and it is otherwise not possible to quantify these risks with available data. Amendment 80 entities have varying fishing portfolios in which leasing CDQ groundfish quota plays a part in an overall operational strategy in combination with their own cooperative quota and other CDQ fisheries quota. Given that the CDQ halibut PSC limit (315 t) would not change under any of the proposed action alternatives (unlike Amendment 80 halibut PSC limits that would vary with halibut abundance under the proposed action alternatives), it is assumed adverse (or beneficial) impacts, if any, to CDQ quota leasing practices and leasing revenues accruing to CDQ groups resulting from implementation of any of the action alternatives would be indirect and would vary by contracted entity, based on multiple factors. These would include circumstances unique to individual Amendment 80 entities including cooperative quota portfolio holdings, CDQ fishery leasing agreement portfolios, in-season operational decision making, and strategic partnering considerations, among other factors. As noted in DEIS Section 3.3.4, Amendment 80 vessels that harvest CDQ fish must record whether a haul is a CDQ haul within two hours after completion of weighing all catch in the haul (679.5(c)(4)(ii)(B)(2)). This may be advantageous for Amendment 80 vessels fishing CDQ alongside their cooperative quota, as they can more flexibly manage to which sector tows are allocated based on different operational portfolios and allocations, as halibut PSC that occurs on a CDQ haul accrues to the CDQ halibut PSC limit. If, however, there were to be a reduction revenues to CDQ entities as the result of the implementation of a proposed action alternative, the level of impact experienced by any specific CDQ group would vary based on a range of factors specific to that group, including the scale of Amendment 80 revenues relative to other CDQ fishery revenue streams, the viability of alternative revenue generation options for all or some portion of CDQ fishery portfolio leased by current Amendment 80 sector partners, either within or outside of the Amendment 80 sector, and the socioeconomic/demographic context of the communities represented by the CDQ group itself.

A fifth CDQ group (NSEDC) holds partial ownership interest in multiple vessels in the Amendment 80 sector and thus is at some financial risk under the proposed action alternatives (similar to any other entity with Amendment 80 ownership interests), but again this risk is not quantifiable with available data. This CDQ group, as well as the sixth group (CBSFA), does not routinely use Amendment 80 entities to harvest their BSAI multispecies groundfish quota (including partially owned entities), but the quota of these groups, normally leased out to an AFA entity is sometimes harvested in at least modest amounts by Amendment 80 vessels when quota swaps between BSAI groundfish fishery participants occur as they attempt to fill out their harvest plans over the course of a season. While potential adverse impacts resulting from the amounts of quota at potential risk are not quantifiable with available data, they are understood to be minimal.

St. Paul, as shown in Table 8, has averaged the fourth highest number of port calls of Amendment 80 vessels among Alaska communities on an annual average basis 2010-2019. Alaska Department of Revenue data suggest, however, that these port calls do not involve an amount of revenue from taxable product transfers that are substantial compared to other fishery tax revenue sources and, as noted in Section 6.2.7, St. Paul does not otherwise appear to experience substantial economic benefits from these port calls, based on a lack of port facilities and support service businesses of a scale capable of supporting relatively large vessels on a routine basis. As a result, no substantial adverse impacts to St. Paul related to any changes to patterns of Amendment 80 port calls resulting from implementation of either of the action alternatives are anticipated.

It is also important to note that efforts directed toward exploration or development of a greater degree of direct engagement in the BSAI Pacific cod fishery through local small vessel fleets is underway in some CDQ communities, including Nome, Savoonga, and St. Paul, and has previously been contemplated in False Pass and Atka. At present, it does not appear that the proposed action alternatives are likely to adversely impact these efforts, although potential adverse impacts under the no-action alternative in low halibut abundance conditions could make diversification efforts more difficult if they were to be capitalized through revenue earned in the BSAI/Area 4 halibut fishery.

7.1.1.3.3 Communities Outside of the CDQ Regions

Sand Point, as noted in Section 6.6.2, does serve as a product transfer location for catcher/processors, but the origin (BSAI or GOA) of the fish processed into the product transferred is not discernable from the available data and the level of shared tax revenue associated with these transfers returning to the city is relative to other fishery related tax revenues. As shown in Table 8, Sand Point experienced a three Amendment 80 port calls during the years 2010-2019. As shown in that same table, only other community outside of the CDQ regions that experienced Amendment 80 port calls 2010-2019 was Kodiak, which had one port call in 2011. Given the modest size and scale of local support services businesses in Sand Point and the infrequent nature of Amendment 80 port calls in Sand Point and Kodiak, neither community would appear vulnerable to substantial adverse impacts if local Amendment 80 product transfers or port calls were to decline from current levels under the proposed action alternatives.

As noted in Table 83, based on EDR data, in 2019 (the most recent year for which data are available), a total of 24 persons listing an Alaska residence address served as crew aboard Amendment 80 vessels. Of these, none were from CDQ communities and 13 (54 percent) were in communities outside the BSAI region.[132] Specifically, there were eight crew members from Anchorage and one each from Barrow, Kotzebue, Ninilchik, Ouzinkie, and Wasilla. None used Sand Point or Kodiak addresses.

As shown in Table 18 and discussed in Section 6.6.1, a single shore-based processor in Sand Point and multiple shore-based processors in Kodiak accepted deliveries of BSAI/Area 4 halibut in each year 2010-2019. No catcher vessels with Sand Point ownership addresses are shown in the data used for this analysis as participating in the BSAI/Area 4 halibut fishery in any year 2010-2019. As shown in Table 64, on an annual average basis 2010-2019, approximately 12 catcher vessels with Kodiak ownership addresses participated in the fishery. Potential impacts of the proposed alternatives to Sand Point and Kodiak's participation in the BSAI/Area 4 halibut fishery are discussed in Section 7.2.3.1, below.

7.1.1.3.4 Potential Environmental Justice Concerns

As noted above, one CDQ group has partial ownership interest in multiple Amendment 80 vessels and four other CDQ groups derive revenue from leasing BSAI groundfish CDQ quota to industry partners in the Amendment 80 sector. Also as noted above, risks to Amendment 80 ownership interests and to leasing revenues under the proposed action alternatives are not possible to quantify with existing data for multiple reasons (and may be mitigated to greater or lesser degrees based on adaptive responses by Amendment 80 entities) and potential impacts, if any, to the CDQ fishery itself would be of an indirect nature and outcomes would be expected to vary by CDQ entity. However, it is also important to note that

[132] 11 used addresses in Unalaska/Dutch Harbor which, while not a CDQ community, is within the APICDA CDQ region (and the BSAI region).

Amendment 80-derived revenues are an important source of income for multiple CDQ groups and are used to fund to greater or lesser degrees a range of benefits programs that, among others, include helping to address basic health, safety, and infrastructure needs in communities with limited alternative revenue sources and funding opportunities. Given that CDQ groups overwhelmingly represent communities with high proportions of Alaska Native residents and high proportions of low-income residents and that are home to one or more federally recognized tribal entities, adverse impacts to these CDQ entities would be of potential environmental justice concern.

7.1.2 BSAI Groundfish Amendment 80 Fishery Dependency and Vulnerability to Community-Level Impacts of the Proposed Action Alternatives among Pacific Northwest Communities

Given the degree of centralization of ownership of the BSAI groundfish Amendment 80 sector in the Seattle MSA (Table 9), the centralization of the support services provided by Seattle-based firms (described in Section 6.7), and the concentration of Amendment 80 crew member residence in the state of Washington (Table 68) potential adverse economic impacts associated with proposed action alternatives described in DEIS Section 5.3.2 would largely accrue to the Seattle MSA in particular and the Pacific Northwest in general, with the limited exceptions described in Section 7.1.1.

As noted in DEIS Section 2, under both Alternative 2 and Alternative 4: the PSC limit would: (1) remain the same as the status quo PSC limit under combined "high setline index + high trawl index" halibut abundance conditions (only) and (2) under all other combinations of abundance conditions PSC limit reductions would occur. In contrast, under Alternative 3: (1) the alternative PSC limit would be higher than the status quo PSC limit under combined "high setline index + high trawl index" abundance conditions (the only circumstance under any alternative not modified by an option that this would occur); (2) the alternative PSC limit would remain the same as the status quo PSC limit under "high setline index + low trawl index" and "medium setline index + high trawl index" conditions; and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit. When reductions in PSC limits would occur, the amounts of those reductions for any combination of conditions would vary by alternative, as detailed in DEIS Section 2.

As noted in DEIS Section 5.3.2, numerous variables would influence the impacts of PSC limit reductions under the proposed action alternatives on the Amendment 80 sector, including environmental, regulatory, and behavioral variables. While sector participants cannot directly modify environmental or regulatory variables, they can alter behavioral variables through halibut avoidance strategies, all of which come with avoidance costs. These costs are incurred regardless of whether the PSC limit becomes a constraint and cannot be quantified with available data. Other costs associated with PSC mortality reduction include foregone groundfish revenues if halibut PSC limits become constraining. These costs impact net revenues but quantifying costs of foregone groundfish revenue resulting from PSC limit reductions is not straightforward. Estimates of gross revenue impacts within the constraints of available data are provided in DEIS Section 5.3.2.

Finally, as noted in the DEIS Section 5.3.2.3 practicability of bycatch avoidance discussion, if halibut PSC limits become sufficiently constraining under an ultimately implemented proposed action alternative, additional consolidation of the Amendment 80 sector could occur. Consolidation could result as firms that are less efficient at addressing halibut bycatch constraints experience less profitability and sell to firms that are more efficient. In terms of the maximum level of consolidation that could occur under existing Amendment 80 ownership and control limits (and given current participation levels), only one firm could exit the fishery (because a person may not individually or collectively hold or use more than 30 percent of the aggregate Amendment 80 quota share units initially assigned to the Amendment 80 sector and resulting cooperative quota). Current vessel caps are set so that an Amendment 80 vessel may not be used to catch an amount of a species greater than 20 percent of the aggregate Amendment 80 sector's species

ITACs, meaning the number of vessels in the fishery could theoretically consolidate to a minimum of five under the current caps. However, that degree of consolidation is not considered a realistic possibility, as the fleet would still need sufficient capacity to harvest the cooperative quota that can be supported by the available halibut PSC mortality limit.

7.1.2.1.1 Potential Environmental Justice Concerns

In terms of absolute numbers (based on existing participation/engagement patterns), whatever adverse impacts related to BSAI groundfish Amendment 80 catcher/processor direct employment and income that would occur as the result of implementation of the proposed action alternative ultimately selected for implementation would largely accrue to the Seattle MSA. It is assumed that fishery-wide, catcher vessel skippers and crew are more-or-less representative of the general population of community of vessel ownership where crew recruiting likely takes place, so environmental justice concerns would not be likely. For catcher/processor crew, however, a different set of assumptions are used.

While no recent information from secondary sources on sector-wide catcher/processor crew demographics is readily available for this community impact analysis, an earlier (and now dated) Steller sea lion protection measure social impact assessment (NMFS 2001) indicated that the workforce population of the BSAI groundfish catcher/processor sector was substantially different demographically from the overall greater Seattle area, based on 2000 U.S. Census data for the community and on industry self-reported information for the same year. While the greater Seattle area was 23 percent minority in 2000, the catcher/processor workforce was 63 percent minority, according to industry data. The minority component of the various entity workforces within this sector was largely composed of individuals of Hispanic or Asian ancestry. Industry-provided data indicated that, in 2000, individual reporting entities were anywhere from about 36 percent minority to about 86 percent minority (NMFS 2001). Although more recent data were not available for the entire sector, to facilitate the social impact assessment for an earlier BSAI halibut PSC limit revisions analysis (AECOM 2015), employee demographic data were supplied by four firms with catcher/processors operating in the Amendment 80 catcher/processor sector. Together, these firms accounted for 10 of the 18 trawl catcher/processors operating that year (2014) in the BSAI groundfish fisheries. The demographic data supplied by those firms are presented Table 84 (in Section 10.3 [Attachment C]).

For the current analysis, five firms representing a total of 19 Amendment 80 BSAI groundfish catcher/processors provided employee demographic data for 2019, which are presented in Table 85 (in Section 10.3 [Attachment C]). As shown in that table, 68 percent of all employees working on the catcher/processors represented in these data are minority employees. Minority representation is substantially higher for two of the job categories (factory foreman/quality control and processing labor/galley crew/cleaning, both over 75 percent), and in all but two job categories (captains and engineers) minority employees represented greater than 50 percent of all employees in that category. Asian Americans, Native Hawaiians, and Pacific Islanders as a group accounted for over 25 percent of all employees. All of these figures are largely consistent with the data from 2014. In contrast, minority representation in the general Seattle MSA 2010 population was 32 percent (1,099,535 minority residents out of a total population of 3,439,809 residents). Given the demographic characteristics summarized here, if disproportionate high and adverse impacts were to accrue to the Seattle MSA ownership address BSAI groundfish Amendment 80 catcher/processor workforce due to implementation of a proposed action alternative, environmental justice would potentially be an issue of concern.

Of potential concern would be loss of income opportunities for crew, with increased expenses in operations with additional halibut avoidance measures, and/or more time away from home with time-consuming and/or labor-intensive measures such as increased deck sorting. Although there are theoretically many more alternate employment and income opportunities for workers in a large urban area than in smaller communities or rural settings, there may not be comparable employment and earning potential ashore as is available to workers aboard these vessels, even in an otherwise robust job market, especially employees who have worked their way up from entry level positions.

7.2 Community Engagement, Dependence, Vulnerability, Resilience, and Risks to Fishing Community Sustained Participation in the Relevant BSAI Halibut Fisheries

7.2.1 Overview

The problematic nature of the no-action alternative for directed halibut fishery participants under halibut low abundance conditions is inherently recognized in the Council's purpose and need statement. The potential for BSAI halibut-related community-level impacts from the proposed action alternatives in any given community is in part a function of present and future engagement in and dependence of the community on the potentially affected BSAI halibut fisheries. Like what was described for BSAI Amendment 80 groundfish fisheries, dependency on the BSAI halibut fishery is influenced by the relative importance of BSAI halibut fisheries in the larger community fisheries sector(s), as well as the relative importance of the overall community fishery sector(s) within the larger community economic base (both in terms of private sector business activity and public revenues). Also important to community-level impact outcomes is the specific nature of local engagement in the potentially affected BSAI halibut fisheries and alternative employment, income, business, and public revenue opportunities available within the community because of the location, scale, and relative economic diversity of the community.

It is assumed that the BSAI/Area 4 commercial halibut fishery would potentially benefit in low halibut abundance conditions from implementation of the action alternatives due to what could effectively (if indirectly) be a reallocation of access to halibut between the BSAI groundfish and BSAI/Area 4 directed halibut fisheries that would potentially occur to greater or lesser degrees under the different action alternatives. The beneficial impacts of these incidental allocative effects, were they to occur, would be realized in the near-term following action alternative implementation (assuming low abundance conditions relevant to the design of the alternative were occurring at the time of implementation) and potentially in the long-term, if low abundance conditions were to persist over time. As noted in DEIS Section 5.4, given that IPHC catch setting policy removes O26 bycatch by IPHC regulatory area, the spatial distribution of Amendment 80 halibut PSC may impact the distribution of directed halibut fishery catch limits within the BSAI/Area 4.[133] Specifically, while total Amendment 80 halibut PSC mortality has decreased, the distribution of PSC occurrence within Area 4 has stayed fairly consistent, with Area 4CDE accounting for between 83 percent and 90 percent of annual Amendment 80 PSC since 2015 (when spatial resolution of PSC occurrence substantially improved). In other words, the directed halibut fishery in Area 4CDE would have the greatest potential for experiencing whatever incidental reallocative effects may occur under the proposed action alternatives (and may have the greatest potential for experiencing adverse impacts during halibut low abundance conditions under the no action alternative, especially compared to conditions that existed before 2015 when changes were made to the NMFS methodology for apportioning PSC mortality to IPHC areas, as described in DEIS Section 5.4[134]).

[133] As noted in that section, current IPHC interim harvest policy subtracts the O26 portion of non-directed discard mortality (bycatch) from the TCEY by IPHC regulatory area when calculating fishing limits. Therefore, if the interim harvest policy is followed, directed catch limits in IPHC areas 4A, 4B, and 4CDE could increase if PSC mortality decreases in those areas.

[134] As noted in that section, the implementation of the method used for apportioning halibut PSC mortality to IPHC areas since 2015 may have had the unintended consequence of indirectly but ultimately negatively impacting Area 4CDE directed halibut fishery quota limits. Of the NMFS reporting areas that overlap IPHC areas, 521 and 523 apportionment changed very little with the new methodology, while 541 apportioned approximately half of the PSC that would have previously been deducted from 4A to 4B and 517 apportioned varying amounts of PSC that would have previously been deducted from 4A to 4CDE.

The conditions under which the potential for incidental allocative effects beneficial to the directed halibut fishery could occur vary by action alternative. Table 73 provides a simplified view of the alternatives showing, by action alternative and without modifying options, the halibut abundance conditions under which the Amendment 80 halibut PSC limits would be lower than, the same as, or higher than status quo/Alternative 1 conditions (highlighted in green, yellow, and orange, respectively).

Table 73. Simplified look-up table of Alternatives 2, 3, and 4 showing Amendment 80 halibut PSC limits lower, same as, or higher relative to the status quo (Alternative 1)

	Alternative 2		Alternative 3		Alternative 4	
	Low Trawl Index	High Trawl Index	Low Trawl Index	High Trawl Index	Low Trawl Index	High Trawl Index
High Setline Index	PSC Limit **LOWER** than Status Quo	PSC Limit **SAME** as Status Quo	PSC Limit **SAME** as Status Quo	PSC Limit **HIGHER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **SAME** as Status Quo
Medium Setline Index	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **SAME** as Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo
Low Setline Index	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo
Very Low Setline Index	*(Note: Alt 2 does not have a separate Very Low category)*		PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo	PSC Limit **LOWER** than Status Quo

As shown, under both Alternative 2 and Alternative 4: (1) the alternative PSC limit would not be higher than the status quo PSC limit under any halibut abundance conditions; (2) the PSC limit would remain the same as the status quo PSC limit under combined "high setline index + high trawl index" halibut abundance conditions (only); and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit. The *amount* of PSC limit reductions under all but "high setline index + high trawl index" abundance conditions (and therefore the potential *level* of incidental allocative effects beneficial to the directed halibut fishery) would vary between the two alternatives, as described in DEIS Section 2, but combinations of abundance *conditions* under which at least some level of incidental allocative effects could potentially occur would be the same under Alternative 2 and Alternative 4. (Under "high setline index + high trawl index" abundance conditions, Alternative 2 and Alternative 4 would both be neutral in terms of incidental allocative effects relative to Alternative 1.)

As shown in the same table, the pattern is different for Alternative 3, as: (1) the alternative PSC limit would be higher than the status quo PSC limit under combined "high setline index + high trawl index" abundance conditions; (2) the alternative PSC limit would remain the same as the status quo PSC limit under "high setline index + low trawl index" and "medium setline index + high trawl index" conditions; and (3) under all other halibut abundance conditions the alternative PSC limit would be lower than the status quo PSC limit (and therefore potential incidental allocative effects beneficial to the directed halibut fishery could occur). All things being equal, the increase in the Amendment 80 PSC limit under "high setline index + high trawl index" halibut abundance conditions would result in fewer opportunities for the directed halibut fishery under these conditions than would be the case under status quo PSC limits (Alternative 1). This could be characterized as a loss to the directed halibut fishery, as the directed fishery not fully realizing otherwise expected gains under high abundance conditions, and/or as Amendment 80 halibut PSC use and directed fishery halibut opportunities both increasing based on high abundance conditions.

The provision of additional opportunities for the directed halibut fishery that may accompany PSC limit reductions would be determined by IPHC management processes and, as described in DEIS Section 5.4, would not likely result in those additional directed halibut fishery opportunities occurring on a pound-for-pound basis. Additionally, the potential options that maybe applied to any of the action alternatives would influence the level of additional directed halibut fishery opportunities available in a given year. It is also important to note that some communities are substantially engaged in or substantially dependent on both the Amendment 80 fishery and the Area 4 directed halibut fishery to varying degrees and a simple characterization of potential incidental reallocative effects to halibut dependent communities does not capture the complexity of overall impacts to those communities, much less the range of potential impacts to individual harvesters, processors, and/or fishery support businesses in those communities that may ultimately result from changes in Amendment 80 PSC limits.

It is further assumed that directed BSAI/Area 4 commercial halibut fishery could potentially benefit from implementation of the proposed action alternatives relative to the degree that the Pacific halibut stock itself would potentially benefit from the promotion of the conservation of the stock as a result of the implementation of the individual action alternatives. The IPHC's spawning biomass per recruit-based management approach, however, is expected to conserve spawning biomass across differing patterns in fishery selectivity and/or allocation among different fisheries. As such, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives including status quo. Closed-loop model simulations that appeared in previous analyses, described in DEIS Section 4.3, are consistent with this expectation. Whatever potential benefits of this nature, were they to occur, would not be immediately apparent in the relevant halibut fisheries and the full extent of their impact would not be realized for several years. In addition to being longer term, these potential impacts, were they to occur, would be of greater spatial extent than would the potential incidental allocative effects previously noted.[135]

Within a relatively few Alaska communities, specifically those discussed in Section 7.1.1, beneficial impacts to these directed halibut fisheries could, under specific conditions, potentially serve to partially mitigate if not offset adverse impacts to participation in BSAI Amendment 80 groundfish fisheries at the community level, if not at the individual or sector operational level, given the different combinations of engagement in and dependency on the different fisheries, although differences between the fisheries and sectors within the fisheries make potential assessments of net outcomes on the community level less than straightforward. Many of the Alaska communities most heavily engaged in or dependent upon the BSAI/Area 4 halibut fisheries are not engaged in the BSAI Amendment 80 groundfish fisheries (except through participation in the CDQ program and then, in most cases, primarily through BSAI multispecies groundfish CDQ quota lease fees).

Especially when including communities outside of Alaska, it is also likely that the potential beneficial impacts to commercial halibut fishery participants would be relatively modest in absolute economic terms compared to potential negative impacts to BSAI Amendment 80 groundfish fishery participants under some of the proposed action alternative scenarios, at least over the short term, as discussed in DEIS Section 5.3. These figures, of course, do not consider a range of social and economic impacts on both the operational and community levels that would extend beyond gross revenue changes that may be experienced by direct sector participants. Particularly important is the fact that they do not take into account the sociocultural as well as the socioeconomic importance of the halibut fishery, across its multiple sectors, to numerous Alaska communities, especially small, remote, primarily indigenous communities, and the direct and indirect benefits that would accrue to these communities if the proposed action alternatives were to result in additional halibut conservation and additional opportunities for the directed halibut fleet over the long run.

[135] That is, they would be experienced within the coast-wide Pacific halibut stock rather than concentrated in the BSAI/Area 4, particularly with reduced mortality of the U26 portion of PSC as these smaller halibut migrate and recruit into the commercial halibut fisheries.

7.2.2 Background

In general, the potential beneficial impacts to the various halibut fisheries under the proposed action alternatives in low abundance conditions would be spread more widely among Alaska communities than would be the potential adverse impacts to the Amendment 80 fisheries. While there are many more Alaska communities directly engaged in the BSAI halibut fisheries than in the BSAI groundfish fisheries in general, among the communities that are assumed to have the greatest potential for realizing substantial beneficial impacts under the proposed action alternatives under low abundance conditions are the 20 communities in the BSAI region selected by use of initial screening criteria for communities potentially substantially engaged in and/or substantially dependent on the BSAI halibut fishery[136] and those 16 communities across all regions identified by the PCFA exercise as highly engaged in either BSAI commercial halibut harvesting or processing sectors (described in overview in Section 4.3.2 and in detail in Section 10.1 [Attachment A]).

It is important to note that, as described in detail in DEIS Section 4, commercial halibut fisheries in Alaska have not been in equilibrium, with substantial reductions in the net weight pounds of halibut IFQ and CDQ harvests seen in recent years (along with ex-vessel gross revenues and crew payments, influenced both by volume of harvest and price per pound received by the vessel). While price may fluctuate due to many factors, it is assumed that low abundance conditions under the no-action alternative would result in adverse impacts to potentially substantially engaged or substantially dependent BSAI halibut communities. Adverse impacts could be compounded for those CDQ communities, such as St. Paul, that have chosen to focus local community fisheries development investments on direct engagement in the BSAI/Area 4 halibut fishery in terms of infrastructure, processing, and/or harvesting capacity.

7.2.3 Potential Differential Distribution of Impacts to Communities Engaged in the Commercial Halibut Fishery

7.2.3.1 Alaska Communities

As noted in Section 5.2, dependence of the total resident-owned catcher vessel fleet (all resident-owned commercial fishing vessels, not just resident-owned vessels that participated in the halibut fishery) for these communities varied widely, as the fleets of some communities are more exclusively focused on the halibut fishery than are others. St. Paul, the BSAI region community with easily the highest 2010-2019 annual average catcher vessel Area 4 halibut ex-vessel gross revenues (at approximately $2.4 million, one-third higher than Unalaska, the next closest community in the BSAI region), was also one of three communities with virtually complete community fleet dependency on BSAI halibut ex-vessel gross revenues (99.4 percent) (Table 17). The other two communities with equally high local fleet dependency on BSAI halibut ex-vessel gross revenues, St. George (100 percent) and Savoonga (99.9 percent), have smaller scale community fleets, each with total annual average ex-vessel gross revenues 2010-2019 of just under $200,000.

[136] The initial screening criteria for communities potentially substantially engaged in and/or substantially dependent on the BSAI halibut fishery included all communities with a 2010-2019 annual average harvest engagement of 2.0 or more catcher vessels with local ownership addresses active in the BSAI/Area 4 halibut fishery and/or communities with a 2010-2019 annual average BSAI/Area 4 halibut processing engagement of 0.5 or more locally operating shore-based processors that accepted BSAI/Area halibut deliveries. A total of 20 communities in the BSAI region met these criteria. Eighteen are listed by name in Table 13 as having met the harvester criteria (Akutan, Atka, St. George, and Unalaska/Dutch Harbor, APICDA region; St. Paul, CBSFA region; Chefornak, Hooper Bay, Kipnuk, Mekoryuk, Newtok, Nightmute, Quinhagak, Toksook Bay, and Tununak, CVRF region; Nome and Savoonga, NSEDC region; and Dillingham and Togiak, BBEDC region) and two additional communities appear in Table 20 as having met the processor criteria (Adak, APICDA region; and Twin Hills, BBEDC region) in addition to those listed in that table that also met the harvester criteria.

Among the other communities or small groups of communities for which ex-vessel gross revenue totals can be disclosed, three other communities (Adak/Atka, Akutan, and Mekoryuk) have local ownership address catcher vessels fleets that were 85 percent or more dependent on BSAI halibut ex-vessel gross revenues on an annual average basis for the years 2010-2019, while two others were 25 percent or more dependent (Unalaska/Dutch Harbor and Toksook Bay) (Table 17). In terms of ex-vessel gross revenues to BSAI halibut vessels specifically, among the potentially substantially engaged or substantially dependent halibut communities for which revenues can be disclosed on an individual community or aggregated community basis (as shown in Table 16), nine have dependencies of 90 percent or greater and one is more than 85 percent dependent.

As described in Section 6, in all but two cases (Adak and Unalaska/Dutch Harbor), potentially substantially engaged or substantially dependent BSAI halibut communities located in the BSAI region itself are member communities of CDQ entities one of which has partial ownership interest in Amendment 80 vessels and four of which routinely lease CDQ quota for harvest to Amendment 80 industry partners. These CDQ entities and their constituent communities would be vulnerable to potential decreases in revenues during low abundance halibut conditions under the proposed alternatives being considered. Ultimately, the level of direct impact to an individual CDQ entity and level of direct or indirect impact to its member communities cannot be quantitatively estimated given the role of individual entity business decision making, specific contractual agreements, levels of investment, range of investments with regard to fishery and geography, and/or overall portfolio holdings inside and outside of commercial fishing, among myriad other factors.

While each CDQ entity pursues individual strategies, one primary goal of the CDQ program is to encourage individual entities to use the returns from their engagement in commercial fishing to support regional economic growth, including the direct reinvestment in commercial fisheries, the support of community development activities, and the creation/maintenance of commercial fishing support infrastructure in member communities. As detailed in the regional discussions in Section 6, different CDQ groups have faced different circumstances and pursued different strategies regarding the establishment or sustainment of an in-region small boat commercial halibut fishery. Some CDQ regions are coincident with Area 4E which has a 100 percent CDQ reserve, essentially meaning that engagement of small, locally owned vessels in a commercial halibut fishery would necessarily be mediated by the CDQ group; in other CDQ regions with different levels of CDQ reserve, individuals, assuming they own or otherwise have the means to acquire or access IFQ quota, have the option of engaging in the fishery directly without going through the local CDQ entity.

For those CDQ groups whose experience in, or assessment of, supporting an in-region small boat commercial halibut fishery would indicate that the effort is not or would not be sustainable (or equitable to all of the constituent communities they serve), especially under low abundance conditions, it is unknown whether the beneficial impacts that may accrue from implementation of one or more of the proposed alternatives would be sufficient to pass a threshold whereby in-region CDQ halibut fisheries programs would be considered sustainable (or equitable) even in low abundance conditions. For this reason, it is not possible to predict whether implementation of any one of the proposed alternatives would potentially result in a different pattern of in-region CDQ community commercial small boat direct BSAI/Area 4 halibut fishery engagement than is seen at present.

7.2.3.1.1 Potential Environmental Justice Concerns

The potentially substantially engaged or substantially dependent BSAI/Area 4 halibut communities as determined by use of initial screening criteria that would potentially experience high and adverse impacts under halibut low abundance conditions under the no-action alternative, and that would potentially benefit the most from the proposed action alternatives under halibut low abundance conditions, include communities with high proportions of minority populations and high proportions of low-income populations. Of the 17 Alaska communities considered BSAI halibut-dependent for the purposes of this analysis, in 2010 minority residents (including Alaska Native residents) accounted for:

- More than 90 percent of the population in 13 of the communities.
- Between 80 and 90 percent of the population in two of the communities.
- More than 65 percent of the population in the remaining two communities.

In terms of Alaska Native populations specifically, of the 17 Alaska communities considered BSAI halibut-dependent for the purposes of this analysis:

- 16 have federally recognized Alaska Native tribes, and 15 are members of CDQ groups.[137]
- Among the 15 communities that are also CDQ communities, Alaska Native residents make up over 90 percent of the total population in 11 of the communities (Atka, Chefornak, Hooper Bay, Kipnuk, Mekoryuk, Newtok, Nightmute, Quinhagak, Toksook Bay, Tununak, and Savoonga), over 80 percent of the total population in two communities (St. Paul and St. George), and over 50 percent in one community (Nome).
- In the other BSAI halibut-dependent CDQ community (Akutan), and in the two BSAI halibut-dependent non-CDQ communities (Adak and Unalaska), Alaska Native residents make up between five and six percent of the total population of these communities. In the case of Akutan, if individuals residing in shore-based processor housing are excluded, most community residents are Alaska Native.

In terms of low-income populations, of the 17 Alaska communities considered BSAI halibut-dependent for the purposes of this analysis, as of the 2015-2019 5-Year American Community Survey:

- Two had 40 percent or more of their residents living below the poverty threshold (Hooper Bay and Tununak).
- Five had between 30 percent and less than 40 percent of their residents living below the poverty threshold (Kipnuk, Newtok, Quinhagak, Toksook Bay, and Savoonga).
- Two had between 20 percent and less than 30 percent of their residents living below the poverty threshold (Mekoryuk, and Nightmute).
- Five had a higher percentage of their residents living below the poverty threshold than the State of Alaska as a whole (10.7 percent) but less than 20 percent of their residents overall (Adak, Akutan, Atka, St. Paul, and Chefornak).
- Three had smaller percentage of their residents living below the poverty threshold than the State of Alaska as a whole (St. George, Unalaska, and Nome).

Given these demographics and the federally recognized tribal status of all but one of the communities involved, if these communities were to experience disproportionate high and adverse impacts under the no-action alternative under halibut low abundance conditions, environmental justice would be an issue of concern. Conversely, if these communities were to experience beneficial impacts under the proposed action alternatives, environmental justice would not be an issue of concern.

[137] Unalaska is the non-CDQ community that has a federally recognized tribe. The community that does not have a federally recognized tribe and is not a CDQ community, Adak, nevertheless has strong ties the Aleut Corporation, an ANCSA regional corporation, and its subsidiaries, including ties directly related to engagement in federal fisheries as discussed in Section 7.1.1.2.

7.2.3.2 Pacific Northwest Communities

As noted in Section 6.7, the Seattle MSA is also substantially engaged in the BSAI/Area 4 halibut fishery as measured by ownership address of actively participating catcher vessels, among other indicators of engagement. Its engagement in the BSAI halibut fishery is not as dominant relative to that of Alaska communities, however, compared to its relative engagement in the BSAI groundfish fisheries likely to be most directly affected by the proposed action alternatives. No community level adverse impacts related to the BSAI halibut fishery are anticipated to the Seattle MSA under either the no-action alterative or the proposed action alternatives.

7.2.4 Potential Impacts to BSAI Communities Engaged in the Subsistence Halibut Fishery

Subsistence harvest of halibut would not be directly affected by the proposed action alternatives. Further, unlike the commercial halibut fishery, the subsistence halibut fishery would not benefit from potential incidental reallocative effects that may occur under the proposed action alternatives and provide additional opportunities for the directed halibut fishery. As noted in DEIS Section 4, the IPHC accounts for incidental halibut removals in the groundfish fisheries, recreational and subsistence catches, and other sources of halibut mortality before setting commercial halibut catch limits each year. Each year, the IPHC estimates subsistence harvest by using the actual harvest level from the previous year as a base, and then adjusts the estimate by considering how accurate the previous year's harvest estimate was compared to actual harvest for that year. While subsistence removals are accounted for in setting the commercial halibut catch limits, subsistence halibut harvests are not constrained by this process. There are no caps on removals from Area 4 in the subsistence halibut fishery analogous to quotas established annually for the commercial halibut fishery, nor are there size limits on halibut harvested for subsistence use.

In Areas 4A and 4B, encompassing the communities of Akutan, Unalaska, Nikolski, Atka, and Adak, under a SHARC permit there is a harvest limit of 20 halibut per person per day and no possession limit and a limit of 30 hooks per person onboard up to 90 hooks per vessel. In Areas 4C, 4D, and 4E, which encompass all the other BSAI area communities, there are no daily or possession limits and there are no hook limits under SHARC permits.[138]

Subsistence halibut harvests (and harvesters) could indirectly benefit from the implementation of the proposed action alternatives if the proposed action ultimately implemented were to result in changes to the spatial distribution of halibut stock or an overall increase in availability of halibut for subsistence harvest and/or an accompanying decrease in effort and expense in harvesting halibut for subsistence use over the long term. These indirect benefits could occur if the Pacific halibut stock itself benefits from additional promotion of conservation of the stock under the individual action alternatives (and to the extent that whatever conservation gains that may be realized are not fully redirected into additional opportunities for the commercial halibut fishery, while recognizing that the relationship between the commercial and subsistence fisheries is complex and varies by community). As noted in Section 7.2.1, however, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative, for multiple reasons.

Beyond direct use of halibut as a subsistence resource, the proposed alternatives could have impacts on other subsistence pursuits. These types of impacts fall into two main categories:

- *Impacts to other subsistence pursuits because of loss of income from the BSAI Amendment 80 groundfish fishery under the action alternatives (or the BSAI/Area 4 halibut fishery under halibut low abundance conditions under the no-action alternative).* This income, typically derived from

[138] https://www.fisheries.noaa.gov/alaska/subsistence-fishing/frequently-asked-questions-alaska-subsistence-halibut-program accessed 2/17/2021.

CDQ quota leasing fee revenue, could be used to purchase fuel, vehicles, or other subsistence-related gear, or otherwise offset expenses required to engage in a range of subsistence pursuits. These types of impacts could be experienced by anyone engaged in the potentially affected fisheries who uses income derived from the fishery to help capitalize subsistence pursuits, regardless of the community of residence of the individual involved or the location of those subsistence pursuits. These types of impacts, then, could occur in areas far removed from the location of the management action itself (e.g., these types of impacts could, for example, theoretically be felt by residents of relevant CDQ communities if there were a decline in BSAI Amendment 80-related groundfish revenues that would have otherwise been used in underwriting subsistence efforts).

- *Impacts to other subsistence pursuits because of the loss of opportunity to use commercial fishing gear and vessels for subsistence pursuits.* This would result from vessels not being ready to go as a result of being prepared for commercial fishing or from the simultaneous harvest of fish and game resources during commercial fishing forays, including retention of halibut from commercial catch for subsistence use, where these assets are used in such a manner that commercial and subsistence catches are jointly produced, based on shared use of fixed and variable inputs.

In general, however, while the indirect impact of the proposed action alternatives on subsistence is difficult to assess for multiple reasons, joint production impacts in particular are likely to be concentrated among small halibut catcher vessel owners under halibut low abundance conditions under the no-action alternative.

In terms of distribution of subsistence halibut fishing across communities, locally important subsistence halibut fishing takes place in many BSAI communities not directly engaged in the BSAI Amendment 80 groundfish fisheries; in a few cases, however, the communities most heavily engaged in the BSAI Amendment 80 fisheries are the communities most engaged in the subsistence halibut fishery. For example, Unalaska/Dutch Harbor, one of the communities most heavily engaged in the relevant BSAI Amendment 80 groundfish fisheries, also is one of the highest annual average halibut subsistence harvest communities as identified within the limitations of the available data. It is important to remember, however, that recent halibut subsistence data for BSAI communities are limited, so caution should be used in interpreting these data.

7.2.5 Potential Impacts to BSAI Communities Engaged in the Sport Halibut Fishery

Sport harvest of halibut would not be directly affected by the proposed action alternatives. Further, unlike the commercial halibut fishery, the sport halibut fishery would not benefit from potential incidental reallocative effects that may occur under the proposed action alternatives and provide additional opportunities for the directed halibut fishery. As noted in Section 5.5, due to the relatively small volume of recreational use in Area 4 and the management under a daily bag limit rather than an area/sector allocation, IPHC accounts for recreational removals using a projection. There are no caps on removals from Area 4 in the sport halibut fishery analogous to quotas established annually for the commercial halibut fishery, but sport effort is constrained in Area 4 by a sport fishing season that extends from February 1 to December 31 and a bag limit of two halibut of any size per person per day unless otherwise specified, as noted in Section 5.5. Sport halibut harvests (and the guided and unguided sport halibut fisheries) could indirectly benefit from the implementation of the proposed action alternatives if reducing BSAI halibut PSC limits under low abundance conditions were to ultimately result in an overall improvement in availability of halibut for sport harvest, an accompanying decrease in effort and expense in harvesting halibut for sport use, and/or an increase in interest in halibut sport fishing in the region prompted by an increasing abundance of larger halibut. These indirect benefits could occur if the Pacific halibut stock itself benefits from additional promotion of conservation of the stock under the individual action alternatives (and to the extent that those gains are not fully redirected into additional opportunities for the commercial halibut fishery). As noted in Section 7.2.1, however, there is likely to be little difference among the average future halibut spawning biomass under levels of PSC anticipated across all of the alternatives, including the no action alternative, for multiple reasons.

7.2.6 Potential Cumulative Small/Rural Community and Cultural Context Issues

7.2.6.1 Overview

This SIA has largely focused on community impacts associated with the implementation of proposed BSAI halibut abundance-based management of PSC limit alternatives using quantitative fishery information and through characterizations of individual communities and groups of communities in several Alaskan regions and the Pacific Northwest that describe the magnitude of engagement and dependency on both the BSAI Amendment 80 groundfish fishery and the BSAI/Area 4 commercial halibut fishery. This approach provides an analysis of anticipated socioeconomic impacts that may accompany implementation of the no-action and proposed action alternatives.

This section of the SIA provides an additional description of non-economic social and cultural aspects of halibut fishing for coastal Bering Sea communities for which secondary data are available. Staff also reached out to regional points of contact connected with BSAI communities and Alaska Native organizations.[139] The purpose of this discussion is to convey the cultural significance of the BSAI halibut resource and to help inform the analysis of potential cumulative impacts of the no-action and proposed action alternatives.

Staff also reached out to points of contact connected with the Amendment 80 fishery but, as noted in Section 4.5.6, no similar information on the non-economic social and cultural aspects of fishing, including employment in the fishery as an integral part of self-identity, appears to be available for those serving aboard Amendment 80 vessels. Were those types of data to be available, they would likely have been useful to the Council in making more explicit the balance of impacts to the fisheries and communities that are potentially directly and indirectly affected by the proposed action alternatives.

7.2.6.2 Approach

Fishing regulatory actions can result in a wide range of sociocultural impacts in rural fishing communities. For many residents of these communities, commercial fishing is not seen as a stand-alone socioeconomic activity, but an integral part of self-identity. This relationship is compounded for those residents who come from families with multi-generational experience in commercial and/or subsistence fishing, particularly for those Alaska Native residents for whom fishing is part of a larger, integrated traditional subsistence and economic sustenance practice rooted in thousands of years of history.

The descriptions of values and perceptions related to halibut fishing are based on LK, TK, and the social science of LK. LK broadly includes the observations and experiences of local people in a region as well as people with substantial experience or expertise related to a particular location, species, or fishery.[140] LK

[139] Tran and Divine (2021) is a white paper compiled by staff of the Aleut Community of St. Paul Island Ecosystem Conservation Office (ECO) that was received in response to this outreach and includes community voices and perspectives on the cultural significance of halibut. ECO staff surveyed St. Paul community members and fishing families through email and phone calls on the role of commercial and subsistence fishing, specifically related to Pacific halibut as a resource, in their lives and livelihoods. Other materials were also compiled, such as archival recordings, writings, and other information, published and unpublished, from Pribilof Islands community members.

[140] The Local Knowledge, Traditional Knowledge, and Subsistence Taskforce's workplan contains a more detailed description of LK and TK. https://www.npfmc.org/wp-content/PDFdocuments/membership/LKTKS/LKTKSworkplan.pdf

can evolve over time, and it is often acquired over the course of a few generations or less, but it is inherently the product of knowledge formation and dissemination based on personal, shared, and inherited experience (Martin et al. 2007). TK is also experience-based, but it is inherently deeply embedded in cultures of those who have dwelled in a landscape since time immemorial (Berkes 1999; Ingold 2000). TK is more than information about the ecosystem and its components (i.e., species abundance or movement patterns) as it refers more specifically to knowledge held by Indigenous people which is inseparable from particular values. Specifically, TK is:

> *"A living body of knowledge which pertains to explaining and understanding the universe and living and acting within it. It is acquired and utilized by Indigenous communities and individuals in and through long-term sociocultural, spiritual and environmental engagement. [Traditional knowledge] is an integral part of the broader knowledge system of Indigenous communities, is transmitted intergenerationally, is practically and widely applicable, and integrates personal experience with oral traditions. It provides perspectives applicable to an array of human and nonhuman phenomena. It is deeply rooted in history, time, and place, while also being rich, adaptable, and dynamic, all of which keep it relevant and useful in contemporary life. This knowledge is part of, and used in, everyday life, and is inextricably intertwined with peoples' identity, cosmology, values, and way of life. Tradition – and [traditional knowledge] – does not preclude change, nor does it equal only 'the past'; in fact, it inherently entails change." (Raymond-Yakoubian et al., 2017).*

The sources of social science related to LK and TK were selected for inclusion based on the geographic position of the research (i.e., Bering Sea) and the methodology. Specifically, this section draws from works using ethnographic and other qualitative methods to engage communities and individuals with knowledge or experience related to halibut fishing acquired over time and through extensive observation (Huntington 2000). Finally, because this section focuses on the cultural significance of halibut for fishermen residing in coastal communities across the BSAI region, it does not disaggregate how (i.e., via non-CDQ directed fishery or CDQ directed fishery) individuals or communities access the halibut resource. This is because the non-economic social aspects and the cultural values attached to halibut are connected to the resource and act of fishing that persist regardless of how people access the halibut resource.

7.2.6.3 The Cultural Importance of Halibut and Halibut Fishing

The cultural importance of halibut (as a species) and halibut fishing (as traditional activity) is well documented in the anthropological literature for Alaska Native tribes and ethnic groups throughout Alaska, including the Yup'ik, Aleut, Alutiiq, and Tlingit. In addition to being a primary subsistence resource for many coastal cultures, halibut feature prominently in legends and parables. It is not uncommon to see halibut iconography in carvings, paintings, and textile handicrafts throughout the region, suggesting its traditional cultural importance. Halibut is also a highly valued commercial fishery for BSAI communities. Although the price of halibut may fluctuate for many reasons, it typically holds high market value. More than being economically viable, however, halibut IFQ and CDQ can also be fished as a day fishery. Day fisheries allow individuals to fish in the day, earn a local livelihood, and return home to be with their families in the evenings. Spending time in their community is the primary pathway for individuals to participate in meaningful, community-based activities in their off time (Lyons et al., 2017). (Other day fisheries for Bering Sea communities include herring, crab, or salmon.)

> *"I don't think anybody's willing to go out from here and fish halibut overnight… everybody's pretty much fished those small boats in day fisheries. They just don't go out overnight or travel any great distance to fish." (St. George halibut fisherman; Lyons et al. 2017).*

Day fishery halibut operations reflect the cultural history of Pribilof Island residents who have engaged in fur seal harvesting for subsistence and as a cash economy (Torrey 1978). For centuries, residents have harvested fur seals in the summer. In the mornings, men travel down to the rookeries and return in the evening while women care for their families and community. This pace of life is important to Pribilof Island residents and it is one that can be provided by particular fishing opportunities (Lyons et al., 2017).

Additionally, for some fishermen, the rhythm of local CDQ and IFQ fisheries creates opportunities for broader family and community participation in halibut operations. For example, the impacts of participating in the commercial halibut fisheries extends beyond the catcher vessel (i.e., skipper and crew positions) as youths learn to bait hooks and earn wages, and women prepare meals and provisions for fishermen (Lyons et al., 2017; Lyons et al., 2019).

> *"I am showing the young folks on my boat a way of life I absolutely love that brings a completeness to my soul." (St. Paul halibut fisherman; Tran and Divine 2021).*

> *"Halibut provides an identity for the community. [The fishing season] may only be three months out of the year, but it is intense. I change my hours, I have to be home in the morning and at night to cook and support the fishermen. It's a change of lifestyle for that period. We're a fishing household." (Resident from St. Paul; Lyons et al., 2019[141]).*

> *"It's the value you give your son when he's fishing on your boat with you, that he can give to his som. That's intergenerational benefits… You can't just give us money for our halibut. We have to be able to fish, because that's who we are." (St. Paul halibut fisherman; Lyons et al., 2019)*

Fishing operations that include family members create an opportunity for social cohesion and solidarity within households across the community (Lavoie et al., 2019). These operations create an opportunity for inter-generational transfers of knowledge related to halibut fishing, and it provides the opportunity for extended family to come together and work alongside one another (Lyons et al., 2019). In addition, for some Bering Sea communities like St. Paul, halibut is a keystone cultural species and a traditional food. Just as the physical acts of halibut fishing can bring families together, so too does halibut as a food. As Tran and Divine (2021, 13) describe, "recipes and dishes are a tangible outpouring of Traditional Knowledge and preparing and sharing dishes such as halibut spread, marinated and grilled halibut, and fish pie, represent the passing of knowledge from generation to generation."

> *"Womenfolk would gather together when we bring in the fresh halibut and cut it up, and then they eat some of that raw halibut. Chuumlaĝii [eating raw halibut], we call it." (St. Paul community members; Tran and Divine 2021).*

> *"I think all those connect the dances, the food, and church…they all intertwine they all are important to us on the islands." (St. Paul community members; Tran and Divine 2021).*

> *"Traditional foods…are vital to our continuance as a People." (St. Paul community members; Tran and Divine 2021).*

It is assumed that the BSAI/Area 4 commercial halibut fishery would potentially benefit in low halibut abundance conditions from implementation of the action alternatives due to what could effectively (if indirectly) be a reallocation of access to halibut between the BSAI groundfish and BSAI/Area 4 directed

[141] Lyons et al.'s (2019) work evaluates how CDQs influence perceptions of wellbeing in four communities dispersed across multiple CDQ group regions: St. Paul, Mekoryuk, Savoonga, and Unalaska.

halibut fisheries that would occur to greater or lesser degrees under the different action alternatives. This potential benefit could be substantial for BSAI communities with relatively few economic alternatives.

Located on St. Lawrence Island in the Bering Strait, Savoonga is an Alaska Native community of approximately 700 people. The primary year-round employment opportunities in Savoonga include work at the tribal government, school district, airport, and small shops.

> *"We live off the halibut, the ocean around here… the ocean is our store. [If the fishery stops] I ain't got no job to go buy at the store." (Savoonga halibut fisherman; Lyons et al., 2019).*

Participation in the local CDQ halibut fishery (both as skippers and crew on catcher vessels as well as fish processing) is an important source of seasonal work in Savoonga. Halibut fishermen in Savoonga prosecute CDQ halibut from small aluminum skiffs (typically 16- to 24-feet in length overall) where skates are hauled by hand. The establishment of a commercial halibut fishery via CDQs and a local processing plant in the mid-1990s aligned with local cultural norms of autonomy and being out on the water hunting and fishing for subsistence. The commercial halibut fishery is a reliable source of cash income for Savoonga residents where the local halibut fleet was 100 percent dependent on the halibut fishery (i.e., those vessels did not participate in any other commercial fisheries) (see Table 14). For a community with substantial dependence on the halibut fishery like Savoonga, the condition of the halibut resource is important as conditions of high abundance can increase resilience by continuing to provide a source of income.

At the same time, however, halibut fishing is valued as an activity for more than its ability to provide a source of income as it also perceived as providing a meaningful vocation and culturally relevant way of life.

> *"[I like] everything. The work, the baiting. I love when I feel that halibut tugging [on the line]. I'm wanting to catch more and more, especially when there's one after the other, feeling them coming up. One comes out and, [it's like] got one, keep it pumping!" (Savoonga halibut fisherman; Lyons et al., 2019).*
>
> *"Employment [in the commercial halibut fishery] is more important than if somebody just wanted to pay you off. It's not just money coming in, it's the value." (St. Paul halibut fisherman; Lyons et al., 2019).*

The ability to be out on the water fishing commercially for halibut also mirrors marine harvesting ways of life which are rooted in cultural practices and values like subsistence for many Alaska Native ethnic groups. Alaska Native communities and their residents across the BSAI/Area 4 region have depended on the resources of the land and water for millennia. This dependence on natural resources, and the unique cultures associated with it, continue to be practiced (Raymond-Yakoubian 2013). Subsistence contributes to sustaining strong sense of place and intergenerational bonds as community members can exchange knowledge, experience culture, and connect over traditional activities linked to the marine environment.

> *"[Subsistence]… it's our time to get away… I see it as a constructive use of time…. You have a friendship…a lot of joking around and talking…" (St. Paul halibut fisherman; Tran and Divine 2021).*
>
> *"I will eat halibut and crab forever. I am a fisherman inside and out, and it is a big part of who I am. Not fishing would cause loss of self-identification, sense of self-worth, wealth, and my pride and dignity that stems from earning my living from the bottom of the ocean." (St. Paul halibut fisherman; Tran and Divine 2021).*

The ability to pursue subsistence activities, including halibut fishing, is vital to the health and wellbeing of communities and individuals. Halibut is also an important subsistence resource with deep cultural connections for residents of St. George and St. Paul (AECOM 2015). As described by community leaders, the phasing out of the commercial fur seal harvest in early 1980s forced a transition to commercial halibut fishing that now involves a high proportion of residents in both communities either directly or indirectly. The unique history of settlement in the Pribilof Islands, and the abrupt end to the commercial fur seal harvest which supported the St. Paul economy is the cornerstone to understanding the community's contemporary relationship and dependence of our communities on halibut as a commercial and subsistence resource (Torrey 1978). When the commercial fur seal harvest ended, there was a transition toward commercial fishery engagement and dependence which was natural progression for Unangan culture and community (Tran and Divine 2021).

However, prior to the beginning of the commercial halibut fishery in the Pribilofs, halibut fishing was a key subsistence activity through which traditional practices and TK was passed down from one generation to another.

> *"I'm a second-generation commercial fisherman. Our family has been depending on subsistence halibut for countless generations." (St. Paul halibut fisherman; Tran and Divine 2021).*
>
> *"I am a first-generation commercial halibut fisherman, but come from generations that have depended on halibut for subsistence and culture for hundreds or thousands of years." (St. Paul halibut fisherman; Tran and Divine 2021).*

Additionally, in one essay published by St. Paul resident Larry Merculieff, the author describes landing a large halibut while reflecting on his youth and the connection he feels to his ancestors by engaging in subsistence halibut fishing (Merculieff n.d.). He notes during his description of reeling the halibut aboard his skiff:

> *Prior to the invention of the cotton line, my ancestors used strong lengths of kelp for their hand-lines. The smell, taste, and feel of this wondrous place in the middle of the Bering Sea were the same as what my ancestors experienced. This Sea is my experiential history book and a personal link to my ancestors. ...*
>
> *Like the kayak to the Sea, I had to intimately connect with the halibut in order to feel her every nuance and intention, in order to succeed in bringing her on board. This connection is the foundation for what is often termed by native peoples as our Traditional Knowledge and Wisdom.*
>
> *I witnessed how the men would take information in through use of all their senses, about the clouds, color of water, direction of drift, speed of drift, timing between tides, movement of wind, cloud formations, type of sea bottom, and shape and movement of the Sea in the areas we were in. I began to understand the value of self-awareness and necessity of remaining connected to the Sea, the air, and the land for success in catching halibut and to be safe. I was learning an ancient language of communication with the Bering Sea, Mother Earth, and Father Sky, one that allowed our people survive and thrive in one of the most challenging of conditions for hundreds of generations.*

The above bring forth two important observations. First, is that there are enduring cultural connections and knowledge which are linked to, and dependent upon, the marine environment. The second, as exemplified by the extended quote from Larry Merculief, is a perspective that halibut and humans are connected in a larger network of kin relationships. An Alaska Native perspective on subsistence, which is often informed by and connect to TK, is deeply connected to history, culture, and tradition (Raymond-Yakoubian et al., 2017; Lavoie 2019). As the NPFMC LK/TK/Subsistence Taskforce notes, the importance of subsistence for Alaska Native communities, and the continuation of subsistence-related practices, is that it is a critical linkage to linguistic and cultural survival (Active 1999; LKTKS Workplan 2020).

In terms of a regional perspective, the subsistence activities of Bering Sea communities, such as Akutan, St. Paul, Togiak, Emmonak, and Savoonga, have been shown to be adaptive to a range of economic, environmental, and personal explanations (Fall et al., 2013). Long-term ethnographic research by Reedy Maschner (2009) in Aleut communities describes how fishermen have combined subsistence and commercial fishing thereby creating ‘entangled’ livelihoods and economies. Most fish coming into villages does so via commercial vessels and gear. In these cases, subsistence would not be possible for many people without some cash income from the commercial sale of halibut. Fishermen who participate in commercial fishing in the BSAI region are often central providers in subsistence networks in their local community and, as involvement in commercial fishing changes in rural Alaskan communities, the level of access to subsistence resources can change (Reedy Maschner and Maschner 2012). These changes have a potentially negative cultural impact as opportunities to commercially fish halibut not only provides an income base but allows people to fish for subsistence resources, therefore making it a foundation for cultural practices, education, and food security as well. In this way, for some fishermen and communities, commercial halibut fishing is more than a source of income for which a dollar amount or alternative source of employment could be substituted.

7.2.6.4 Summary and Potential Small/Rural Community Outcomes

In sum, the cultural significance of halibut for fishermen and their associated communities includes but exceeds the economic value of the fishery. Key themes include how halibut fishing provides a local source of employment in a day fishery that allows individuals to remain in their community, spend time with their family and build social networks, as well as engage in broader, culturally meaningful practices like subsistence. Based on these data, halibut fishing is also considered a meaningful vocation and way of life.

The action alternatives could, under conditions of low halibut abundance, effectively (if indirectly) reallocate halibut away from PSC use in the BSAI groundfish Amendment 80 sector and toward use as quota in the directed commercial halibut fishery. To the extent these incidental reallocative effects occur, they would benefit of the participants in the directed commercial halibut fishery (and, potentially, facilitate access to more halibut for subsistence use from catch retained from commercial fishing, among other means).

Regional small boat halibut fisheries are one of the intended beneficiaries of the action alternatives being considered; any adverse impacts to regional small boat halibut fisheries from potential increases in halibut PSC limits under conditions of high abundance would presumably be offset by those abundance conditions themselves. The problematic nature of the no-action alternative for directed halibut fishery participants under halibut low abundance conditions is inherently recognized in the Council’s purpose and need statement. It is assumed that the decline of the in-region, small boat commercial halibut fishery in low halibut abundance conditions in the CVRF region likely has altered access to halibut as a subsistence resource (beyond the direct U32 retention from commercial catch described Section 5.4.3 as well as elsewhere above). No studies are apparently yet available to document how sharing networks may have evolved under those changed conditions, but it is important to note that in general, halibut remains important to a way of life, cultural continuity, and economic livelihood of Alaska Natives in the BSAI region.

Some BSAI/Area 4 halibut communities like St. George, Atka, and, to a lesser degree Adak, are particularly vulnerable to adverse community level impacts under halibut low abundance conditions as participation in the local halibut fishery has been one of the few private sector sources of employment and income in the community and thereby potentially a key factor in retaining working age residents in the community. School enrollments in Atka and Adak are near the minimum number required to retain state school funding; the loss of any families with school age children from the community raises concerns about the ability to keep the school open which, in turn, would make retention of other families with school age children in the community even more difficult. In St. George, the school closed in 2017 and remains closed.[142] While the sustainability of fishing communities themselves depends on far more than any fishery management action or set of actions, providing for socioeconomically viable access to the BSAI/Area 4 commercial halibut fishery under low abundance conditions would potentially make an incremental contribution toward community stability.

While sustained participation of fishing communities in the BSAI Amendment 80 groundfish or BSAI/Area 4 commercial halibut fishery would not appear to be directly or at immediate risk from implementation of no-action or action alternatives, the available literature and recent NPFMC analyses underlines the fact that the proposed action is not taking place in isolation. Existing trends suggest that sustained participation in a range of commercial fisheries by residents of small communities in the region has become more challenging in recent years, with less inherent flexibility to adjust to both short- and long-term fluctuations in resource availability (as well as to changing markets for seafood products).

This flexibility is widely perceived in the communities as a key element in an overall adaptive strategy practiced in subsistence and economic contexts in the region for generations. This strategy involves piecing together individual livings (and often local economies) with an employment and income plurality approach. This plurality approach is particularly important given that the availability of non-fishing alternatives for income and employment are limited and, like the natural resources (and market factors) that underpin commercial fishing opportunities, tend to be subject to both short- and long-term fluctuations. This ongoing fluctuation in non-fishing opportunities further reinforces the importance of flexibility in the pursuit of a range of commercial fishing opportunities to enable individuals and communities the ability to successfully combine fishing and non-fishing as well as commercial and subsistence pursuits considered critical to long-term socioeconomic and sociocultural survival if not stability. To the extent that the proposed action alternatives would serve to provide for more opportunities for the success of small-scale commercial halibut fisheries during periods of low halibut abundance, overall sustained participation in a range of local fisheries by residents of the smaller communities would be more secure.

[142]Beyond the Aleutian/Pribilof region, schools with enrollments near the minimum state funding threshold in communities formerly or intermittently engaged in the BSAI/Area 4 commercial halibut fisheries include Platinum, the site of a regional shore-based processing plant that formerly accepted deliveries of BSAI/Area 4 halibut and was the address of at least minimal catcher vessel participation in the fishery 2010-2019 in the CVRF region, and Clark's Point in the BBEDC region, which has had intermittent/minimal participation in the fishery in the last few years. The school in False Pass, an APICDA community which is the site of a shore-based processing plant that intermittently accepted deliveries of BSAI/Area 4 halibut during the period 2010-2019, was below the state funding threshold for enrollments in the 2019-2020 school year.

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9 List of Persons Consulted

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10 Attachments

10.1 Attachment A: Fisheries Engagement Indices for BSAI/Area 4 Halibut Communities

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The National Marine Fisheries Service (NMFS) has developed a framework to create quantitative indices to help understand community well-being and participation in marine fisheries.[143, 144] The Alaska Fisheries Science Center's Economic and Social Sciences Research Program has adapted this framework to develop a set of performance metrics to track fisheries participation over time using pre-existing data for all communities participating in commercial fisheries. These performance metrics provide information to examine the degree to which Alaska communities participate in different aspects of commercial, recreational, and subsistence fisheries.[145, 146] This analysis focuses specifically on those communities engaged in IPHC Area 4 halibut harvesting and processing activities. The purpose of this analysis is to explore the degree to which communities are engaged in Area 4 halibut harvesting and processing in Alaska fisheries and how their participation has changed over time. These indices can be used to provide information about the degree to which communities have sustained participation in this fishery over time to support NMFS and NPMFC decision making processes as they relate to National Standard 8.[147]

10.1.1 Methods

10.1.1.1 Commercial Fisheries Engagement Indices

Communities were included in the analysis based on the activity of vessels that are prosecuting the IPHC Area 4 halibut fishery over the period 2010-2018. This analysis considers two somewhat distinct aspects of community engagement in commercial fisheries in Alaska: a) commercial processing engagement reflects activities associated with vessel landings and actual fish deliveries in the community and associated processing employment, municipal tax revenues, demand for supplies, and profits; b) commercial harvesting engagement reflects activities associated with the community of residence of the vessel owners engaged in this fishery as that community also benefits from the fisheries activity and associated income, including some portion of crew and other supplies that will also be procured in this

[143] Jepson, M., & Colburn, L. L. (2013). *Development of social indicators of fishing community vulnerability and resilience in the US southeast and northeast regions*. US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

[144] A map of the most recent social indicators for coastal communities in the U.S. is available at: https://www.st.nmfs.noaa.gov/humandimensions/social-indicators/map

[145] Kasperski, S., & Himes-Cornell, A. (2014). Indicators of fishing engagement and reliance of Alaskan fishing communities. *Alaska Fisheries Science Center Quarterly Report feature (January-February-March 2014)*.

[146] Himes-Cornell, A., & Kasperski, S. (2016). Using socioeconomic and fisheries involvement indices to understand Alaska fishing community well-being. *Coastal Management*, *44*(1), 36-70.

[147] National Standard 8 states "*Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirement of paragraph (2) [i.e., National Standard 2], in order to (a) provide for the sustained participation of such communities, and (b) to the extent practicable, minimize adverse economic impacts on such communities.*"

location. The communities that are highly engaged in processing in Alaska are not always the same as those engaged in the harvesting, and this analysis will consider these two aspects of engagement and their impacts separately.

All communities in Alaska with activities in these fisheries are included in the anslysis,[148] and non-Alaska communities are grouped into 5 groupings: the Seattle metropolitan statistical area (MSA), Other Washington, Oregon, and All Other States. Communities were included in the processing engagement analysis if any vessels made IPHC Area 4 halibut landings in the community from 2010-2018 and in the harvesting engagement analysis if the owner of a vessel that fished in the fisheries resided in the community for any year from 2010 through 2018.[149] Processing engagement is represented by the amount of landings and associated revenues from landings in the community, the number of vessels delivering any Area 4 halibut in the community, and the number of processors in the community processing Area 4 halibut. Harvesting engagement is represented by the Area 4 halibut landings and revenues associated with vessels owned by community residents (regardless of the location of landing), the number of vessels with Area 4 halibut landings owned by residents in the community, and the number of distinct resident vessel owners whose vessels made Area 4 halibut landings in any community. By separating commercial processing from commercial harvesting, the engagement indices highlight the importance of fisheries in communities that may not have a large amount of landings or processing in their community but have a large number of fishermen and/or vessel owners that participate in commercial fisheries based in the community.

To examine the relative harvesting and processing engagement of each community, a separate principal components factor analysis (PCFA) was conducted each year for each category to determine a community's engagement relative to all other Alaska communities. There are nine years in the study and two PCFAs are conducted each year (processing engagement and harvesting engagement) for a total of 18 different PCFAs summarized below.

PCFA is a variable reduction strategy that separates a large number of correlated variables into a set of fewer, linearly independent components. The first component from each PCFA, which by definition explains the most variation in the data, is used to create quantitative indices of engagement for each community by using the regression method of summing the standardized coefficient scores multiplied by the included variable values. A unique processing index and harvesting index value for each community in each year is created using the first un-rotated extracted factor from the PCFA, 14 of the 18 PCFAs resulted in single factor solutions with second factor eigenvalues below 1.00. Each index is normalized to have a mean of zero and a standard deviation of one for each year across communities. These indices are relative scores in that they represent each community's engagement in commercial fisheries within a single year relative to all other communities in that year. Indices are then appended across all years to create a time series of relative engagement in these two aspects of commercial fisheries over time.

Communities that scored above one (above one standard deviation from the mean of zero) for any year are classified as highly engaged for that particular year. These communities are used in additional analyses to explore the changes in their participation for communities that were highly engaged for all 9 years from 2010-2018 for processing engagement or harvesting engagement. It is important to note that since these are relative indices, a large change in the total number of active vessels over time will only cause a change in an index if one community loses a larger share of their vessels (or other commercial fisheries activities) than another community. If the change in number of active vessels (or other commercial fishing activities) are directly proportional to the existing number of vessels across communities, there will not be a change in the indices over time.

[148] Eagle River is included as part of Anchorage and Douglas is included as part of Juneau.

[149] The owner's community is determined from the CFEC vessel registration each year.

10.1.1.2 Regional Quotient

The regional quotient is a measure of the importance of the community's Area 4 halibut activities in terms of pounds landed or revenue generated from all Area 4 halibut fisheries. It is calculated as the landings or revenue attributable to a community, divided by the total landings or revenue from all communities and community groupings. The regional quotient is reported for revenue from landings in a community (similar to processing engagement). The regional quotient uses the same criteria for inclusion as the processing and harvesting engagement indices and is presented for all communities that were highly engaged for at least one year from 2010-2018.

10.1.2 Results

This section will report performance metrics of community participation in Alaska fisheries from 2010-2018. Data were collected for 59 communities or community groupings throughout the U.S. that had either some commercial Area 4 halibut fisheries landings or residents who owned vessels that were used in commercial Area 4 halibut fishing during this period. There were 27 communities that had some Area 4 halibut landings occurring in their community and were included in the commercial processing engagement analysis. In contrast, 54 of the 59 communities had a resident who owned a vessel that participated in commercial Area 4 halibut fishing and therefore were included in the commercial harvesting engagement analysis.

10.1.2.1 Area 4 halibut Commercial Processing Engagement

The results of the commercial processing engagement PCFA analyses are shown in Table 74 which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. The results suggest somewhat strong relationships among variables, particularly among ex-vessel value, pounds, and number of delivering vessels, and that a single index based on the first extracted factor explains nearly 70% of the variation in each of the variables in each year.

Table 74. Commercial Processing Engagement PCFA Results

	Eigenvalues				Factor Loadings				1st Eigenvalue	
Year	1	2	3	4	Ex-vessel value	Pounds landed in community	Number of vessels delivering	Number of processors	Percent variance explained	Armor's Theta
2010	2.68	0.86	0.46	0.00	0.96	0.96	0.79	0.46	0.67	0.84
2011	2.79	0.82	0.39	0.00	0.93	0.94	0.83	0.59	0.70	0.85
2012	2.78	0.81	0.41	0.00	0.93	0.93	0.81	0.62	0.69	0.85
2013	2.77	0.77	0.45	0.00	0.94	0.93	0.80	0.61	0.69	0.85
2014	2.92	0.92	0.16	0.00	0.96	0.97	0.94	0.43	0.73	0.88
2015	3.25	0.68	0.07	0.00	0.97	0.97	0.97	0.64	0.81	0.92
2016	3.28	0.67	0.05	0.00	0.97	0.97	0.98	0.66	0.82	0.93
2017	3.06	0.90	0.04	0.00	0.98	0.99	0.99	0.39	0.76	0.90
2018	3.21	0.72	0.07	0.00	0.98	0.97	0.97	0.61	0.80	0.92

In addition to the goodness of fit statistics of the analyses provided in Table 74, each PCFA provides an index score for each of the 27 communities included in the analyses. These index scores are presented in Table 75 for the six communities that were highly engaged (index score above one, which is one standard deviation above the mean of zero) for at least one year from 2010-2018, and these cells are shaded in Table 75. The index is an indicator of the degree of participation in a community relative to the participation of other communities. It is a measure of the presence of commercial fishing in the federal fisheries in Alaska through fishing activity including pounds landed, revenue, processors, and the number of delivering vessels in the Area 4 halibut fisheries.

Table 75. Communities highly engaged in Area 4 halibut commercial processing for one or more years from 2010-2018

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Adak	-0.75	0.14	0.86	0.20	0.22	0.29	0.34	0.34	1.52
Akutan	1.42	1.34	1.09	1.32	1.06	0.83	1.39	1.46	1.60
Anchorage	-0.50	1.51	1.48	1.03	0.78	-0.20	-0.60	-0.56	-0.29
Kodiak	0.59	0.35	0.28	0.55	0.75	1.27	1.31	0.66	0.08
Saint Paul Island	2.40	2.24	0.81	0.74	0.09	0.40	0.40	0.61	0.50
Unalaska/Dutch Harbor	3.58	3.33	3.80	3.93	4.35	4.39	4.21	4.34	3.93

Note: Shaded cells are index scores above one (highly engaged) for at least one year from 2010-2018.

Of the six communities found in Table 75 and displayed in Figure 4, only Unalaska/Dutch Harbor was highly engaged in commercial processing all 9 years from 2010-2018. Unalaska/Dutch Harbor has the highest engagement scores over time, with each of the other five communities starting from very different positions and experiencing different trends over time with Adak increasing in processing engagement since 2010, St. Paul Island and Anchorage experiencing declines over the same period, and Kodiak and Akutan remaining relatively consistent over time. Adak experienced the largest increase in its processing engagement index score in 2018 and was the first year in which the community's processing engagement index score was above one and therefore deemed a highly engaged community. Anchorage's decline may be due to changes in the way processing operations listing Anchorage as their *intent to operate location* even if the plant is not located in Anchorage. Future versions of this analysis will attempt to disentangle these relationships, especially as they relate to processing operations in the BSAI region.

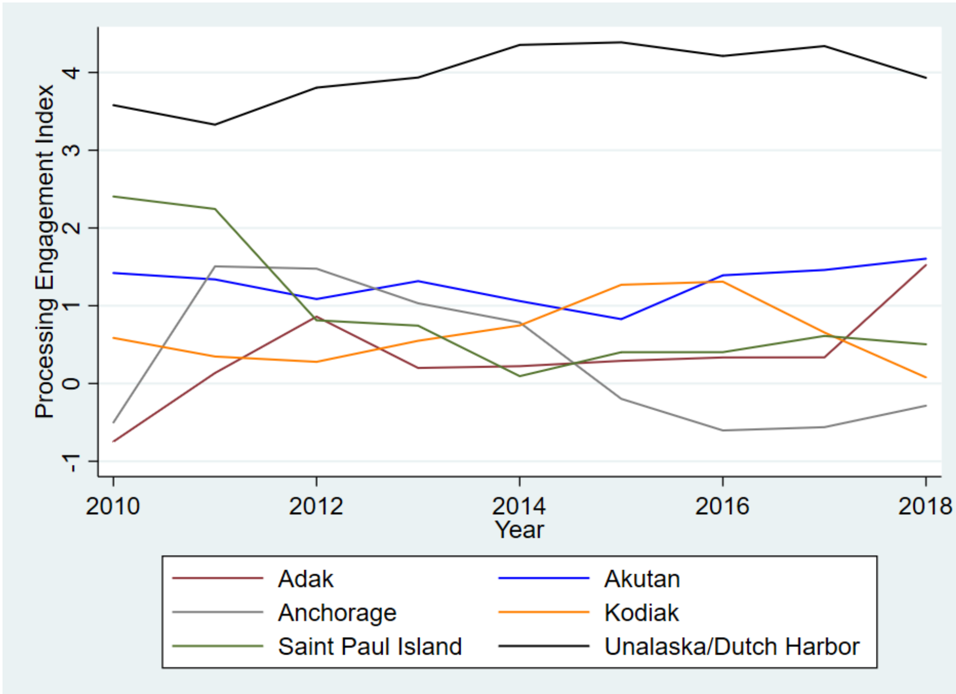

Figure 4. Index scores of communities highly engaged in commercial Area 4 halibut processing for at least one year from 2010-2018.

10.1.2.2 Processing Regional Quotient

Another measure of a community's participation in commercial Area 4 halibut fisheries is its processing regional quotient of revenues, defined as the share of commercial revenues within a community out of the total North Pacific Area 4 halibut revenues.[150] It is an indicator of the percentage contribution in revenue landed in that community relative the total revenue from all communities throughout the U.S. Figure 5 shows the processing regional quotient for revenue from 2010-2018.

[150] The regional quotient for pounds is not calculated as pounds and revenues across communities are very highly correlated for a single species and does not show meaningful differences across communities, but is available.

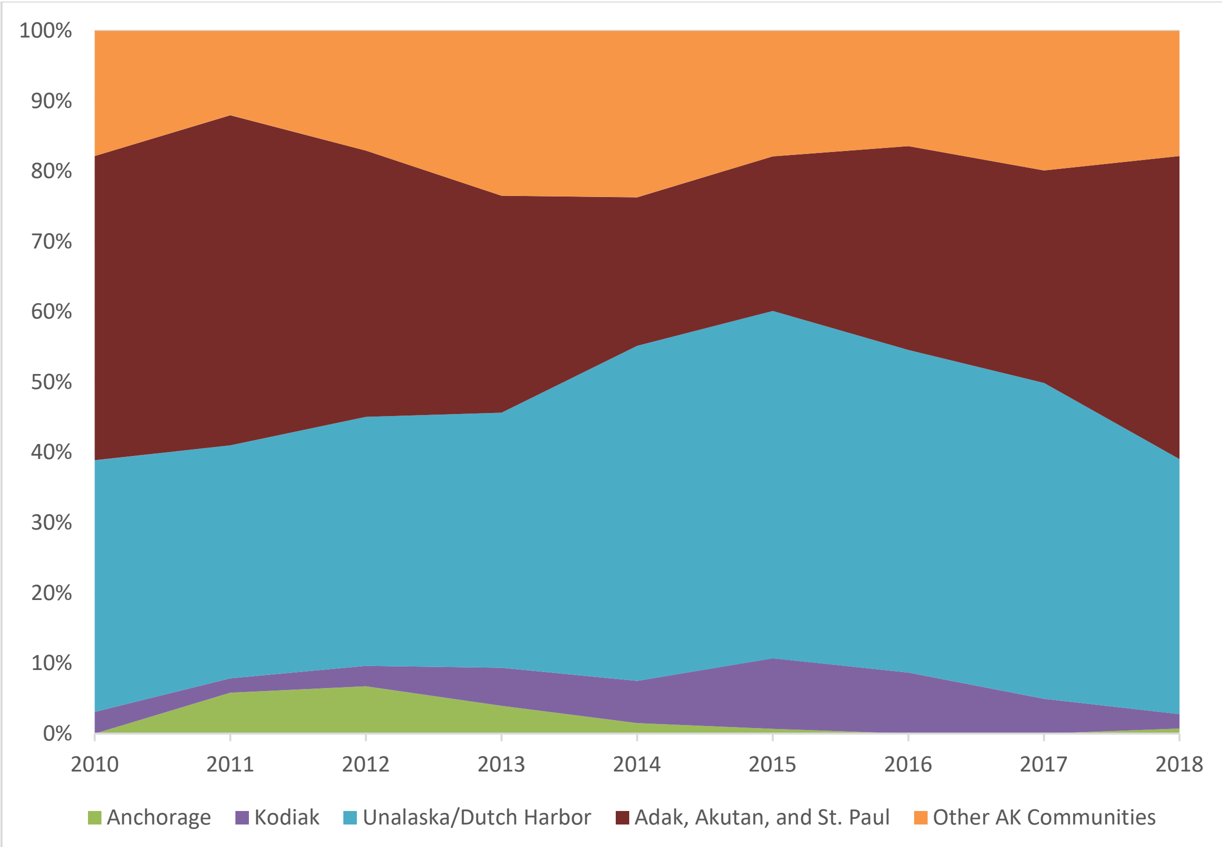

Figure 5. Processing regional quotient of revenue for communities highly engaged in commercial Area 4 halibut processing for all years from 2010-2018.

The most prominent community for processing Area 4 halibut in terms of ex-vessel revenue over this period has been Unalaska/Dutch Harbor, which accounts for approximately 41% of the value of Area 4 halibut retained in the North Pacific on average. This is followed by the grouping of Adak/Akutan/St. Paul Island (grouped for confidentiality purposes) at 34%, followed by all Other Communities at 18%.

10.1.2.3 Commercial Area 4 Halibut Harvesting Engagement

The results of the commercial Area 4 halibut harvesting engagement PCFA analyses are shown in Table 76 which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. The results suggest somewhat strong relationships among variables and that a single index based on the first extracted factor explains approximately 70% of the variation in each of the variables in each year.

Table 76. Commercial Harvesting Engagement PCFA Results

Year	Eigenvalues				Factor Loadings				1st Eigenvalue Percent variance explained	Armor's Theta
	1	2	3	4	Ex-vessel value by resident owned vessels	Pounds landed by resident owned vessels	Number of vessels owned by residents	Number of vessel owners		
2010	2.89	1.11	0.00	0.00	0.85	0.85	0.85	0.85	0.72	0.87
2011	2.73	1.27	0.00	0.00	0.82	0.83	0.83	0.82	0.68	0.84
2012	2.85	1.14	0.00	0.00	0.84	0.85	0.84	0.84	0.71	0.87
2013	2.81	1.19	0.00	0.00	0.84	0.83	0.84	0.84	0.70	0.86
2014	3.41	0.59	0.00	0.00	0.92	0.93	0.93	0.92	0.85	0.94
2015	3.58	0.42	0.00	0.00	0.95	0.95	0.94	0.95	0.90	0.96
2016	3.63	0.36	0.00	0.00	0.95	0.95	0.95	0.95	0.91	0.97
2017	3.57	0.43	0.00	0.00	0.94	0.94	0.94	0.94	0.89	0.96
2018	3.69	0.31	0.00	0.00	0.96	0.96	0.96	0.96	0.92	0.97

Index scores derived from the PCFA results are presented in Table 77 for the 13 communities that were highly engaged (index score above one, which is one standard deviation above the mean of zero) for any year from 2010-2018. These cells are shaded in Table 77. The harvesting engagement index is an indicator of the degree of participation in a community relative to the participation of all other communities in Alaska. It is a measure of the presence of commercial Area 4 halibut fishing through residents who own commercial fishing vessels including Area 4 halibut pounds landed, revenue, the number of vessels harvesting Area 4 halibut, and the total number of vessel owners harvesting Area 4 halibut in a community.

Table 77. Communities highly engaged in commercial harvesting for one or more years from 2010-2018

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Other States	-0.24	-0.26	-0.20	0.08	0.46	0.26	0.47	0.54	1.02
Homer	1.22	1.63	2.03	1.55	1.90	2.10	2.40	2.74	3.00
Juneau	0.28	0.44	0.27	0.25	1.11	0.76	0.63	-0.13	-0.10
Kodiak	2.30	1.67	1.56	1.79	1.82	1.85	2.33	1.58	1.57
Mekoryuk	1.48	1.44	1.34	1.30	0.90	-0.54	-0.53	-0.53	-0.54
Other Washington	0.67	0.52	0.21	0.30	0.94	0.89	1.02	1.02	1.40
Saint Paul Island	1.91	1.81	1.95	2.13	2.71	2.04	1.76	2.37	2.59
Savoonga	0.21	0.02	0.54	0.39	1.08	1.02	0.74	0.81	0.42
Seattle MSA	4.59	4.55	4.70	4.61	4.67	5.11	4.96	4.86	4.31
Togiak	-0.05	0.17	0.64	0.15	1.04	1.16	1.22	1.25	1.12
Toksook Bay	1.82	2.13	1.92	1.94	0.49	-0.54	-0.53	-0.53	-0.54
Tununak	1.23	1.28	1.26	1.40	-0.35	-0.54	-0.53	-0.53	-0.54
Unalaska/Dutch Harbor	0.97	0.71	0.81	0.84	0.96	1.38	1.14	0.96	1.49

*Shaded cells are index scores above one (which is one standard deviation above the mean of zero) for at least one year from 2010-2018.

Figure 6 displays the commercial Area 4 halibut harvesting engagement index for the 13 communities listed in Table 77. These trends will be explored in more detail below, but the most apparent trend from Figure 6 is that the Seattle Metropolitan Statistical Area (MSA – which includes King, Snohomish and Pierce Counties in Washington) grouping has a substantially higher level of harvesting engagement than many of the Alaska communities and community groupings, averaging 4.71 over the entire period while the next two highest average index scores are for St. Paul Island and Homer at 2.14 and 2.06, respectively.

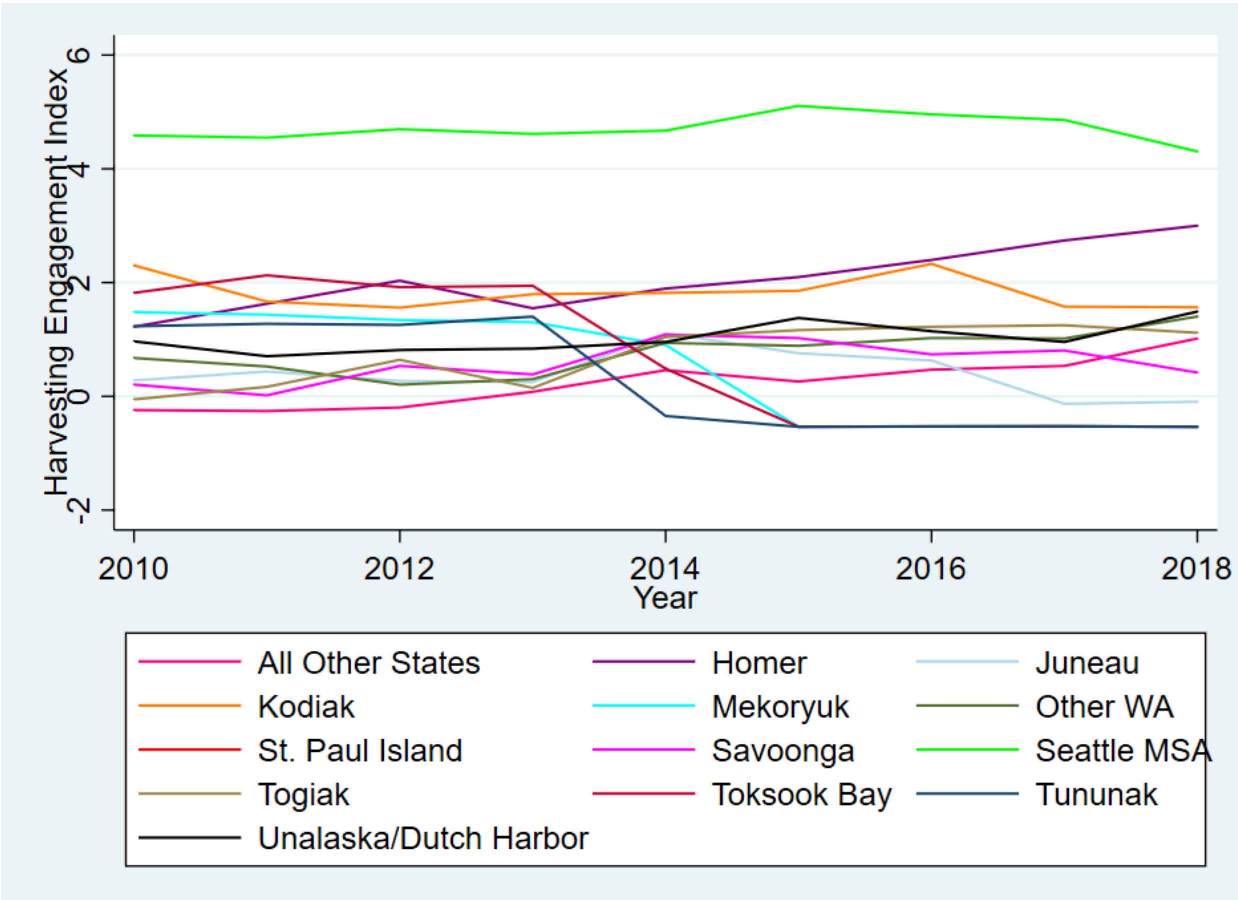

Figure 6. Index scores of communities highly engaged in commercial Area 4 halibut harvest for at least one year from 2010-2018.

Of the 13 communities listed in Table 77 and shown in Figure 6, four communities were highly engaged in commercial harvesting for all years from 2010-2018 (Figure 7). They are Homer, Kodiak, St. Paul Island, and the Seattle MSA. The Seattle MSA has by far the highest harvesting engagement scores over time, with fairly consistent index scores from 2010-2018 and experienced a slight decline 2018 relative to the average of 2013-2017. Both St. Paul Island and Kodiak have had periods of higher and lower engagement with this fishery over time but have experienced nearly opposite trends from 2016-2018 with St. Paul Island experiencing increases and Kodiak experiencing declines. Homer has experienced a fairly substantial increase in commercial Area 4 halibut harvesting engagement scores, which went up from 1.22 in 2010 to 3.00 in 2018.

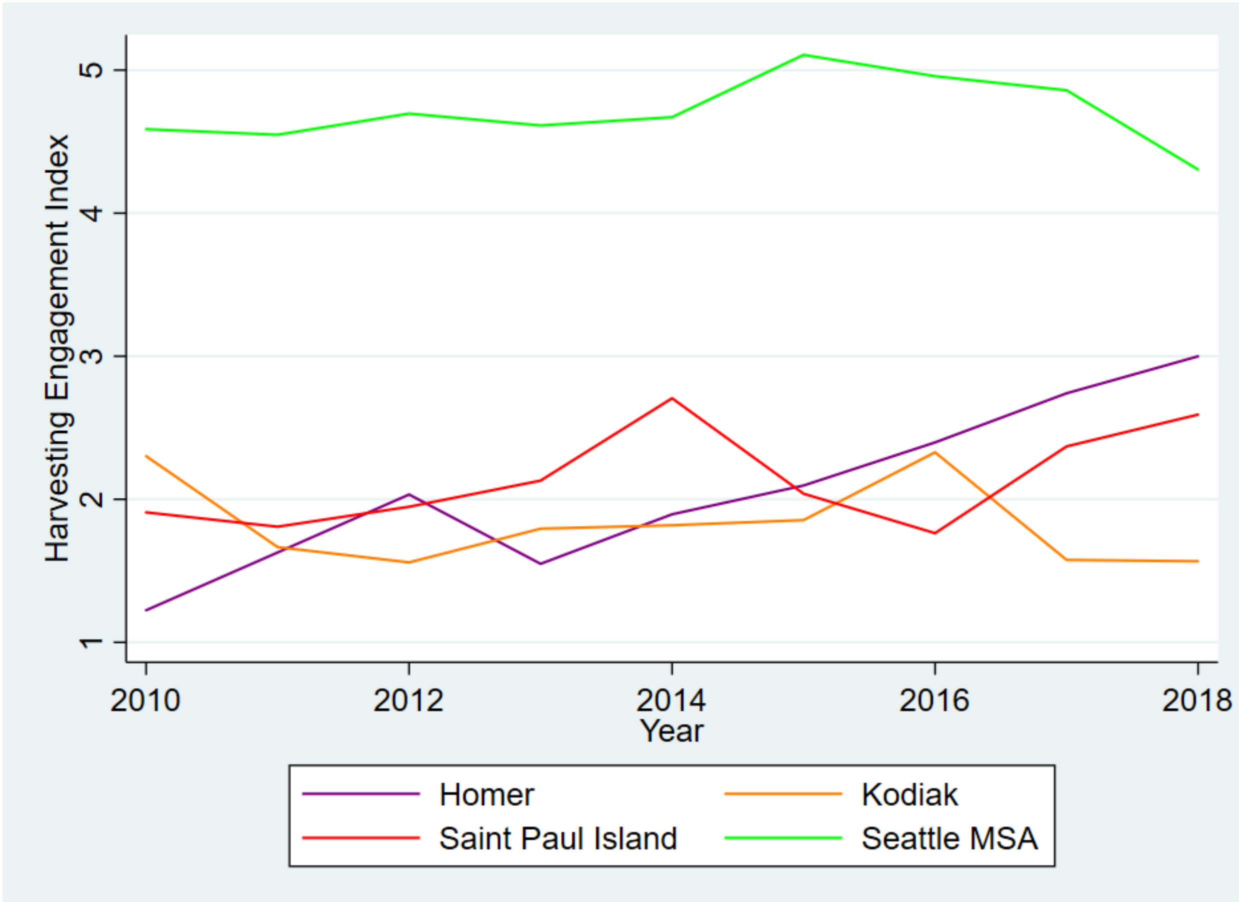

Figure 7. Index scores of communities highly engaged in commercial Area 4 halibut harvest for all years from 2010-2018.

Of the 13 communities highly engaged in commercial Area 4 halibut harvesting, three dropped entirely out of the harvesting portion of the fishery in a 2015 (Figure 8): Mekoryuk, Toksook Bay, and Tununak, but each experienced a decline in 2014 as well.

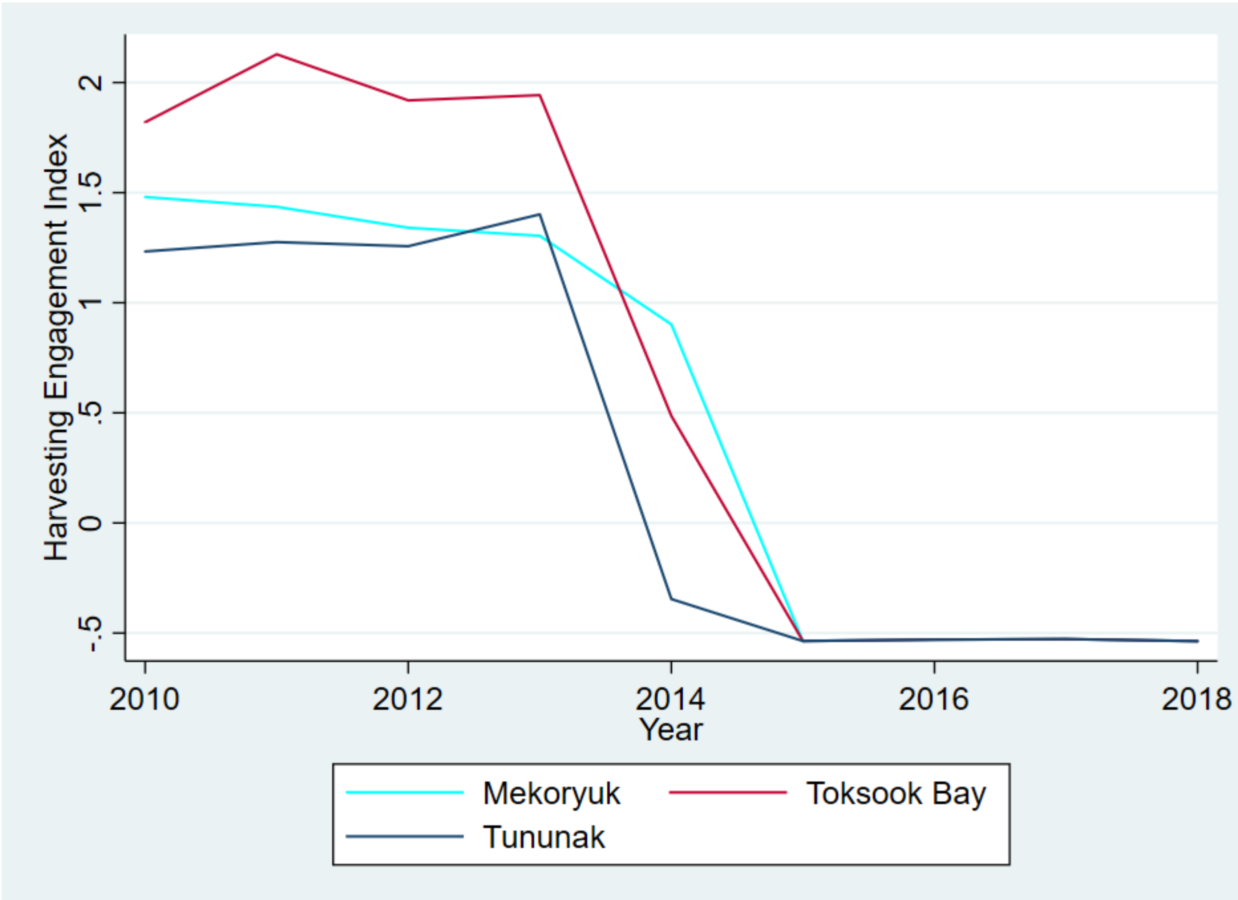

Figure 8. Index scores of communities exiting the harvesting of Area 4 halibut fishery over the period 2010-2018.

10.1.2.4 Harvesting Regional Quotient

Similar to the processing regional quotient, the harvesting regional quotient is defined as the share of IPHC Area 4 halibut commercial revenues attributable to vessel owners residing in each community compared with the total IPHC Area 4 halibut revenues. It is an indicator of the percentage contribution from resident vessel owners in a community relative the revenue from all communities throughout the U.S. Figure 9 shows the harvesting regional quotient for revenue from for all communities highly engaged for at least 1 year 2010-2018. The Seattle MSA grouping accounts for the largest percentage (24.3%) of Area 4 halibut in terms of ex-vessel harvesting revenues on average over this period, followed by Other Communities at 21.5%, Homer at 10.5% and Kodiak at 9.6%.

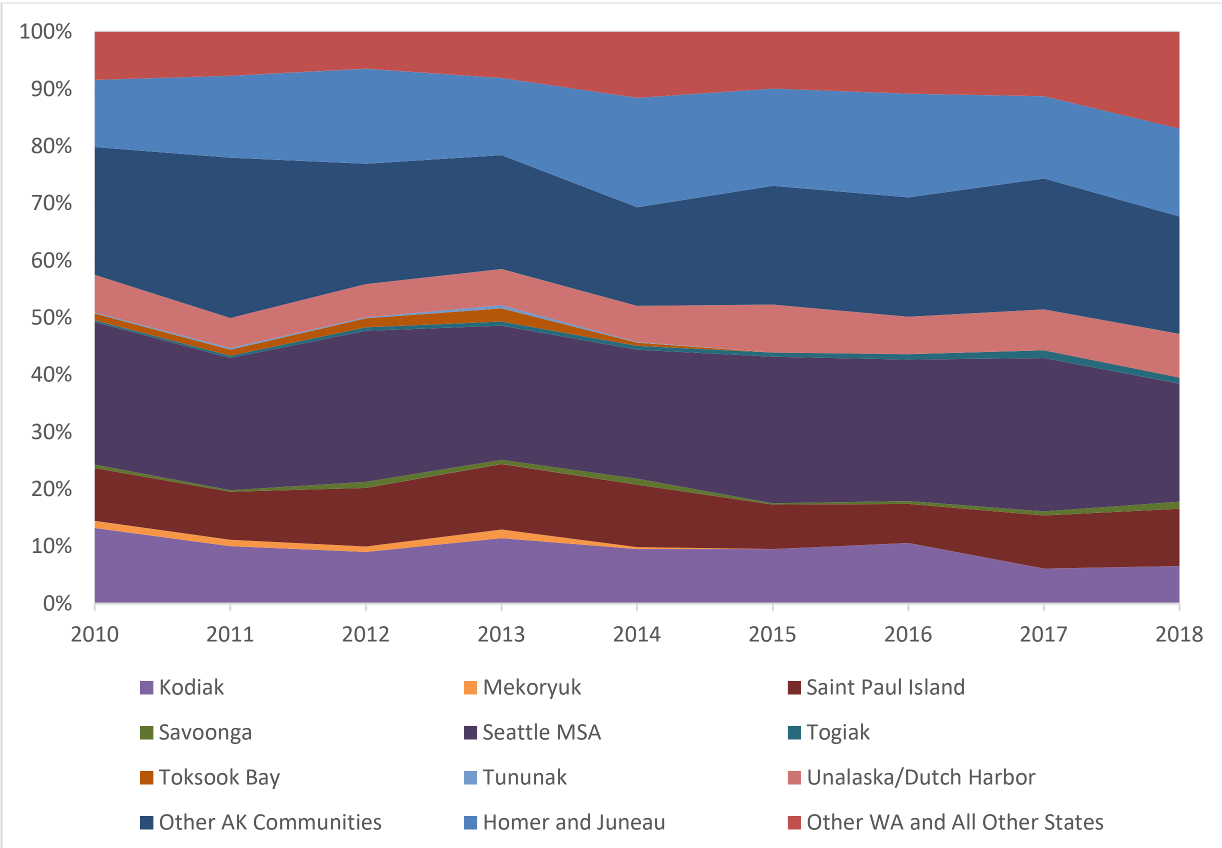

Figure 9. Harvesting regional quotient of revenue for communities highly engaged in commercial harvesting for at least 1 year from 2010-2018.

10.1.3 Participation Summary

Based on the community engagement index scores for both commercial Area 4 halibut processing and commercial Area 4 halibut harvesting engagement, communities were categorized into low (index scores below the mean of 0), medium (index scores between 0 and 0.5), medium-high (index scores between 0.50001 and 1), and high engagement (index scores above 1) for each year. The number of years a community is in each category for the processing and harvesting engagement indices is presented in Table 78. There are 31 communities or community groupings in Table 78 that had medium, medium-high, or high engagement in either commercial Area 4 halibut harvesting or commercial Area 4 halibut processing engagement. Sixteen communities were highly engaged in one aspect of commercial fisheries in any year from 2010-2018. There were six communities that were highly engaged in commercial Area 4 halibut processing engagement and 13 that were highly engaged in commercial Area 4 halibut harvesting engagement for at least one year from 2010-2018.

Table 78. Number of years by commercial Area 4 halibut processing and commercial Area 4 halibut harvesting engagement level. Alaska communities not listed had low commercial Area 4 halibut processing and commercial Area 4 halibut harvesting engagement in all years,2010-2018

Community	Harvesting Engagement				Processing Engagement			
	Low	Medium	Medium-High	High	Low	Medium	Medium-High	High
Adak	9	0	0	0	1	6	1	1
Akutan	9	0	0	0	0	0	1	8
All Other States	3	4	1	1	0	0	0	0
Anchorage	4	5	0	0	5	0	1	3
Atka	7	2	0	0	3	5	1	0
Chefornak	6	0	3	0	9	0	0	0
Delta Junction	5	4	0	0	0	0	0	0
Homer	0	0	0	9	8	1	0	0
Hooper Bay	7	2	0	0	9	0	0	0
Juneau	2	4	2	1	0	0	0	0
King Cove	0	0	0	0	8	1	0	0
Kipnuk	5	0	4	0	9	0	0	0
Kodiak	0	0	0	9	0	3	4	2
Mekoryuk	4	0	1	4	9	0	0	0
Newtok	8	1	0	0	0	0	0	0
Nome	4	4	1	0	8	1	0	0
Oregon	6	3	0	0	0	0	0	0
Other Washington	0	2	4	3	8	1	0	0
Quinhagak	7	1	1	0	0	0	0	0
Saint George Island	4	5	0	0	0	0	0	0
Saint Paul Island	0	0	0	9	0	3	4	2
Savoonga	0	4	3	2	7	2	0	0
Seattle MSA	0	0	0	9	9	0	0	0
Seward	9	0	0	0	7	1	1	0
Sitka	2	5	2	0	9	0	0	0
Togiak	1	2	1	5	9	0	0	0
Toksook Bay	4	1	0	4	5	1	3	0
Tununak	5	0	0	4	6	3	0	0
Twin Hills	0	0	0	0	8	1	0	0
Unalaska/Dutch Harbor	0	0	6	3	0	0	0	9
Wasilla	2	7	0	0	0	0	0	0

10.2 Attachment B: Available EDR Data for Crew Members on BSAI Groundfish Amendment 80 Sector Catcher/Processors

Table 79. Summary Number of Positions and Employees Onboard BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2015

Community of Vessel Ownership Address	No. of CPs	Average Number of Positions Onboard				Number of Employees Onboard			
		Fishing (Deck Crew)	Processing	All Other*	Total	Fishing (Deck Crew)	Processing	All Other*	Total
Seattle MSA	15	6.3	25.9	8.1	40.3	213	990	304	1,507
Other WA and Other States	3	4.0	20.0	6.7	30.7	18	170	34	222
All Geographies	**18**	**5.9**	**24.9**	**7.8**	**38.7**	**231**	**1,160**	**338**	**1,729**

*Includes officers, engineers, cooks, etc.

Source: Amendment 80 EDR Data

Table 80. Summary Number of Positions and Employees Onboard BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2016

Community of Vessel Ownership Address	No. of CPs	Average Number of Positions Onboard				Number of Employees Onboard			
		Fishing (Deck Crew)	Processing	All Other*	Total	Fishing (Deck Crew)	Processing	All Other*	Total
Seattle MSA	16	6.0	26.1	8.6	40.6	245	1,174	382	1,801
Other WA and Other States	3	4.0	20.0	6.7	30.7	17	183	35	235
All Geographies	**19**	**5.7**	**25.1**	**8.3**	**39.1**	**262**	**1,357**	**417**	**2,036**

*Includes officers, engineers, cooks, etc.

Source: Amendment 80 EDR Data

Table 81. Summary Number of Positions and Employees Onboard BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2017

Community of Vessel Ownership Address	No. of CPs	Average Number of Positions Onboard				Number of Employees Onboard			
		Fishing (Deck Crew)	Processing	All Other*	Total	Fishing (Deck Crew)	Processing	All Other*	Total
Seattle MSA	14	5.7	26.9	8.5	41.1	164	1,187	374	1,725
Other WA and Other States	5	4.6	25.4	8.2	38.2	38	346	72	456
All Geographies	**19**	**5.4**	**26.5**	**8.4**	**40.4**	**202**	**1,533**	**446**	**2,181**

*Includes officers, engineers, cooks, etc.

Source: Amendment 80 EDR Data

Table 82. Summary Number of Positions and Employees Onboard BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2018

Community of Vessel Ownership Address	No. of CPs	Average Number of Positions Onboard				Number of Employees Onboard			
		Fishing (Deck Crew)	Processing	All Other*	Total	Fishing (Deck Crew)	Processing	All Other*	Total
Seattle MSA	14	5.5	28.5	8.9	42.9	144	1,215	300	1,659
Other WA and Other States	5	4.4	25.4	8.2	38.0	34	380	72	486
All Geographies	**19**	**5.2**	**27.7**	**8.7**	**41.6**	**178**	**1,595**	**372**	**2,145**

*Includes officers, engineers, cooks, etc.

Source: Amendment 80 EDR Data

Table 83. Catcher/Processor Crew Community of Residence for BSAI Groundfish Amendment 80 Sector Catcher/Processors, 2019

State or Territory of Crew Member Residence	Community of Crew Member Residence	Number of Crew Licenses
1. Washington Total		**443**
1	Algona	2
2	Anacortes	4
3	Auburn	3
4	Bellevue	1
5	Blame	1
6	Chelan	4
7	Clinton	4
8	Coupeville	1
9	Deer Park	1
10	East Wenatchee	1
11	Elmo	1
12	Everett	1
13	Federal Way	4
14	Ferndale	2
15	Gig Harbor	3
16	Kenmore	1
17	Kent	5
18	Lacey	1
19	Longview	1
20	Lynden	1
21	Lynnwood	2
22	Mill Creek	2
23	Monroe	2
24	Oak Harbor	3
25	Olympia	2
26	Orting	1
27	Pasco	2
28	Port Orchard	1
29	Poulsbo	2
30	Puyallup	2
31	Renton	1
32	Richland	1
33	Sea	1
34	Seattle	353

35	Selah	1
36	Shelton	1
37	Silver Creek	1
38	Silverdale	1
39	Snohomish	1
40	Soap Lake	1
41	Spanaway	3
42	Spokane	1
43	Stanwood	1
44	Sunnyside	1
45	Suquamish	1
46	Tacoma	8
47	Union Gap	1
48	Vancouver	1
49	Wapato	1
50	Yakima	1
51	Yelm	1
2. Alaska Total		**24**
1	Anchorage	8
2	Barrow	1
3	Dutch Harbor	10
4	Kotzebue	1
5	Ninilchik	1
6	Ouzinkie	1
7	Unalaska	1
8	Wasilla	1
3. California Total		**15**
1	Brea	2
2	Chatsworth	1
3	Cottonwood	1
4	Escondido	1
5	Fairfield	1
6	Fontana	1
7	Huntington Park	1
8	Indio	1
9	Murrieta	1
10	Orosi	1
11	Red Bluff	1
12	Redding	2
13	San Diego	2
14	Stockton	3
15	Westmorland	1

4. Maine Total		**15**
1	Boothbay	1
2	Camden	1
3	Cushing	1
4	Falmouth	1
5	Gorham	1
6	Hollis Center	1
7	Millirocket	1
8	Old Town	1
9	Portland	1
10	Richmond	1
11	Rockland	2
12	Rockport	1
13	South Portland	1
14	Union	1
5. Oregon Total		**10**
1	Bend	2
2	Fairview	1
3	Gresham	2
4	Hermiston	1
5	Philomath	1
6	Siletz	1
7	Silverton	2
6. Idaho Total		**8**
1	Blackfoot	1
2	Bonners Ferry	1
3	Coeur D' Alene	1
4	Firth	1
5	Nampa	3
6	Osburn	1
7. Texas Total		**8**
1	El Paso	2
2	Killeen	1
3	Pharr	2
4	Tomball	2
5	Tualatin	1
8. Arizona Total		**6**
1	Surprise	1
2	Tucson	3
3	Vail	2
9. Florida Total		**4**
1	Baton Raton	1

2	Dade City	1
3	Gulf Breeze	1
4	Jacksonville	1
10. Utah Total		**4**
1	Clearfield	1
2	N Slc	1
3	North Salt Lake	1
4	West Valley	1
11. Hawaii Total		**3**
1	Kamuela	2
2	Volcano	1
12. Minnesota Total		**3**
1	Onamia	2
2	Roseville	1
13. Michigan Total		**2**
1	Muskegon	1
2	Saginaw	1
14. Missouri Total		**2**
1	Jefferson City	1
2	Saint Louis	1
3	Maple Wood	1
4	Onamia	1
Other Total		**14**
15. Puerto Rico	Aguada	2
16. New Hampshire	Westmoreland	2
17, Georgia	Richmond Hill	2
18. Nevada	Las Vegas	1
19, Massachusetts	Kingston	1
20. Illinois	Lovington	1
21. Iowa	West Des Moines	1
22. Virginia	Suffolk	1
23. Indiana	Brazil	1
24. Louisiana	New Orleans	1
25. Connecticut	Niantic	1
26. Mississippi	Lumberton	1
27. Tennessee	Knoxville	1
28. Montana	Great Falls	1
29. Nebraska	Tacoma	1
Grand Total		**570**

Source: Amendment 80 EDR Data

10.3 Attachment C: Demographic Information by Job Category for Ten BSAI Groundfish Amendment 80 Sector Catcher/Processors Owned by Four Seattle MSA-Based Firms, 2014 and 2019

Table 84. Demographic Information by Job Category for Ten Amendment 80 BSAI Groundfish Trawl Catcher/Processors Owned by Four Seattle MSA-Based Firms, 2014

Job Categories	Total Employees	Non-Hispanic or Latino Employees (by Race)						Hispanic or Latino Employees (any Race)	Total Minority Employees*	
		White	Black or African American	Native Hawaiian or other Pacific Islander	Asian	American Indian or Alaska Native	Other Race or Two or More Races		Number	Percent
Captains	31	31	0	0	0	0	0	0	0	0.0%
Mates and deck crew/purser	147	71	1	36	13	0	3	23	76	51.7%
Engineers	86	65	2	4	4	1	0	10	21	24.4%
Factory foreman/quality control	94	24	3	29	13	0	4	21	70	74.5%
Processing labor/galley crew/cleaning	776	189	89	153	69	1	16	259	587	75.6%
Cook	50	23	4	5	2	1	0	15	27	54.0%
Total	**1,184**	**403**	**99**	**227**	**101**	**3**	**23**	**328**	**781**	**66.0%**

*Note: Total minority consists of all individuals except those self-identified as being both White and non-Hispanic or Latino.
Source: Industry-supplied spreadsheet generated from 2014 Equal Employment Opportunity Commission data, in AECOM 2015.

Table 85. Demographic Information by Job Category for Nineteen Amendment 80 BSAI Groundfish Trawl Catcher/Processors Owned by Five Seattle MSA-Based Firms, 2019

Job Categories	Total Employees	Non-Hispanic or Latino Employees (by Race)						Hispanic or Latino Employees (any Race)	Total Minority Employees*	
		White	Black or African American	Native Hawaiian or other Pacific Islander	Asian	American Indian or Alaska Native	Other Race or Two or More Races		Number	Percent
Captains	48	46	0	0	0	0	1	1	2	4.2%
Mates and deck crew/purser	247	110	6	62	19	1	5	44	137	55.5%
Engineers	121	95	3	6	6	0	2	9	26	21.5%
Factory foreman/quality control	76	13	8	18	12	0	2	23	63	82.9%
Processing labor/galley crew/cleaning	1,492	366	285	351	59	12	34	385	1,126	75.5%
Cook	74	33	7	2	11	0	1	20	41	55.4%
Total	**2,058**	**663**	**309**	**439**	**107**	**13**	**45**	**482**	**1,395**	**67.8%**

*Note: Total minority consists of all individuals except those self-identified as being both White and non-Hispanic or Latino.
Source: Industry-supplied spreadsheet generated from individual firm 2019 human resources records (C. Woodley/Groundfish Forum via email 7/20/2021).

10.4 Attachment D: State of Alaska Shared Fishery Tax Revenues, by Tax Type and Fiscal Year, 2010-2019

10.4.1 Alaska Department of Revenue Data

The Alaska communities appearing in the tables in this section are those that received Alaska Department of Revenue (DOR) shared Fishery Resource Landing Tax revenues, 2010-2019. Table 86 provides an overview of the DOR fishery tax revenue sharing program (and in item 4 in the Fisheries Business tax program row provides an overview of Alaska Department of Commerce, Community, and Economic Development [DCCED] fishery tax revenue sharing program, the data from which appears in Section 10.4.2).

Table 87 provides a list of communities that received DOR shared Fishery Resource Landing Tax revenues (shown as blue highlighted cells), and the total number of years they did so during the period 2010-2019.

Table 88 provides the 2010-2019 annual average of DOR shared revenue amounts by municipality, borough, and city, by fishery tax type, for Alaska communities receiving Fishery Resource Landing Tax revenues and all other Alaska communities receiving any shared fishery tax revenues combined. The next series of tables, from Table 89 through Table 98, break out this information by individual year 2010-2019.

Table 86. Alaska DOR Shared Fisheries Taxes Overview, Fiscal Years 2010-2019

Tax Program	Share Provision	Share Cycle	
		Disbursal Date	Period
Fisheries Business *AS 43.75.130*	50% of fisheries business taxes are shared with the municipalities where fishery resources were processed. Taxes are shared as follows: 1) If processing occurred within and incorporated city, which is not located within an organized borough, 50% of the tax collected is shared with the city. 2) If processing occurred within an incorporated city, which is located within an organized borough, 25% of the tax collected is shared with the city and 25% of the tax is shared with the borough. 3) If processing occurred at a locaton within an organized borough but not within an incorporated city, 50% of the tax is shared with the borough. 4) If processing occurred in the unorganized borough, 50% of the tax is shared with municipalities statewide through an allocation program administered by DCCED.	September (FY2010-2014) December (FY2015-2016) October (FY2017-2019)	Preceding Fiscal Year
Fishery Resource Landing *AS 43.77.060*	50% of fishery resource landing taxes are shared with the municipality where fishery resources were landed. The mechanics for sharing landing taxes are the same as fisheries business taxes, except that the proration applies to boroughs incorporated after January 1, 1994.	September (FY2010-2014) December (FY2015-2016) October (FY2017-2019)	Preceding Fiscal Year

Source: Alaska Dept of Revenue, FY 2019 Shared Taxes and Fees Annual Report. http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?1571r accessed 4/24/2020.

Table 87. Alaska Municipalities, Boroughs, and Cities Receiving DOR Administered Shared Fisheries Resource Landing Tax Revenues in any Fiscal Year 2010-2019

Municipality, Borough, or City	Fiscal Years Receiving DOR Shared Fishery Resource Landing Tax Revenues										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total Years 2010-2019
City and Borough of Juneau											1
City and Borough of Sitka											3
City and Borough of Wrangell											3
Aleutians East Borough											8
Kenai Peninsula Borough											8
Kodiak Island Borough											10
Lake and Peninsula Borough											1
Petersburg Borough	(Incorporated January 3, 2013)										3
Yakutat Borough											8
City of Adak											10
City of Akhiok											1
City of Akutan											6
City of Aleknagik											1
City of Atka											9
City of Cordova											3
City of Homer											2
City of Kodiak											10
City of Old Harbor											2
City of Ouzinkie											1
City of Petersburg											3
City of Saint Paul											10
City of Sand Point											7
City of Seward											6
City of Togiak											10
City of Unalaska											10
Total Number of Communities	15	17	16	16	14	13	13	14	8	10	na

Source: Alaska Dept of Revenue, FY 2010-2019 Shared Taxes and Fees Annual Reports. http://tax.alaska.gov/programs/sourcebook/index.aspx accessed 4/24/2020.

Table 88. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Annual Average 2010-2019

Municipality, Borough, or City	Total Shared Revenue	Shared Revenue by Source			Shared Revenue by Source		
		Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
City and Borough of Juneau	$466,294	$42,223	$539	$423,532	9.1%	0.1%	90.8%
City and Borough of Sitka	$395,747	$319,152	$3,533	$73,062	80.6%	0.9%	18.5%
City and Borough of Wrangell	$83,183	$75,178	$202	$7,804	90.4%	0.2%	9.4%
Aleutians East Borough	$1,495,030	$1,468,494	$26,536	$0	98.2%	1.8%	0.0%
Kenai Peninsula Borough	$1,095,546	$630,850	$6,768	$457,928	57.6%	0.6%	41.8%
Kodiak Island Borough	$1,406,321	$1,314,354	$45,481	$46,487	93.5%	3.2%	3.3%
Lake and Peninsula Borough	$25,673	$25,509	$43	$121	99.4%	0.2%	0.5%
Petersburg Borough	$257,064	$252,753	$1,871	$2,440	98.3%	0.7%	0.9%
Yakutat Borough	$213,581	$187,932	$21,040	$4,609	88.0%	9.9%	2.2%
City of Adak	$196,245	$115,021	$78,864	$2,360	58.6%	40.2%	1.2%
City of Akhiok	$37	$6	$31	$0	15.6%	84.4%	0.0%
City of Akutan	$545,251	$536,193	$9,059	$0	98.3%	1.7%	0.0%
City of Aleknagik	$285	$0	$0	$285	0.0%	0.1%	99.9%
City of Atka	$52,315	$27,539	$24,776	$0	52.6%	47.4%	0.0%
City of Cordova	$309,533	$248,875	$1,215	$59,444	80.4%	0.4%	19.2%
City of Homer	$27,336	$13,053	$126	$14,157	47.8%	0.5%	51.8%
City of Kodiak	$1,099,444	$986,442	$16,772	$96,230	89.7%	1.5%	8.8%
City of Old Harbor	$1,213	$1	$1,134	$78	0.1%	93.5%	6.4%
City of Ouzinkie	$20	$0	$20	$0	0.0%	100.0%	0.0%
City of Petersburg	$299,693	$294,202	$1,791	$3,700	98.2%	0.6%	1.2%
City of Saint Paul	$924,965	$902,759	$20,086	$2,120	97.6%	2.2%	0.2%
City of Sand Point	$203,263	$187,895	$12,738	$2,630	92.4%	6.3%	1.3%
City of Seward	$518,608	$285,427	$6,199	$226,983	55.0%	1.2%	43.8%
City of Togiak	$115,849	$78,355	$36,069	$1,425	67.6%	31.1%	1.2%
City of Unalaska	$8,335,805	$3,639,851	$4,681,068	$14,886	43.7%	56.2%	0.2%
Subtotal	$18,068,302	$11,632,063	$4,995,961	$1,440,278	64.4%	27.7%	8.0%
All Other AK Communities	$28,358,030	$10,109,583	$0	$18,248,447	35.6%	0.0%	64.4%
Grand Total	$46,426,332	$21,741,646	$4,995,961	$19,688,725	46.8%	10.8%	42.4%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

Source: Alaska Dept of Revenue, FY 2010-2019 Shared Taxes and Fees Annual Reports. http://tax.alaska.gov/programs/sourcebook/index.aspx accessed 4/24/2020.

Table 89. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2010

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
City and Borough of Wrangell	$140,564	$105,537	$447	$34,580	75.1%	0.3%	24.6%
Aleutians East Borough	$1,618,203	$1,581,128	$37,075	$0	97.7%	2.3%	0.0%
Kenai Peninsula Borough	$1,173,875	$621,786	$482	$551,607	53.0%	0.0%	47.0%
Kodiak Island Borough	$1,098,604	$1,026,385	$20,016	$52,203	93.4%	1.8%	4.8%
Yakutat Borough	$219,417	$169,470	$43,447	$6,500	77.2%	19.8%	3.0%
City of Adak	$72,216	$13,567	$54,949	$3,700	18.8%	76.1%	5.1%
City of Akutan	$707,992	$685,996	$21,996	$0	96.9%	3.1%	0.0%
City of Atka	$9,682	$0	$9,682	$0	0.0%	100.0%	0.0%
City of Cordova	$871,773	$756,157	$1,804	$113,812	86.7%	0.2%	13.1%
City of Homer	$131,040	$73,801	$482	$56,757	56.3%	0.4%	43.3%
City of Kodiak	$835,106	$740,229	$731	$94,146	88.6%	0.1%	11.3%
City of Saint Paul	$758,940	$655,739	$102,601	$600	86.4%	13.5%	0.1%
City of Sand Point	$177,721	$160,704	$14,517	$2,500	90.4%	8.2%	1.4%
City of Togiak	$48,664	$46,940	$455	$1,269	96.5%	0.9%	2.6%
City of Unalaska	$6,137,185	$2,882,391	$3,234,224	$20,570	47.0%	52.7%	0.3%
Subtotal	$14,000,982	$9,519,830	$3,542,908	$938,244	68.0%	25.3%	6.7%
All Other AK Communities**	$20,836,801	$6,735,328	$0	$14,101,473	32.3%	0.0%	67.7%
Grand Total	$34,837,783	$16,255,158	$3,542,908	$15,039,717	46.7%	10.2%	43.2%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2010, Fisheries Business Tax revenues were shared with a total of 69 Alaska communities, including those individually listed on this table.

Source: Alaska Dept of Revenue, FY 2010 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 90. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2011

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
City and Borough of Wrangell	$282,246	$265,498	$1,038	$15,710	94.1%	0.4%	5.6%
Aleutians East Borough	$1,705,146	$1,664,919	$40,227	$0	97.6%	2.4%	0.0%
Kenai Peninsula Borough	$1,567,732	$1,004,361	$5,556	$557,815	64.1%	0.4%	35.6%
Kodiak Island Borough	$1,452,304	$1,405,360	$4,229	$42,715	96.8%	0.3%	2.9%
Lake and Peninsula Borough	$256,728	$255,093	$428	$1,207	99.4%	0.2%	0.5%
Yakutat Borough	$415,095	$390,043	$21,052	$4,000	94.0%	5.1%	1.0%
City of Adak	$185,567	$143,848	$40,219	$1,500	77.5%	21.7%	0.8%
City of Akhiok	$372	$58	$314	$0	15.6%	84.4%	0.0%
City of Akutan	$710,896	$689,120	$21,776	$0	96.9%	3.1%	0.0%
City of Atka	$68,238	$57,861	$10,377	$0	84.8%	15.2%	0.0%
City of Kodiak	$1,204,117	$1,123,205	$160	$80,752	93.3%	0.0%	6.7%
City of Petersburg	$676,807	$655,901	$3,006	$17,900	96.9%	0.4%	2.6%
City of Saint Paul	$762,970	$736,836	$22,134	$4,000	96.6%	2.9%	0.5%
City of Sand Point	$255,170	$229,620	$18,450	$7,100	90.0%	7.2%	2.8%
City of Seward	$996,650	$596,097	$5,310	$395,243	59.8%	0.5%	39.7%
City of Togiak	$91,640	$85,308	$4,919	$1,413	93.1%	5.4%	1.5%
City of Unalaska	$6,764,307	$3,780,072	$2,977,485	$6,750	55.9%	44.0%	0.1%
Subtotal	$17,395,985	$13,083,200	$3,176,680	$1,136,105	75.2%	18.3%	6.5%
All Other AK Communities**	$21,874,331	$9,133,698	$0	$12,740,633	41.8%	0.0%	58.2%
Grand Total	$39,270,316	$22,216,898	$3,176,680	$13,876,738	56.6%	8.1%	35.3%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2011, Fisheries Business Tax revenues were shared with a total of 68 Alaska communities, including those individually listed on this table.

Source: Alaska Dept of Revenue, FY 2011 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 91. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2012

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
City and Borough of Juneau	$4,662,940	$422,230	$5,391	$4,235,319	9.1%	0.1%	90.8%
City and Borough of Wrangell	$409,023	$380,741	$532	$27,750	93.1%	0.1%	6.8%
Aleutians East Borough	$2,082,874	$2,033,097	$49,777	$0	97.6%	2.4%	0.0%
Kenai Peninsula Borough	$1,473,978	$952,078	$8,152	$513,748	64.6%	0.6%	34.9%
Kodiak Island Borough	$1,722,846	$1,647,025	$16,812	$59,009	95.6%	1.0%	3.4%
Yakutat Borough	$272,798	$254,820	$11,478	$6,500	93.4%	4.2%	2.4%
City of Adak	$139,604	$75,469	$61,035	$3,100	54.1%	43.7%	2.2%
City of Akutan	$1,014,327	$990,609	$23,718	$0	97.7%	2.3%	0.0%
City of Atka	$70,114	$51,168	$18,946	$0	73.0%	27.0%	0.0%
City of Kodiak	$1,371,504	$1,252,420	$15,586	$103,498	91.3%	1.1%	7.5%
City of Petersburg	$1,056,400	$1,036,385	$11,415	$8,600	98.1%	1.1%	0.8%
City of Saint Paul	$1,137,135	$1,135,628	$907	$600	99.9%	0.1%	0.1%
City of Sand Point	$365,756	$337,198	$26,058	$2,500	92.2%	7.1%	0.7%
City of Seward	$869,806	$519,689	$8,152	$341,965	59.7%	0.9%	39.3%
City of Togiak	$110,947	$100,492	$8,988	$1,467	90.6%	8.1%	1.3%
City of Unalaska	$8,542,195	$3,968,378	$4,558,307	$15,510	46.5%	53.4%	0.2%
Subtotal	$25,302,247	$15,157,427	$4,825,254	$5,319,566	59.9%	19.1%	21.0%
All Other AK Communities**	$23,228,238	$9,419,151	$0	$13,809,087	40.6%	0.0%	59.4%
Grand Total	$48,530,485	$24,576,578	$4,825,254	$19,128,653	50.6%	9.9%	39.4%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2012, Fisheries Business Tax revenues were shared with a total of 68 Alaska communities, including those individually listed on this table.

Source: Alaska Dept of Revenue, FY 2012 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 92. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2013

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
City and Borough of Sitka	$1,353,344	$1,183,956	$7,108	$162,280	87.5%	0.5%	12.0%
Aleutians East Borough	$1,917,991	$1,869,127	$48,864	$0	97.5%	2.5%	0.0%
Kenai Peninsula Borough	$1,321,482	$774,646	$19,801	$527,035	58.6%	1.5%	39.9%
Kodiak Island Borough	$1,614,183	$1,546,308	$17,328	$50,547	95.8%	1.1%	3.1%
Petersburg Borough***	$778,093	$760,516	$9,077	$8,500	97.7%	1.2%	1.1%
Yakutat Borough	$213,078	$202,334	$6,744	$4,000	95.0%	3.2%	1.9%
City of Adak	$256,322	$168,370	$86,452	$1,500	65.7%	33.7%	0.6%
City of Akutan	$1,033,862	$1,028,308	$5,554	$0	99.5%	0.5%	0.0%
City of Aleknagik	$2,852	$0	$3	$2,849	0.0%	0.1%	99.9%
City of Atka	$144,872	$54,710	$90,162	$0	37.8%	62.2%	0.0%
City of Kodiak	$1,298,299	$1,189,750	$15,331	$93,218	91.6%	1.2%	7.2%
City of Saint Paul	$1,286,503	$1,278,016	$4,487	$4,000	99.3%	0.3%	0.3%
City of Sand Point	$288,518	$255,282	$28,636	$4,600	88.5%	9.9%	1.6%
City of Seward	$863,213	$480,290	$18,008	$364,915	55.6%	2.1%	42.3%
City of Togiak	$112,152	$88,071	$22,613	$1,468	78.5%	20.2%	1.3%
City of Unalaska	$10,600,375	$3,957,391	$6,636,364	$6,620	37.3%	62.6%	0.1%
Subtotal	$23,085,139	$14,837,075	$7,016,532	$1,231,532	64.3%	30.4%	5.3%
All Other AK Communities**	$26,587,497	$8,328,246	$0	$18,259,251	31.3%	0.0%	68.7%
Grand Total	$49,672,636	$23,165,321	$7,016,532	$19,490,783	46.6%	14.1%	39.2%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2013, Fisheries Business Tax revenues were shared with a total of 68 Alaska communities, including those individually listed on this table.

***Petersburg Borough, a non-unified home rule borough, was incorporated on January 3, 2013.

Source: Alaska Dept of Revenue, FY 2013 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 93. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2014

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
City and Borough of Sitka	$1,466,546	$1,127,772	$13,914	$324,860	76.9%	0.9%	22.2%
Aleutians East Borough	$1,797,534	$1,769,278	$28,256	$0	98.4%	1.6%	0.0%
Kenai Peninsula Borough	$1,402,081	$919,123	$14,108	$468,850	65.6%	1.0%	33.4%
Kodiak Island Borough	$1,614,025	$1,561,675	$31,958	$20,392	96.8%	2.0%	1.3%
City of Adak	$180,249	$122,489	$54,660	$3,100	68.0%	30.3%	1.7%
City of Akutan	$890,075	$877,450	$12,625	$0	98.6%	1.4%	0.0%
City of Atka	$50,964	$29,615	$21,349	$0	58.1%	41.9%	0.0%
City of Kodiak	$1,274,151	$1,164,404	$31,958	$77,789	91.4%	2.5%	6.1%
City of Petersburg	$1,263,718	$1,249,730	$3,488	$10,500	98.9%	0.3%	0.8%
City of Saint Paul	$1,205,636	$1,183,913	$21,723	$0	98.2%	1.8%	0.0%
City of Sand Point	$243,817	$236,923	$4,394	$2,500	97.2%	1.8%	1.0%
City of Seward	$820,074	$482,543	$14,108	$323,423	58.8%	1.7%	39.4%
City of Togiak	$114,789	$107,578	$5,759	$1,452	93.7%	5.0%	1.3%
City of Unalaska	$8,218,176	$3,307,022	$4,890,289	$20,865	40.2%	59.5%	0.3%
Subtotal	$20,541,835	$14,139,515	$5,148,589	$1,253,731	68.8%	25.1%	6.1%
All Other AK Communities**	$30,365,125	$10,772,654	$0	$19,592,471	35.5%	0.0%	64.5%
Grand Total	$50,906,960	$24,912,169	$5,148,589	$20,846,202	48.9%	10.1%	40.9%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2014, Fisheries Business Tax revenues were shared with a total of 63 Alaska communities, including those individually listed on this table.

Source: Alaska Dept of Revenue, FY 2014 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 94. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2015

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
Aleutians East Borough	$2,088,104	$2,067,182	$20,922	$0	99.0%	1.0%	0.0%
Kenai Peninsula Borough	$1,162,737	$629,725	$14,338	$518,674	54.2%	1.2%	44.6%
Kodiak Island Borough	$1,352,566	$1,301,537	$19,897	$31,132	96.2%	1.5%	2.3%
City of Adak	$71,151	$67,968	$1,683	$1,500	95.5%	2.4%	2.1%
City of Atka	$48,116	$34,706	$13,411	-$1	72.1%	27.9%	0.0%
City of Cordova	$1,270,344	$1,023,286	$6,015	$241,043	80.6%	0.5%	19.0%
City of Kodiak	$1,116,054	$1,021,500	$10,858	$83,696	91.5%	1.0%	7.5%
City of Old Harbor	$9,237	$11	$8,835	$391	0.1%	95.6%	4.2%
City of Ouzinkie	$204	$0	$204	$0	0.0%	100.0%	0.0%
City of Saint Paul	$1,074,604	$1,053,712	$16,891	$4,001	98.1%	1.6%	0.4%
City of Seward	$716,111	$334,691	$14,338	$367,082	46.7%	2.0%	51.3%
City of Togiak	$102,038	$91,511	$9,077	$1,450	89.7%	8.9%	1.4%
City of Unalaska	$6,745,512	$3,752,155	$2,989,207	$4,150	55.6%	44.3%	0.1%
Subtotal	$15,756,778	$11,377,984	$3,125,676	$1,253,118	72.2%	19.8%	8.0%
All Other AK Communities**	$28,869,269	$10,101,087	$1	$18,768,181	35.0%	0.0%	65.0%
Grand Total	$44,626,047	$21,479,071	$3,125,677	$20,021,299	48.1%	7.0%	44.9%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2015, Fisheries Business Tax revenues were shared with a total of 55 Alaska communities, including those individually listed on this table.

Note: Apparent errors of $1 in City of Atka and All Other Communities rows cannot be reconciled with publicly available data, but are assumed to result from rounding error.

Source: Alaska Dept of Revenue, FY 2015 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 95. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2016

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
City and Borough of Sitka	$1,137,579	$879,793	$14,311	$243,475	77.3%	1.3%	21.4%
Aleutians East Borough	$1,641,745	$1,606,523	$35,222	$0	97.9%	2.1%	0.0%
Kodiak Island Borough	$1,299,763	$1,197,033	$55,488	$47,242	92.1%	4.3%	3.6%
Yakutat Borough	$221,225	$198,800	$15,925	$6,500	89.9%	7.2%	2.9%
City of Adak	$150,945	$44,636	$103,209	$3,100	29.6%	68.4%	2.1%
City of Atka	$85,463	$31,852	$53,611	$0	37.3%	62.7%	0.0%
City of Cordova	$953,216	$709,305	$4,330	$239,581	74.4%	0.5%	25.1%
City of Kodiak	$685,304	$525,670	$52,979	$106,655	76.7%	7.7%	15.6%
City of Old Harbor	$2,896	$0	$2,509	$387	0.0%	86.6%	13.4%
City of Saint Paul	$896,427	$879,802	$16,625	$0	98.1%	1.9%	0.0%
City of Sand Point	$238,143	$200,421	$35,222	$2,500	84.2%	14.8%	1.0%
City of Togiak	$106,112	$30,639	$74,049	$1,424	28.9%	69.8%	1.3%
City of Unalaska	$11,820,247	$4,018,888	$7,776,504	$24,855	34.0%	65.8%	0.2%
Subtotal	$19,239,065	$10,323,362	$8,239,984	$675,719	53.7%	42.8%	3.5%
All Other AK Communities**	$26,167,024	$5,911,807	$0	$20,255,217	22.6%	0.0%	77.4%
Grand Total	$45,406,089	$16,235,169	$8,239,984	$20,930,936	35.8%	18.1%	46.1%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2016, Fisheries Business Tax revenues were shared with a total of 54 Alaska communities, including those individually listed on this table.

Source: Alaska Dept of Revenue, FY 2016 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 96. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2017

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
Aleutians East Borough	$2,098,704	$2,093,687	$5,017	$0	99.8%	0.2%	0.0%
Kenai Peninsula Borough	$1,501,883	$771,171	$4,469	$726,243	51.3%	0.3%	48.4%
Kodiak Island Borough	$1,082,940	$1,022,586	$12,985	$47,369	94.4%	1.2%	4.4%
Petersburg Borough***	$890,524	$877,158	$5,766	$7,600	98.5%	0.6%	0.9%
Yakutat Borough	$261,851	$218,773	$39,078	$4,000	83.5%	14.9%	1.5%
City of Adak	$110,655	$34,908	$74,247	$1,500	31.5%	67.1%	1.4%
City of Akutan	$1,095,361	$1,090,445	$4,916	$0	99.6%	0.4%	0.0%
City of Atka	$39,429	$15,479	$23,950	$0	39.3%	60.7%	0.0%
City of Kodiak	$1,036,269	$926,525	$9,587	$100,157	89.4%	0.9%	9.7%
City of Saint Paul	$906,129	$892,296	$9,833	$4,000	98.5%	1.1%	0.4%
City of Sand Point	$463,507	$458,805	$102	$4,600	99.0%	0.0%	1.0%
City of Seward	$920,229	$440,958	$2,071	$477,200	47.9%	0.2%	51.9%
City of Togiak	$100,900	$64,130	$35,339	$1,431	63.6%	35.0%	1.4%
City of Unalaska	$7,949,858	$3,649,322	$4,291,531	$9,005	45.9%	54.0%	0.1%
Subtotal	$18,458,239	$12,556,243	$4,518,891	$1,383,105	68.0%	24.5%	7.5%
All Other AK Communities**	$28,495,853	$8,689,414	$0	$19,806,439	30.5%	0.0%	69.5%
Grand Total	$46,954,092	$21,245,657	$4,518,891	$21,189,544	45.2%	9.6%	45.1%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2017, Fisheries Business Tax revenues were shared with a total of 55 Alaska communities, including those individually listed on this table.

***Petersburg Borough, a non-unified home rule borough, was incorporated on January 3, 2013.

Source: Alaska Dept of Revenue, FY 2017 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 97. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2018

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
Kodiak Island Borough	$1,974,407	$1,742,302	$177,159	$54,946	88.2%	9.0%	2.8%
Petersburg Borough***	$902,022	$889,855	$3,867	$8,300	98.7%	0.4%	0.9%
Yakutat Borough	$292,155	$226,992	$57,127	$8,036	77.7%	19.6%	2.8%
City of Adak	$198,487	$34,131	$161,256	$3,100	17.2%	81.2%	1.6%
City of Kodiak	$994,468	$859,223	$21,419	$113,826	86.4%	2.2%	11.4%
City of Saint Paul	$623,980	$623,979	$1	$0	100.0%	0.0%	0.0%
City of Togiak	$166,446	$73,227	$91,786	$1,433	44.0%	55.1%	0.9%
City of Unalaska	$8,196,954	$3,306,990	$4,855,139	$34,825	40.3%	59.2%	0.4%
Subtotal	$13,348,919	$7,756,699	$5,367,754	$224,466	58.1%	40.2%	1.7%
All Other AK Communities**	$38,142,311	$15,953,859	$0	$22,188,452	41.8%	0.0%	58.2%
Grand Total	$51,491,230	$23,710,558	$5,367,754	$22,412,918	46.0%	10.4%	43.5%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2018, Fisheries Business Tax revenues were shared with a total of 54 Alaska communities, including those individually listed on this table.

***Petersburg Borough, a non-unified home rule borough, was incorporated on January 3, 2013.

Source: Alaska Dept of Revenue, FY 2018 Shared Taxes and Fees Annual Report. http://tax.alaska.gov/programs/documentviewer/viewer.aspx?1499r accessed 9/26/2019.

Table 98. Alaska DOR Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2019

Municipality, Borough, or City	Total Shared Revenue	Amount of Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*	Percent of Total Shared Revenue by Source: Fisheries Business Tax	Fisheries Resource Landing Tax	All Other Sources*
Kenai Peninsula Borough	$1,351,691	$635,611	$775	$715,305	47.0%	0.1%	52.9%
Kodiak Island Borough	$851,575	$693,326	$98,935	$59,314	81.4%	11.6%	7.0%
Yakutat Borough	$240,188	$218,086	$15,549	$6,553	90.8%	6.5%	2.7%
City of Adak	$597,253	$444,822	$150,931	$1,500	74.5%	25.3%	0.3%
City of Atka	$6,269	$0	$6,269	$0	0.0%	100.0%	0.0%
City of Homer	$142,315	$56,729	$776	$84,810	39.9%	0.5%	59.6%
City of Kodiak	$1,179,170	$1,061,495	$9,115	$108,560	90.0%	0.8%	9.2%
City of Saint Paul	$597,330	$587,670	$5,660	$4,000	98.4%	0.9%	0.7%
City of Togiak	$204,805	$95,658	$107,701	$1,446	46.7%	52.6%	0.7%
City of Unalaska	$8,383,238	$3,775,900	$4,601,633	$5,705	45.0%	54.9%	0.1%
Subtotal	$13,553,834	$7,569,297	$4,997,344	$987,193	55.8%	36.9%	7.3%
All Other AK Communities**	$39,013,849	$16,050,581	$0	$22,963,268	41.1%	0.0%	58.9%
Grand Total	$52,567,683	$23,619,878	$4,997,344	$23,950,461	44.9%	9.5%	45.6%

*Other sources of shared revenue, depending on the community, may include: aviation fuel taxes, commercial passenger vessel excise taxes, electric cooperative taxes, liquor license fees, and/or telephone cooperative taxes.

**In FY 2019, Fisheries Business Tax revenues were shared with a total of 53 Alaska communities, including those individually listed on this table.

Source: Alaska Dept of Revenue, FY 2019 Shared Taxes and Fees Annual Report. http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?1571r accessed 4/24/2020.

10.4.2 Alaska Department of Commerce, Community, and Economic Development Data

The Alaska communities appearing in the tables in this section are those with a minimum one year with $500 or more in DCCED shared Fishery Resource Landing Tax revenues, 2010-2019, or appearing in the previous set of DOR data tables as receiving DOR shared Fishery Resource Landing Tax revenues (for taxable events that occurred within their municipal boundaries) during the same period but that did not meet the $500 threshold applied to the DCCED in any one year (i.e., Homer, Juneau, Petersburg/Petersburg Borough, Seward, and Wrangell). Table 99 provides an overview of the DCCED fishery tax revenue sharing program as of 2019.[151]

Table 100 provides a list of communities that met the criteria described in the paragraph above, the years the $500 threshold was met (shown as blue highlighted cells), and the total number of years that $500 threshold was met.

Table 101 provides the 2010-2019 annual average of DECC shared revenue amounts by municipality, borough, and city, by fishery tax type, for Alaska communities meeting the threshold criteria and all other Alaska communities combined. The series of tables from Table 102 through Table 111 break out this information by individual year 2010-2019.

Table 99. Alaska DCCED Shared Fisheries Taxes Overview, 2019

Program Description	The purpose of the Shared Fisheries Business Tax Program is to provide for an annual sharing of fish tax collected outside municipal boundaries to municipalities that can demonstrate they suffered significant effects from fisheries business activities. This program is administered separately from the state fish tax sharing program administered by the Department of Revenue which shares fish tax revenues collected inside municipal boundaries.
Program Eligibility	To be eligible for an allocation under this program, applicants must: 1. Be a municipality (city or borough); and 2. Demonstrate the municipality suffered significant effects as a result of fisheries business activity that occurred within its respective fisheries management area(s).
Program Funding	The funding available for the program this year is equal to half the amount of state fisheries business tax revenues collected outside of municipal boundaries during calendar year 2018. Program funding is allocated in two stages:
	1st Stage: Nineteen Fisheries Management Areas (FMAs) were established using existing commercial fishing area boundaries. The available funding is allocated among these 19 FMAs based on the pounds of fish and shellfish processed in the whole state during the 2018 calendar year. For example, if an area processed 10% of all the fish and shellfish processed in the whole state during 2018, then that area would receive 10% of the funding available for the program this year. These allocations are calculated based on Fisheries Business Tax Return information for calendar year 2018.
	2nd Stage: The funding available within each FMA will be allocated among the municipalities in that area based on the level of fishing industry significant effects suffered by each municipality compared to the level of effects experienced by the other municipalities in that FMA.
	Some boroughs, because of their extensive area, are included in more than one fisheries management area. In these cases, the borough must submit a separate program application for each area.

Source: DCCED supplied text, 10/14/2019.

[151] As with the DOR program, there is a lag time between collection of the taxes and the distribution of revenue to the municipalities. For example, the funding for the taxes collected in the 2018 calendar year will be distributed in March 2020.

Table 100. Alaska Municipalities, Boroughs, and Cities Receiving DDECD Administered Shared Fisheries Resource Landing Tax Revenues in the Amount of $500 or More in any Fiscal Year 2010-2019

Municipality, Borough, or City	Fiscal Years Receiving DCCED Administered Fishery Resource Landing Tax Revenues of at least $500										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total Years 2010-2019
Municipality of Anchorage											7
City and Borough of Juneau											0
City and Borough of Sitka											4
City and Borough of Wrangell											0
Aleutians East Borough											10
Bristol Bay Borough											6
Kenai Peninsula Borough											1
Kodiak Island Borough											6
Lake and Peninsula Borough											8
Petersburg Borough	(Incorporated January 3, 2013)										0
Yakutat Borough											8
City of Adak											10
City of Akhiok											2
City of Akutan											10
City of Aleknagik											2
City of Atka											9
City of Bethel											1
City of Cold Bay											6
City of Cordova											1
City of Dillingham											7
City of False Pass											6
City of Homer											0
City of King Cove											8
City of Kodiak											6
City of Larsen Bay											2
City of Manakotak											3
City of New Stuyahok											3
City of Newhalen											2
City of Old Harbor											2
City of Ouzinkie											2
City of Petersburg											0
City of Port Heiden											6
City of Port Lions											2
City of Saint George											8
City of Saint Paul											8
City of Sand Point											8
City of Seward											0
City of Togiak											4
City of Unalaska											10
City of Whittier											1
Total Number of Communities	20	16	17	18	21	9	4	28	16	23	na

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019

Table 101. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Annual Average 2010-2019

Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
		Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Anchorage	$24,452	$23,697	$755	96.9%	3.1%
City and Borough of Juneau	$10,781	$10,743	$38	99.6%	0.4%
City and Borough of Sitka	$36,980	$36,572	$408	98.9%	1.1%
City and Borough of Wrangell	$14,451	$14,291	$160	98.9%	1.1%
Aleutians East Borough	$200,853	$105,031	$95,823	52.3%	47.7%
Bristol Bay Borough	$15,464	$14,889	$575	96.3%	3.7%
Kenai Peninsula Borough	$7,313	$7,087	$225	96.9%	3.1%
Kodiak Island Borough	$61,585	$59,732	$1,853	97.0%	3.0%
Lake and Peninsula Borough	$35,471	$33,820	$1,652	95.3%	4.7%
Petersburg Borough	$8,928	$8,830	$99	98.9%	1.1%
Yakutat Borough	$5,674	$2,937	$2,737	51.8%	48.2%
City of Adak	$221,245	$110,972	$110,273	50.2%	49.8%
City of Akhiok	$18,927	$18,491	$435	97.7%	2.3%
City of Akutan	$301,489	$151,517	$149,972	50.3%	49.7%
City of Aleknagik	$6,975	$6,708	$267	96.2%	3.8%
City of Atka	$198,082	$99,302	$98,780	50.1%	49.9%
City of Bethel	$684	$577	$107	84.4%	15.6%
City of Cold Bay	$11,871	$10,927	$943	92.1%	7.9%
City of Cordova	$35,188	$35,077	$112	99.7%	0.3%
City of Dillingham	$31,604	$30,412	$1,191	96.2%	3.8%
City of False Pass	$10,477	$9,684	$793	92.4%	7.6%
City of Homer	$3,667	$3,555	$112	96.9%	3.1%
City of King Cove	$43,391	$40,062	$3,329	92.3%	7.7%
City of Kodiak	$58,480	$56,749	$1,732	97.0%	3.0%
City of Larsen Bay	$19,192	$18,754	$439	97.7%	2.3%
City of Manakotak	$10,073	$9,721	$353	96.5%	3.5%
City of New Stuyahok	$10,181	$9,797	$384	96.2%	3.8%
City of Newhalen	$6,525	$6,275	$250	96.2%	3.8%
City of Old Harbor	$20,678	$20,201	$477	97.7%	2.3%
City of Ouzinkie	$19,454	$19,003	$451	97.7%	2.3%
City of Petersburg	$8,099	$8,010	$90	98.9%	1.1%
City of Port Heiden	$11,248	$10,300	$948	91.6%	8.4%
City of Port Lions	$19,771	$19,313	$458	97.7%	2.3%
City of Saint George	$23,782	$8,566	$15,216	36.0%	64.0%
City of Saint Paul	$23,782	$8,566	$15,216	36.0%	64.0%
City of Sand Point	$46,682	$43,003	$3,680	92.1%	7.9%
City of Seward	$3,486	$3,379	$107	96.9%	3.1%
City of Togiak	$12,525	$12,108	$417	96.7%	3.3%
City of Unalaska	$677,019	$339,384	$337,635	50.1%	49.9%
City of Whittier	$35,188	$35,077	$112	99.7%	0.3%
Subtotal	$2,311,720	$1,463,118	$848,602	63.3%	36.7%
All Other Alaska Communities	$195,022	$192,851	$2,171	98.9%	1.1%
Grand Total	$2,506,741	$1,655,968	$850,773	66.1%	33.9%

Source: DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 102. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2010

Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
		Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Municipality of Anchorage	$27,470	$26,689	$780	97.2%	2.8%
City and Borough of Juneau	$13,822	$13,822	$0	100.0%	0.0%
City and Borough of Sitka	$29,171	$28,729	$441	98.5%	1.5%
City and Borough of Wrangell	$10,998	$10,831	$166	98.5%	1.5%
Aleutians East Borough	$286,296	$105,640	$180,655	36.9%	63.1%
Bristol Bay Borough	$17,217	$16,124	$1,093	93.7%	6.3%
Kenai Peninsula Borough	$8,144	$7,913	$231	97.2%	2.8%
Kodiak Island Borough	$15,209	$15,209	$0	100.0%	0.0%
Lake and Peninsula Borough	$37,843	$33,820	$4,023	89.4%	10.6%
Petersburg Borough	[redacted]				
Yakutat Borough	$6,973	$3,843	$3,130	55.1%	44.9%
City of Adak	$308,178	$107,123	$201,055	34.8%	65.2%
City of Akhiok	$15,209	$15,209	$0	100.0%	0.0%
City of Akutan	$430,468	$149,631	$280,836	34.8%	65.2%
City of Aleknagik	$7,479	$7,004	$475	93.7%	6.3%
City of Atka	$287,401	$99,901	$187,500	34.8%	65.2%
City of Bethel	$1,206	$568	$638	47.1%	52.9%
City of Cold Bay	$14,547	$11,734	$2,813	80.7%	19.3%
City of Cordova	$37,699	$37,699	$0	100.0%	0.0%
City of Dillingham	$33,524	$31,396	$2,128	93.7%	6.3%
City of False Pass	$11,983	$9,666	$2,317	80.7%	19.3%
City of Homer	$4,177	$4,058	$119	97.2%	2.8%
City of King Cove	$47,731	$38,500	$9,231	80.7%	19.3%
City of Kodiak	$15,209	$15,209	$0	100.0%	0.0%
City of Larsen Bay	$15,209	$15,209	$0	100.0%	0.0%
City of Manakotak	$9,805	$9,183	$622	93.7%	6.3%
City of New Stuyahok	$10,560	$9,890	$670	93.7%	6.3%
City of Newhalen	$6,489	$6,077	$412	93.7%	6.3%
City of Old Harbor	$15,209	$15,209	$0	100.0%	0.0%
City of Ouzinkie	$15,209	$15,209	$0	100.0%	0.0%
City of Petersburg	$13,504	$13,300	$204	98.5%	1.5%
City of Port Heiden	$14,547	$11,734	$2,813	80.7%	19.3%
City of Port Lions	$15,209	$15,209	$0	100.0%	0.0%
City of Saint George	$104,697	$10,213	$94,484	9.8%	90.2%
City of Saint Paul	$104,697	$10,213	$94,484	9.8%	90.2%
City of Sand Point	$58,189	$46,936	$11,253	80.7%	19.3%
City of Seward	$3,946	$3,834	$112	97.2%	2.8%
City of Togiak	$14,408	$13,493	$915	93.7%	6.3%
City of Unalaska	$975,626	$339,130	$636,497	34.8%	65.2%
City of Whittier	$37,699	$37,699	$0	100.0%	0.0%
Subtotal	$3,082,956	$1,362,858	$1,720,098	44.2%	55.8%
All Other Alaska Communities	$170,480	$166,276	$4,203	97.5%	2.5%
Grand Total	$3,253,436	$1,529,134	$1,724,302	47.0%	53.0%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 103. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2011

Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
		Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Municipality of Anchorage	$23,424	$23,340	$84	99.6%	0.4%
City and Borough of Juneau	$13,212	$13,212	$0	100.0%	0.0%
City and Borough of Sitka	$41,069	$40,774	$295	99.3%	0.7%
City and Borough of Wrangell	$15,243	$15,134	$110	99.3%	0.7%
Aleutians East Borough	$183,698	$99,674	$84,023	54.3%	45.7%
Bristol Bay Borough	$20,384	$20,374	$10	100.0%	0.0%
Kenai Peninsula Borough	$6,908	$6,883	$25	99.6%	0.4%
Kodiak Island Borough	$17,393	$17,393	$0	100.0%	0.0%
Lake and Peninsula Borough	$40,280	$39,403	$877	97.8%	2.2%
Petersburg Borough	[redacted]				
Yakutat Borough	$8,315	$4,019	$4,296	48.3%	51.7%
City of Adak	$191,893	$98,973	$92,919	51.6%	48.4%
City of Akhiok	$17,393	$17,393	$0	100.0%	0.0%
City of Akutan	$274,174	$141,412	$132,762	51.6%	48.4%
City of Aleknagik	$9,019	$9,014	$4	100.0%	0.0%
City of Atka	$180,535	$93,115	$87,420	51.6%	48.4%
City of Bethel	$1,079	$1,079	$0	100.0%	0.0%
City of Cold Bay	$12,721	$11,901	$821	93.5%	6.5%
City of Cordova	$24,852	$24,284	$568	97.7%	2.3%
City of Dillingham	$40,358	$40,339	$19	100.0%	0.0%
City of False Pass	$10,805	$10,108	$697	93.5%	6.5%
City of Homer	$3,559	$3,547	$13	99.6%	0.4%
City of King Cove	$42,137	$39,418	$2,719	93.5%	6.5%
City of Kodiak	$17,393	$17,393	$0	100.0%	0.0%
City of Larsen Bay	$17,393	$17,393	$0	100.0%	0.0%
City of Manakotak	$12,237	$12,231	$6	100.0%	0.0%
City of New Stuyahok	$13,485	$13,478	$6	100.0%	0.0%
City of Newhalen	$7,987	$7,983	$4	100.0%	0.0%
City of Old Harbor	$17,393	$17,393	$0	100.0%	0.0%
City of Ouzinkie	$17,393	$17,393	$0	100.0%	0.0%
City of Petersburg	$18,841	$18,705	$135	99.3%	0.7%
City of Port Heiden	$12,677	$11,859	$818	93.5%	6.5%
City of Port Lions	$17,393	$17,393	$0	100.0%	0.0%
City of Saint George	$29,303	$10,404	$18,899	35.5%	64.5%
City of Saint Paul	$29,303	$10,404	$18,899	35.5%	64.5%
City of Sand Point	$53,591	$50,134	$3,458	93.5%	6.5%
City of Seward	$3,354	$3,342	$12	99.6%	0.4%
City of Togiak	$18,120	$18,111	$9	100.0%	0.0%
City of Unalaska	$614,414	$316,899	$297,515	51.6%	48.4%
City of Whittier	$24,852	$24,284	$568	97.7%	2.3%
Subtotal	$2,103,577	$1,355,586	$747,990	64.4%	35.6%
All Other Alaska Communities	$210,489	$209,574	$915	99.6%	0.4%
Grand Total	$2,314,066	$1,565,160	$748,906	67.6%	32.4%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 104. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2012

Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Amount of Shared Fisheries Revenue by Source: Fisheries Business Tax	Amount of Shared Fisheries Revenue by Source: Fisheries Resource Landing Tax	Percent of Shared Fisheries Revenue by Source: Fisheries Business Tax	Percent of Shared Fisheries Revenue by Source: Fisheries Resource Landing Tax
Municipality of Anchorage	$39,894	$38,442	$1,452	96.4%	3.6%
City and Borough of Juneau	$13,098	$13,098	$0	100.0%	0.0%
City and Borough of Sitka	$49,670	$49,089	$582	98.8%	1.2%
City and Borough of Wrangell	$19,633	$19,403	$230	98.8%	1.2%
Aleutians East Borough	$256,429	$114,785	$141,644	44.8%	55.2%
Bristol Bay Borough	$24,399	$23,838	$561	97.7%	2.3%
Kenai Peninsula Borough	$11,963	$11,528	$435	96.4%	3.6%
Kodiak Island Borough	$24,817	$24,817	$0	100.0%	0.0%
Lake and Peninsula Borough	$47,249	$44,363	$2,886	93.9%	6.1%
Petersburg Borough	[redacted]				
Yakutat Borough	$13,031	$6,973	$6,057	53.5%	46.5%
City of Adak	$288,707	$122,742	$165,964	42.5%	57.5%
City of Akhiok	$24,817	$24,817	$0	100.0%	0.0%
City of Akutan	$386,808	$164,450	$222,358	42.5%	57.5%
City of Aleknagik	$10,464	$10,224	$241	97.7%	2.3%
City of Atka	$251,621	$106,976	$144,645	42.5%	57.5%
City of Bethel	$752	$752	$0	100.0%	0.0%
City of Cold Bay	$15,796	$13,540	$2,257	85.7%	14.3%
City of Cordova	$65,315	$65,137	$177	99.7%	0.3%
City of Dillingham	$48,256	$47,147	$1,110	97.7%	2.3%
City of False Pass	$12,287	$10,532	$1,755	85.7%	14.3%
City of Homer	$6,009	$5,791	$219	96.4%	3.6%
City of King Cove	$55,700	$47,743	$7,957	85.7%	14.3%
City of Kodiak	$24,817	$24,817	$0	100.0%	0.0%
City of Larsen Bay	$24,817	$24,817	$0	100.0%	0.0%
City of Manakotak	$14,458	$14,126	$332	97.7%	2.3%
City of New Stuyahok	$15,676	$15,316	$360	97.7%	2.3%
City of Newhalen	$9,945	$9,716	$229	97.7%	2.3%
City of Old Harbor	$24,817	$24,817	$0	100.0%	0.0%
City of Ouzinkie	$24,817	$24,817	$0	100.0%	0.0%
City of Petersburg	$22,303	$22,042	$261	98.8%	1.2%
City of Port Heiden	$15,508	$13,293	$2,215	85.7%	14.3%
City of Port Lions	$24,817	$24,817	$0	100.0%	0.0%
City of Saint George	$33,597	$11,337	$22,261	33.7%	66.3%
City of Saint Paul	$33,597	$11,337	$22,261	33.7%	66.3%
City of Sand Point	$57,526	$49,308	$8,218	85.7%	14.3%
City of Seward	$5,736	$5,528	$209	96.4%	3.6%
City of Togiak	$21,175	$20,688	$487	97.7%	2.3%
City of Unalaska	$855,484	$363,706	$491,778	42.5%	57.5%
City of Whittier	$65,315	$65,137	$177	99.7%	0.3%
Subtotal	$2,941,118	$1,691,798	$1,249,320	57.5%	42.5%
All Other Alaska Communities	$290,031	$287,442	$2,588	99.1%	0.9%
Grand Total	$3,231,149	$1,979,241	$1,251,909	61.3%	38.7%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 105. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2013

		Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
Municipality, Borough, or City	**Total DCCED Shared Fisheries Revenue**	**Fisheries Business Tax**	**Fisheries Resource Landing Tax**	**Fisheries Business Tax**	**Fisheries Resource Landing Tax**
Municipality of Anchorage	$28,988	$27,934	$1,055	96.4%	3.6%
City and Borough of Juneau	$21,459	$21,080	$379	98.2%	1.8%
City and Borough of Sitka	$58,046	$57,397	$649	98.9%	1.1%
City and Borough of Wrangell	$23,048	$22,791	$258	98.9%	1.1%
Aleutians East Borough	$230,237	$132,426	$97,812	57.5%	42.5%
Bristol Bay Borough	$16,508	$16,237	$271	98.4%	1.6%
Kenai Peninsula Borough	$8,705	$8,388	$317	96.4%	3.6%
Kodiak Island Borough	$93,720	$92,263	$1,457	98.4%	1.6%
Lake and Peninsula Borough	$41,384	$39,889	$1,495	96.4%	3.6%
Petersburg Borough	[redacted]				
Yakutat Borough	$5,604	$3,991	$1,613	71.2%	28.8%
City of Adak	$261,176	$145,816	$115,360	55.8%	44.2%
City of Akhiok	$20,523	$20,204	$319	98.4%	1.6%
City of Akutan	$350,680	$195,787	$154,893	55.8%	44.2%
City of Aleknagik	$7,049	$6,934	$116	98.4%	1.6%
City of Atka	$226,713	$126,575	$100,138	55.8%	44.2%
City of Bethel	$1,267	$835	$433	65.9%	34.1%
City of Cold Bay	$12,870	$11,792	$1,077	91.6%	8.4%
City of Cordova	$31,222	$31,222	$0	100.0%	0.0%
City of Dillingham	$32,207	$31,678	$529	98.4%	1.6%
City of False Pass	$10,523	$9,642	$881	91.6%	8.4%
City of Homer	$4,365	$4,206	$159	96.4%	3.6%
City of King Cove	$47,386	$43,419	$3,967	91.6%	8.4%
City of Kodiak	$74,883	$73,719	$1,164	98.4%	1.6%
City of Larsen Bay	$22,084	$21,741	$343	98.4%	1.6%
City of Manakotak	$22,084	$21,741	$343	98.4%	1.6%
City of New Stuyahok	$10,257	$10,089	$168	98.4%	1.6%
City of Newhalen	$6,605	$6,496	$108	98.4%	1.6%
City of Old Harbor	$28,095	$27,658	$437	98.4%	1.6%
City of Ouzinkie	$21,473	$21,139	$334	98.4%	1.6%
City of Petersburg	$26,344	$26,049	$294	98.9%	1.1%
City of Port Heiden	$13,112	$12,015	$1,098	91.6%	8.4%
City of Port Lions	$21,056	$20,729	$327	98.4%	1.6%
City of Saint George	$22,914	$10,217	$12,697	44.6%	55.4%
City of Saint Paul	$22,914	$10,217	$12,697	44.6%	55.4%
City of Sand Point	$50,137	$45,940	$4,197	91.6%	8.4%
City of Seward	$4,169	$4,017	$152	96.4%	3.6%
City of Togiak	$14,249	$14,015	$234	98.4%	1.6%
City of Unalaska	$770,298	$430,062	$340,236	55.8%	44.2%
City of Whittier	$31,222	$31,222	$0	100.0%	0.0%
Subtotal	$2,695,575	$1,837,571	$858,004	68.2%	31.8%
All Other Alaska Communities	$240,572	$237,635	$2,937	98.8%	1.2%
Grand Total	$2,936,147	$2,075,205	$860,942	70.7%	29.3%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 106. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2014

Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
		Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Municipality of Anchorage	$28,788	$26,651	$2,137	92.6%	7.4%
City and Borough of Juneau	$11,397	$11,397	$0	100.0%	0.0%
City and Borough of Sitka	$30,548	$29,742	$806	97.4%	2.6%
City and Borough of Wrangell	$12,210	$11,888	$322	97.4%	2.6%
Aleutians East Borough	$224,144	$127,699	$96,445	57.0%	43.0%
Bristol Bay Borough	$14,112	$13,535	$577	95.9%	4.1%
Kenai Peninsula Borough	$8,634	$7,993	$641	92.6%	7.4%
Kodiak Island Borough	$80,350	$79,228	$1,122	98.6%	1.4%
Lake and Peninsula Borough	$36,039	$34,453	$1,586	95.6%	4.4%
Petersburg Borough	$14,479	$14,097	$382	97.4%	2.6%
Yakutat Borough	$3,804	$3,002	$803	78.9%	21.1%
City of Adak	$251,134	$139,135	$111,999	55.4%	44.6%
City of Akhiok	$20,921	$20,629	$292	98.6%	1.4%
City of Akutan	$340,796	$188,810	$151,986	55.4%	44.6%
City of Aleknagik	$6,024	$5,778	$246	95.9%	4.1%
City of Atka	$221,779	$122,872	$98,908	55.4%	44.6%
City of Bethel	$684	$684	$0	100.0%	0.0%
City of Cold Bay	$11,325	$10,392	$933	91.8%	8.2%
City of Cordova	$32,608	$32,608	$0	100.0%	0.0%
City of Dillingham	$28,769	$27,593	$1,176	95.9%	4.1%
City of False Pass	$9,253	$8,490	$763	91.8%	8.2%
City of Homer	$4,338	$4,016	$322	92.6%	7.4%
City of King Cove	$41,703	$38,266	$3,437	91.8%	8.2%
City of Kodiak	$91,105	$89,832	$1,273	98.6%	1.4%
City of Larsen Bay	$22,344	$22,032	$312	98.6%	1.4%
City of Manakotak	$0	$0	$0	--	--
City of New Stuyahok	$9,154	$8,779	$374	95.9%	4.1%
City of Newhalen	$5,755	$5,520	$235	95.9%	4.1%
City of Old Harbor	$24,937	$24,589	$348	98.6%	1.4%
City of Ouzinkie	$21,830	$21,525	$305	98.6%	1.4%
City of Petersburg	[redacted]				
City of Port Heiden	$12,203	$11,197	$1,006	91.8%	8.2%
City of Port Lions	$24,876	$24,529	$347	98.6%	1.4%
City of Saint George	$14,658	$13,975	$683	95.3%	4.7%
City of Saint Paul	$14,658	$13,975	$683	95.3%	4.7%
City of Sand Point	$42,405	$38,910	$3,495	91.8%	8.2%
City of Seward	$4,138	$3,831	$307	92.6%	7.4%
City of Togiak	$12,914	$12,386	$528	95.9%	4.1%
City of Unalaska	$759,066	$420,543	$338,523	55.4%	44.6%
City of Whittier	$32,608	$32,608	$0	100.0%	0.0%
Subtotal	$2,526,488	$1,703,185	$823,303	67.4%	32.6%
All Other Alaska Communities	$197,686	$194,641	$3,045	98.5%	1.5%
Grand Total	$2,724,174	$1,897,826	$826,348	69.7%	30.3%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 107. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2015

		Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Municipality of Anchorage	$21,150	$20,531	$620	97.1%	2.9%
City and Borough of Juneau	$4,400	$4,400	$0	100.0%	0.0%
City and Borough of Sitka	$43,235	$42,941	$294	99.3%	0.7%
City and Borough of Wrangell	$17,347	$17,229	$118	99.3%	0.7%
Aleutians East Borough	$136,516	$101,299	$35,217	74.2%	25.8%
Bristol Bay Borough	$8,660	$8,618	$42	99.5%	0.5%
Kenai Peninsula Borough	$6,320	$6,135	$185	97.1%	2.9%
Kodiak Island Borough	$60,772	$59,514	$1,257	97.9%	2.1%
Lake and Peninsula Borough	$26,182	$26,033	$148	99.4%	0.6%
Petersburg Borough	$20,336	$20,198	$139	99.3%	0.7%
Yakutat Borough	$880	$880	$0	100.0%	0.0%
City of Adak	$148,848	$108,405	$40,443	72.8%	27.2%
City of Akhiok	$14,405	$14,107	$298	97.9%	2.1%
City of Akutan	$209,000	$152,213	$56,787	72.8%	27.2%
City of Aleknagik	$3,871	$3,852	$19	99.5%	0.5%
City of Atka	$133,931	$97,541	$36,390	72.8%	27.2%
City of Bethel	$1,347	$1,347	$0	100.0%	0.0%
City of Cold Bay	$8,136	$8,041	$95	98.8%	1.2%
City of Cordova	$38,684	$38,684	$0	100.0%	0.0%
City of Dillingham	$18,357	$18,267	$90	99.5%	0.5%
City of False Pass	$6,949	$6,867	$81	98.8%	1.2%
City of Homer	$3,179	$3,086	$93	97.1%	2.9%
City of King Cove	$30,539	$30,181	$358	98.8%	1.2%
City of Kodiak	$58,135	$56,932	$1,203	97.9%	2.1%
City of Larsen Bay	$14,426	$14,128	$298	97.9%	2.1%
City of Manakotak	$5,735	$5,707	$28	99.5%	0.5%
City of New Stuyahok	$5,788	$5,760	$28	99.5%	0.5%
City of Newhalen	$3,891	$3,872	$19	99.5%	0.5%
City of Old Harbor	$15,384	$15,066	$318	97.9%	2.1%
City of Ouzinkie	$15,105	$14,792	$312	97.9%	2.1%
City of Petersburg	[redacted]				
City of Port Heiden	$9,007	$8,901	$105	98.8%	1.2%
City of Port Lions	$15,126	$14,813	$313	97.9%	2.1%
City of Saint George	$8,282	$7,441	$842	89.8%	10.2%
City of Saint Paul	$8,282	$7,441	$842	89.8%	10.2%
City of Sand Point	$32,755	$32,372	$383	98.8%	1.2%
City of Seward	$3,019	$2,930	$88	97.1%	2.9%
City of Togiak	$8,295	$8,255	$40	99.5%	0.5%
City of Unalaska	$456,447	$332,427	$124,020	72.8%	27.2%
City of Whittier	$38,684	$38,684	$0	100.0%	0.0%
Subtotal	$1,661,405	$1,359,889	$301,516	81.9%	18.1%
All Other Alaska Communities	$221,889	$221,167	$722	99.7%	0.3%
Grand Total	$1,883,294	$1,581,056	$302,237	84.0%	16.0%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 108. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2016

		Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Municipality of Anchorage	$18,833	$18,607	$226	98.8%	1.2%
City and Borough of Juneau	$9,937	$9,937	$0	100.0%	0.0%
City and Borough of Sitka	$31,363	$31,286	$77	99.8%	0.2%
City and Borough of Wrangell	$12,046	$12,016	$30	99.8%	0.2%
Aleutians East Borough	$117,402	$104,699	$12,703	89.2%	10.8%
Bristol Bay Borough	$12,738	$12,695	$43	99.7%	0.3%
Kenai Peninsula Borough	$5,656	$5,588	$68	98.8%	1.2%
Kodiak Island Borough	$81,256	$80,783	$473	99.4%	0.6%
Lake and Peninsula Borough	$29,643	$29,511	$132	99.6%	0.4%
Petersburg Borough	$14,377	$14,341	$35	99.8%	0.2%
Yakutat Borough	$2,615	$2,615	$0	100.0%	0.0%
City of Adak	$124,501	$110,149	$14,351	88.5%	11.5%
City of Akhiok	$19,106	$18,995	$111	99.4%	0.6%
City of Akutan	$173,049	$153,101	$19,947	88.5%	11.5%
City of Aleknagik	$5,872	$5,853	$20	99.7%	0.3%
City of Atka	$113,826	$100,705	$13,121	88.5%	11.5%
City of Bethel	$507	$507	$0	100.0%	0.0%
City of Cold Bay	$9,152	$9,071	$80	99.1%	0.9%
City of Cordova	$28,504	$28,440	$64	99.8%	0.2%
City of Dillingham	$27,135	$27,044	$91	99.7%	0.3%
City of False Pass	$8,279	$8,206	$73	99.1%	0.9%
City of Homer	$2,834	$2,800	$34	98.8%	1.2%
City of King Cove	$33,713	$33,417	$296	99.1%	0.9%
City of Kodiak	$77,280	$76,831	$449	99.4%	0.6%
City of Larsen Bay	$19,013	$18,902	$111	99.4%	0.6%
City of Manakotak	$8,464	$8,435	$28	99.7%	0.3%
City of New Stuyahok	$8,454	$8,426	$28	99.7%	0.3%
City of Newhalen	$5,631	$5,612	$19	99.7%	0.3%
City of Old Harbor	$20,335	$20,217	$118	99.4%	0.6%
City of Ouzinkie	$19,944	$19,828	$116	99.4%	0.6%
City of Petersburg	[redacted]				
City of Port Heiden	$9,904	$9,817	$87	99.1%	0.9%
City of Port Lions	$19,990	$19,874	$116	99.4%	0.6%
City of Saint George	$7,643	$7,613	$30	99.6%	0.4%
City of Saint Paul	$7,643	$7,613	$30	99.6%	0.4%
City of Sand Point	$34,947	$34,641	$307	99.1%	0.9%
City of Seward	$2,707	$2,675	$33	98.8%	1.2%
City of Togiak	$12,100	$12,059	$41	99.7%	0.3%
City of Unalaska	$392,390	$347,159	$45,231	88.5%	11.5%
City of Whittier	$28,504	$28,440	$64	99.8%	0.2%
Subtotal	$1,557,291	$1,448,508	$108,783	93.0%	7.0%
All Other Alaska Communities	$163,202	$162,847	$354	99.8%	0.2%
Grand Total	$1,720,493	$1,611,355	$109,137	93.7%	6.3%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 109. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2017

Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
		Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Municipality of Anchorage	$20,644	$20,644	$0	100.0%	0.0%
City and Borough of Juneau	$10,604	$10,604	$0	100.0%	0.0%
City and Borough of Sitka	$31,790	$31,105	$685	97.8%	2.2%
City and Borough of Wrangell	$12,453	$12,184	$268	97.8%	2.2%
Aleutians East Borough	$217,008	$78,900	$138,108	36.4%	63.6%
Bristol Bay Borough	$16,566	$15,339	$1,227	92.6%	7.4%
Kenai Peninsula Borough	$6,530	$6,530	$0	100.0%	0.0%
Kodiak Island Borough	$78,304	$73,370	$4,934	93.7%	6.3%
Lake and Peninsula Borough	$33,186	$30,857	$2,329	93.0%	7.0%
Petersburg Borough	$14,709	$14,392	$317	97.8%	2.2%
Yakutat Borough	$3,445	$1,211	$2,234	35.2%	64.8%
City of Adak	$241,271	$82,413	$158,858	34.2%	65.8%
City of Akhiok	$18,459	$17,296	$1,163	93.7%	6.3%
City of Akutan	$319,119	$109,005	$210,114	34.2%	65.8%
City of Aleknagik	$7,995	$7,403	$592	92.6%	7.4%
City of Atka	$216,780	$74,048	$142,733	34.2%	65.8%
City of Bethel	$0	$0	$0	--	--
City of Cold Bay	$9,739	$8,947	$792	91.9%	8.1%
City of Cordova	$39,559	$39,357	$203	99.5%	0.5%
City of Dillingham	$36,610	$33,898	$2,711	92.6%	7.4%
City of False Pass	$9,572	$8,794	$778	91.9%	8.1%
City of Homer	$3,450	$3,450	$0	100.0%	0.0%
City of King Cove	$37,127	$34,108	$3,019	91.9%	8.1%
City of Kodiak	$73,886	$69,231	$4,656	93.7%	6.3%
City of Larsen Bay	$18,414	$17,254	$1,160	93.7%	6.3%
City of Manakotak	$11,150	$10,325	$826	92.6%	7.4%
City of New Stuyahok	$11,431	$10,585	$847	92.6%	7.4%
City of Newhalen	$7,326	$6,784	$543	92.6%	7.4%
City of Old Harbor	$19,693	$18,452	$1,241	93.7%	6.3%
City of Ouzinkie	$19,192	$17,983	$1,209	93.7%	6.3%
City of Petersburg	[redacted]				
City of Port Heiden	$10,938	$10,049	$889	91.9%	8.1%
City of Port Lions	$19,210	$18,000	$1,210	93.7%	6.3%
City of Saint George	$7,956	$6,790	$1,166	85.3%	14.7%
City of Saint Paul	$7,956	$6,790	$1,166	85.3%	14.7%
City of Sand Point	$38,827	$35,670	$3,157	91.9%	8.1%
City of Seward	$3,309	$3,309	$0	100.0%	0.0%
City of Togiak	$0	$0	$0	--	--
City of Unalaska	$753,555	$257,399	$496,156	34.2%	65.8%
City of Whittier	$39,559	$39,357	$203	99.5%	0.5%
Subtotal	$2,427,326	$1,241,831	$1,185,495	51.2%	48.8%
All Other Alaska Communities	$175,975	$172,805	$3,171	98.2%	1.8%
Grand Total	$2,603,302	$1,414,636	$1,188,666	54.3%	45.7%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 110. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2018

		Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
Municipality, Borough, or City	**Total DCCED Shared Fisheries Revenue**	**Fisheries Business Tax**	**Fisheries Resource Landing Tax**	**Fisheries Business Tax**	**Fisheries Resource Landing Tax**
Municipality of Anchorage	$18,861	$17,663	$1,197	93.7%	6.3%
City and Borough of Juneau	$0	$0	$0	--	--
City and Borough of Sitka	$28,371	$28,272	$99	99.7%	0.3%
City and Borough of Wrangell	$11,156	$11,117	$39	99.7%	0.3%
Aleutians East Borough	$180,820	$112,679	$68,141	62.3%	37.7%
Bristol Bay Borough	$8,715	$8,034	$681	92.2%	7.8%
Kenai Peninsula Borough	$5,540	$5,188	$352	93.7%	6.3%
Kodiak Island Borough	$82,398	$80,516	$1,882	97.7%	2.3%
Lake and Peninsula Borough	$27,087	$25,836	$1,251	95.4%	4.6%
Petersburg Borough	$13,076	$13,031	$46	99.7%	0.3%
Yakutat Borough	$4,293	$1,398	$2,895	32.6%	67.4%
City of Adak	$200,953	$121,121	$79,832	60.3%	39.7%
City of Akhiok	$19,413	$18,970	$443	97.7%	2.3%
City of Akutan	$268,504	$161,836	$106,668	60.3%	39.7%
City of Aleknagik	$4,188	$3,861	$327	92.2%	7.8%
City of Atka	$177,100	$106,744	$70,356	60.3%	39.7%
City of Bethel	$0	$0	$0	--	--
City of Cold Bay	$12,730	$12,339	$391	96.9%	3.1%
City of Cordova	$23,144	$23,144	$0	100.0%	0.0%
City of Dillingham	$18,650	$17,193	$1,457	92.2%	7.8%
City of False Pass	$13,394	$12,983	$411	96.9%	3.1%
City of Homer	$2,620	$2,454	$166	93.7%	6.3%
City of King Cove	$53,704	$52,055	$1,650	96.9%	3.1%
City of Kodiak	$76,921	$75,164	$1,757	97.7%	2.3%
City of Larsen Bay	$19,222	$18,783	$439	97.7%	2.3%
City of Manakotak	$6,110	$5,633	$477	92.2%	7.8%
City of New Stuyahok	$6,117	$5,639	$478	92.2%	7.8%
City of Newhalen	$3,919	$3,613	$306	92.2%	7.8%
City of Old Harbor	$20,692	$20,219	$473	97.7%	2.3%
City of Ouzinkie	$20,005	$19,548	$457	97.7%	2.3%
City of Petersburg	[redacted]				
City of Port Heiden	$14,580	$14,132	$448	96.9%	3.1%
City of Port Lions	$20,177	$19,716	$461	97.7%	2.3%
City of Saint George	$6,958	$5,861	$1,097	84.2%	15.8%
City of Saint Paul	$6,958	$5,861	$1,097	84.2%	15.8%
City of Sand Point	$54,653	$52,974	$1,679	96.9%	3.1%
City of Seward	$2,477	$2,320	$157	93.7%	6.3%
City of Togiak	$8,846	$8,154	$691	92.2%	7.8%
City of Unalaska	$605,576	$365,001	$240,575	60.3%	39.7%
City of Whittier	$23,144	$23,144	$0	100.0%	0.0%
Subtotal	$2,071,072	$1,482,195	$588,877	71.6%	28.4%
All Other Alaska Communities	$141,074	$139,085	$1,989	98.6%	1.4%
Grand Total	$2,212,146	$1,621,280	$590,867	73.3%	26.7%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.

Table 111. Alaska DDECD Shared Revenue Amounts by Municipality, Borough, and City by Fishery Tax Type, Communities with Resource Landing Tax Revenues and All Other Alaska Communities, Fiscal Year 2019

Municipality, Borough, or City	Total DCCED Shared Fisheries Revenue	Amount of Shared Fisheries Revenue by Source		Percent of Shared Fisheries Revenue by Source	
		Fisheries Business Tax	Fisheries Resource Landing Tax	Fisheries Business Tax	Fisheries Resource Landing Tax
Municipality of Anchorage	$16,473	$16,473	$0	100.0%	0.0%
City and Borough of Juneau	$9,883	$9,883	$0	--	--
City and Borough of Sitka	$26,537	$26,390	$147	99.4%	0.6%
City and Borough of Wrangell	$10,376	$10,318	$57	99.4%	0.6%
Aleutians East Borough	$175,985	$72,508	$103,477	41.2%	58.8%
Bristol Bay Borough	$15,340	$14,098	$1,241	91.9%	8.1%
Kenai Peninsula Borough	$4,728	$4,728	$0	100.0%	0.0%
Kodiak Island Borough	$81,629	$74,228	$7,401	90.9%	9.1%
Lake and Peninsula Borough	$35,823	$34,032	$1,792	95.0%	5.0%
Petersburg Borough	$12,307	$12,239	$68	99.4%	0.6%
Yakutat Borough	$7,783	$1,438	$6,345	18.5%	81.5%
City of Adak	$195,796	$73,844	$121,952	37.7%	62.3%
City of Akhiok	$19,020	$17,295	$1,724	90.9%	9.1%
City of Akutan	$262,297	$98,925	$163,372	37.7%	62.3%
City of Aleknagik	$7,784	$7,154	$630	91.9%	8.1%
City of Atka	$171,137	$64,544	$106,593	37.7%	62.3%
City of Bethel	$0	$0	$0	--	--
City of Cold Bay	$11,690	$11,517	$173	98.5%	1.5%
City of Cordova	$30,297	$30,190	$107	99.6%	0.4%
City of Dillingham	$32,171	$29,567	$2,604	91.9%	8.1%
City of False Pass	$11,728	$11,554	$174	98.5%	1.5%
City of Homer	$2,143	$2,143	$0	100.0%	0.0%
City of King Cove	$44,170	$43,516	$655	98.5%	1.5%
City of Kodiak	$75,175	$68,359	$6,816	90.9%	9.1%
City of Larsen Bay	$19,001	$17,278	$1,723	90.9%	9.1%
City of Manakotak	$10,690	$9,825	$865	91.9%	8.1%
City of New Stuyahok	$10,888	$10,006	$881	91.9%	8.1%
City of Newhalen	$7,703	$7,079	$623	91.9%	8.1%
City of Old Harbor	$20,226	$18,393	$1,834	90.9%	9.1%
City of Ouzinkie	$19,575	$17,800	$1,775	90.9%	9.1%
City of Petersburg	[redacted]				
City of Port Heiden	$0	$0	$0	--	--
City of Port Lions	$19,853	$18,053	$1,800	90.9%	9.1%
City of Saint George	$1,809	$1,809	$0	100.0%	0.0%
City of Saint Paul	$1,809	$1,809	$0	100.0%	0.0%
City of Sand Point	$43,790	$43,141	$649	98.5%	1.5%
City of Seward	$2,006	$2,006	$0	100.0%	0.0%
City of Togiak	$15,142	$13,916	$1,225	91.9%	8.1%
City of Unalaska	$587,329	$221,510	$365,819	37.7%	62.3%
City of Whittier	$30,297	$30,190	$107	99.6%	0.4%
Subtotal	$2,050,388	$1,147,756	$902,631	56.0%	44.0%
All Other Alaska Communities	$138,817	$137,033	$1,784	98.7%	1.3%
Grand Total	$2,189,205	$1,284,789	$904,416	58.7%	41.3%

Source: Adapted from DCCED Spreadsheet supplied by K. Phillips 10/9/2019.