DRAFT

Regulatory Impact Review

for Proposed Regulatory Amendment

Voluntary Halibut Deck Sorting on Trawl Catcher/Processors When Operating in Non-Pollock Groundfish Fisheries off Alaska

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Abstract: This Regulatory Impact Review evaluates the benefits and costs of a proposed regulatory amendment to allow halibut to be sorted on deck of trawl catcher processors (CPs) when operating in non-pollock groundfish fisheries off Alaska. This would allow Pacific halibut to be returned to sea from the deck prior to crossing the flow scale. The purpose of these regulations is to reduce the discard mortality of halibut aboard trawl CPs operating in non-pollock fisheries off Alaska. This reduction in discard mortality of halibut will increase the amount of time trawl CPs operating in non-pollock fisheries off Alaska can fish for groundfish before reaching the halibut prohibited species catch (PSC) limit. The objective of deck sorting is to minimize halibut bycatch to the extent practicable, which may provide additional harvest opportunities in the commercial halibut fishery.

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List of Acronyms and Abbreviations

AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System
CFR	Code of Federal Regulations
Council	North Pacific Fishery Management Council
CP	catcher/processor
CV	catcher vessel
E.O.	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
ESA	Endangered Species Act
FMP	fishery management plan
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRFA	Final Regulatory Flexibility Analysis
GOA	Gulf of Alaska
IRFA	Initial Regulatory Flexibility Analysis
LLP	license limitation program
m	meter or meters
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
mt	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 Groundfish and Halibut Observer Program
PSC	prohibited species catch
PPA	Preliminary preferred alternative
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation
SBA	Small Business Act
Secretary	Secretary of Commerce
TAC	total allowable catch
U.S.	United States

Contents

List of Tables

List of Figures

1 Introduction

This Regulatory Impact Review (RIR)[1] evaluates the benefits and costs of a proposed regulatory amendment to allow halibut to be sorted on deck of trawl catcher processors (CPs) when operating in non-pollock groundfish fisheries off Alaska. This would allow Pacific halibut to be returned to sea from the deck prior to crossing the flow scale. The purpose of these regulations is to reduce the discard mortality of halibut aboard trawl CPs operating in non-pollock fisheries off Alaska.

A RIR provides assessments of the reasonable alternatives and the economic benefits and costs of the action alternatives, as well as their distribution, and identifies the directly regulated small entities. The only effects of the proposed action are economic, as analyzed in this RIR. The proposed action is a change to a fishery management regulation that would not result in a substantial change in any of the following: fishing location, timing, effort, authorized gear types, or harvest levels. As such, it is categorically excluded from the need to prepare an Environmental Assessment.

This RIR addresses the statutory requirements of Presidential Executive Order (E.O.) 12866 (58 FR 51735, October 4, 1993). This RIR also addresses elements of the Magnuson Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the National Environmental Policy Act.

The preparation of a RIR is required under E.O. 12866. The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the E.O.:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.*

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

[1] "The proposed action has no potential to effect individually or cumulatively on the human environment. The only effects of the action are economic, as analyzed in this RIR/IRFA. As such, it is categorically excluded from the need to prepare an Environmental Assessment."

1.1 Purpose and Need

Regulations for the directed halibut fisheries are implemented by the International Pacific Halibut Commission (IPHC) and allow Pacific halibut to be commercially harvested in the North Pacific Individual Fishing Quota (IFQ) and Multi-Species Community Development Quota (CDQ) fisheries. Halibut is a prohibited species in the groundfish fisheries of the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA). Halibut prohibited species catch (PSC) limits are necessary to limit the amount of halibut taken as bycatch in the trawl groundfish fisheries to ensure halibut is available to support the directed halibut fisheries.

Each year, halibut PSC limits are specified in regulation for the groundfish sectors. In some years, halibut PSC limits may be reached before the fleet has harvested the TAC in the non-pollock limited access fisheries in the BSAI and GOA. This would restrict the harvest of allocated target groundfish species, reducing the overall economic benefit of the fishery. The potential for halibut PSC to limit the harvest of groundfish creates an incentive for vessels to minimize the amount of halibut that accrues toward the PSC limit. In addition, halibut PSC limits were reduced in the GOA in 2014 and in the BSAI in 2016, further increasing the potential to constrain the harvest of target species TAC in non-pollock groundfish trawl fisheries.

Halibut PSC accruing against a sector's halibut PSC limit is determined by applying a discard mortality rate (DMR) to the total estimated amount of halibut caught by that sector. Halibut PSC limits are not expressed as the amount of halibut caught, rather, they are expressed as halibut mortality (i.e., metric tons of dead halibut).The DMR is calculated using viability data collected by NMFS-certified observers (observers). Catch handling and monitoring requirements ensure that no halibut are removed from the catch prior to sampling by an observer after the unsorted catch has been weighed in the factory. Observers assess the condition of halibut at the point of discard (in the factory) to determine the viability of discarded halibut. Halibut mortality increases with increased handling and time out of water. To maximize halibut viability, NMFS requires that all halibut must be returned to the sea as soon as possible after allowing sampling by observers. In the non-pollock groundfish trawl fisheries most of the halibut have typically been out of the water for long periods of time and are usually dead or in poor condition at the time of discard after weighing and sorting in the factory. This results in a high halibut DMR for the non-pollock trawl groundfish fishery.

For several years, experiments conducted through Exempted Fishing Permits (EFPs), have tested procedures to improve halibut viability by sorting, conducting viability sampling, and discarding halibut on the deck of the vessel. The data collected during EFP fishing show that the practice of deck sorting improves halibut viability. Participation in these EFPs has been widespread across fisheries, times of year, and fishing fleets within the BSAI.

The purpose of this action is to establish catch handling and monitoring requirements that would ensure accurate halibut PSC accounting for halibut sorted and discarded from the deck of a vessel prior to entering the factory. Sorting halibut on the deck of a vessel would reduce the mortality of halibut bycatch in the non-pollock groundfish trawl fisheries.

1.2 Statutory Authority

Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801, *et seq*.), the United States has exclusive fishery management authority over all marine fishery resources found within the exclusive economic zone (EEZ). The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the regional fishery management councils. In the Alaska Region, the North Pacific Fishery Management Council (Council) has the responsibility for preparing fishery management plans (FMPs) and FMP amendments for the marine fisheries that require conservation and management, and for submitting its recommendations to the

Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the Federal mandates of the Department of Commerce with regard to marine and anadromous fish.

Trawl CPs operating in non-pollock groundfish fisheries off Alaska are managed under the FMP for Groundfish of the BSAI Management Area and the FMP for Groundfish of the GOA. The proposed action under consideration would amend Federal regulations at 50 CFR 679. Actions taken to implement regulations governing these fisheries must meet the requirements of Federal law and regulations.

NMFS intends to promulgate these regulations under section 305(d) of the Magnuson Stevens Act, which authorizes the Secretary of Commerce to develop regulations necessary to implement FMPs. Specifically, this action is necessary to implement the Management Objectives (Section 2.2.1) of the FMP for the BSAI and the FMP for the GOA, which state:

- "Continue and improve current incidental catch and bycatch management program" (Objective 14) and
- "Continue to account for bycatch mortality in total allowable catch accounting and improve the accuracy of mortality assessments for target, prohibited species catch, and non-commercial species" (Objective 19).

1.3 History of this Action

1.3.1 Background

The IPHC and NMFS manage fishing for Pacific halibut (*Hippoglossus stenolepis*) through regulations established under the authority of the Convention between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea (Convention) and the Northern Pacific Halibut Act of 1982. The IPHC promulgates regulations pursuant to the Convention. The IPHC's regulations are subject to approval by the Secretary of State with concurrence from the Secretary. Regulations implemented by the IPHC allow Pacific halibut to be commercially harvested by the directed North Pacific longline fishery.

Pacific halibut is fully utilized in the waters off Alaska as a target species in subsistence, personal use, recreational (sport), and commercial halibut fisheries. Halibut is also incidentally taken as bycatch in groundfish fisheries. Although participants in the groundfish fisheries are under an obligation to avoid halibut, all halibut cannot be avoided. The groundfish fisheries cannot be prosecuted without some amount of halibut bycatch because groundfish and halibut occur in the same areas at the same times and because no fishing gear or technique has been developed that can avoid all halibut bycatch.

Although halibut is taken as bycatch 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. Halibut bycatch occurs in both the GOA and the BSAI. The greatest portion of halibut bycatch occurs in the BSAI. NMFS manages halibut bycatch in the BSAI groundfish fisheries by (1) establishing halibut PSC limits for trawl and non-trawl fisheries; (2) apportioning those halibut PSC limits to groundfish sectors, fishery categories, and seasons; and (3) managing groundfish fisheries to prevent halibut PSC use from exceeding the established limits. The proposed rule for Amendment 111 to the BSAI FMP contains a detailed explanation of halibut bycatch management in the BSAI groundfish fisheries (80 FR 71650, 71654-71660, November 16, 2015).

Halibut is a prohibited species in the groundfish fishery, requiring immediate return to the sea with a minimum of injury. Halibut caught incidentally by non-pelagic trawl CPs in the groundfish fisheries must be weighed on a NMFS-approved scale, sampled by observers, and returned to the ocean as soon as possible. The Council establishes annual maximum halibut bycatch allowances and seasonal apportionments adjusted by an estimated halibut DMR for groundfish fisheries. The DMRs are based on

the best information available, including information contained in the annual Stock Assessment and Fishery Evaluation (SAFE) report, available at http://www.alaskafisheries.noaa.gov/. NMFS approves the halibut DMRs developed and recommended by the IPHC and the Council for the BSAI groundfish fisheries for use in monitoring the halibut bycatch allowances and seasonal apportionments (see Section 2.3.2 for additional information on DMRs).

Directed fishing in a groundfish fishery closes when the halibut mortality apportionment for the fishery is reached, even if the target species catch is less than the seasonal or annual quota for the directed fishery. In the case of the Bering Sea flatfish fishery, seasons have been closed before fishery quotas have been reached to prevent the fishery from exceeding the halibut mortality apportionment.

A decrease in halibut biomass has been shown in the BSAI[2]. Amendment 57 to the BSAI FMP (65 FR 31105, May 16, 2000) prohibited the use of nonpelagic trawl gear in the non-CDQ pollock fishery in the BSAI. The prohibition was expected to reduce trawl halibut PSC on a permanent basis. Therefore, Amendment 57 reduced the BSAI trawl gear halibut PSC limit of 3,775 mt by 100 mt to 3,675 mt.

With the implementation of Amendment 80 to the BSAI FMP (72 FR 52668, September 14, 2007), halibut PSC limits were established for the Amendment 80 sector and for Amendment 80 cooperatives. Amendment 80 is a catch share program that allocates several BSAI non-pollock trawl groundfish fisheries (including the flatfish fishery) among fishing sectors, and facilitates the formation of harvesting cooperatives in the non-American Fisheries Act (non-AFA) trawl CP sector. Amendment 80 reduced the halibut PSC allocated to the Amendment 80 sector starting in 2009. The allocation of halibut PSC to the Amendment 80 sector was reduced 50 mt a year from 2009 to 2012 ultimately resulting in an annual reduction of 200 mt of halibut PSC from the Amendment 80 sector. In 2011, the 50 mt reduction was allocated to the CDQ sector. The halibut PSC allocation under Amendment 80 resulted in a total reduction of the annual trawl halibut PSC limit by 150 mt. Though halibut PSC limits provide Amendment 80 cooperatives more flexibility to use available mortality, halibut mortality continues to constrain fishing in some Amendment 80 fisheries. Therefore, this sector is actively exploring ways to continue to reduce halibut mortality.

The Amendment 80 sector may also harvest groundfish in the GOA. The Amendment 80 sector does not receive fishery allocations in the GOA and the amount of each groundfish species that may be caught by the cooperative in the GOA is limited to the sideboard amounts specified in Table 27 of the 2018 GOA Groundfish Harvest Specifications. The Amendment 80 sector is subject to halibut PSC limits established for that sector in the GOA. The Amendment 80 sector GOA halibut PSC limits for 2018 are provided in Table 28 of the GOA Groundfish Harvest Specifications. The 2018 GOA Groundfish Harvest Specifications are available at: https://alaskafisheries.noaa.gov/harvest-specifications/field_harvest_spec_year/2017-2018-841.

Amendment 111 to the BSAI FMP, implemented on April 27, 2016 (81 FR 24714), reduced halibut PSC limits in the BSAI groundfish fisheries in four groundfish sectors: the Amendment 80 sector; the BSAI trawl limited access sector (all non-Amendment 80 trawl fishery participants); the non-trawl sector (primarily hook-and-line CPs); and the CDQ Program. The purpose of Amendment 111 was to decrease BSAI halibut PSC to the extent practicable by the BSAI groundfish fisheries while achieving, on a continuing basis, optimum yield from the BSAI groundfish fisheries. The final rule for Amendment 111 implemented the following reduced BSAI halibut PSC limits: 1,745 mt for the Amendment 80 sector; 745 mt for the BSAI trawl limited access sector; 710 mt for the BSAI non-trawl sector; and 315 mt for the CDQ Program. These reductions resulted in an overall BSAI halibut PSC limit of 3,515 mt. By reducing

[2] Described in more detail in Section 3.3.1.1 of the Environmental Assessment/ Regulatory Impact Review For 2018 Pacific halibut catch limits and associated management measures in International Pacific Halibut Commission Regulatory Areas: Area 2C (Southeast Alaska), Area 3A (Central Gulf of Alaska), Area 3B (Western Gulf of Alaska), and Area 4 (subdivided into 5 areas, 4A through 4E, in the Bering Sea and Aleutian Islands of Western Alaska). Available from the NMFS Alaska Region website at http://alaskafisheries.noaa.gov.

halibut PSC, the final rule for Amendment 111 aimed to increase harvest opportunities for the directed halibut fisheries, if the IPHC increased catch limits for the directed halibut fisheries.

GOA halibut PSC limits were reduced 7% with the implementation of Amendment 95 to the GOA FMP (79 FR 9625, March 24, 2014). The reduction of PSC limits also may create additional harvest opportunities in the directed fisheries at a time of declining halibut biomass. This amendment reduced GOA halibut PSC limits by 7% for the hook-and-line CP sector, 15% for the hook-and-line catcher vessel (CV) sector, and 15% for the trawl sector.

The Amendments 111 to the BSAI FMP and 95 to the GOA FMP further incentivized the continued exploration of ways to reduce halibut mortality.

1.3.2 Catch Rates, Bycatch Rates, Total Annual Harvest for Target and Incidental Catch Species, Discards, and Halibut Mortality.

To monitor halibut PSC limits and apportionments, the Regional Administrator uses observed halibut incidental catch rates, halibut DMRs, and estimates of groundfish catch to project when a fishery's halibut PSC limit 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 information available in conjunction with the annual BSAI SAFE report process. The DMR methodology and findings are available on the Council website (https://www.npfmc.org/halibut-management-committee/).

Historically, DMRs consisted of long-term averages of annual DMRs within target fisheries that were defined by management area, CDQ, gear, and target species. Since the late 1990s, halibut DMRs were calculated by the IPHC as part of the SAFE reports, which then provided the estimates to the Council and NMFS for application in managing halibut PSC limits. Long-term averages were taken from annual estimates for the most recent ten-year period with the number of years with data to support annual DMR estimates varying among fisheries. Fishery-specific DMRs, once calculated, were generally in place for three-year increments. See Table 1 for halibut DMRs for the BSAI for 2013 through 2016.

Table 1 IPHC-calculated Pacific halibut DMRs for the BSAI for 2013-2016.

Gear	Fishery	2013, 2014, and 2015 Halibut DMR (%)	2016 Halibut DMR (%)
Non-CDQ hook-and-line	Greenland turbot	13	11
	Other species[1]	9	9
	Pacific cod	9	9
	Rockfish	4	9
Non-CDQ trawl	Alaska Plaice	71	66
	Arrowtooth flounder[2]	76	84
	Atka mackerel	77	82
	Flathead sole	73	72
	Greenland turbot	64	82
	Kamchatka flounder	n/a	84

	Non-pelagic pollock	77	81
	Pelagic pollock	88	88
	Other flatfish[3]	71	63
	Other species[1]	71	66
	Pacific cod	71	66
	Rockfish	79	83
	Rock sole	85	86
	Sablefish	75	66
	Yellowfin sole	83	84
Non-CDQ Pot	Other species[1]	8	9
	Pacific cod	8	9
CDQ trawl	Atka mackerel	86	82
	Arrowtooth flounder[2]	n/a	84
	Flathead sole	79	79
	Greenland turbot	89	84
	Kamchatka flounder	n/a	86
	Non-pelagic pollock	83	90
	Pacific cod	90	87
	Pelagic pollock	90	89
	Rock sole	88	70
	Rockfish	80	86
	Yellowfin sole	86	85
CDQ hook-and-line	Greenland turbot	4	10
	Pacific cod	10	10
CDQ pot	Pacific cod	8	1
	Sablefish	34	41

NMFS revised methods for estimating DMRs consistent with those methods developed by the halibut DMR working group and recommended by the Council for the 2017 and 2018 groundfish harvest specifications in both the BSAI and GOA[3]. Table 2 and Table 3 compare the 2016 halibut DMRs to the 2017 and 2018 halibut DMRs recommended by the working group for the BSAI and GOA, respectively. A summary of the changes in DMR estimation methods made by the DMR working group follows.

[3] Halibut DMR Working Group Report, October 2016. Available at: http://npfmc.legistar.com/gateway.aspx?M=F&ID=fe3c4031-8377-45c7-b081-39fe23315cfe.pdf

The halibut DMR working group, consisting of the IPHC, Council, and NMFS Alaska Region staff, recommended the following broad changes to the DMR estimation method: implementation of sampling design consistent with sampling protocols used under the restructured Observer Program; categorization of data of halibut viability based on vessel operations (sorting and handling practices, gear type, and processing sector) rather than target fisheries; and revision of reference timeframes to obtain estimates that are more responsive to changes in how the groundfish fisheries are observed and managed. These recommendations, and others, are described below.

- Incorporate CDQ with non-CDQ in the calculation of the DMRs instead of the currently specified DMRs, which calculate DMRs separately for CDQ and non-CDQ. Regulations allow assignment of CDQ status to a haul up to two hours after completion of gear retrieval. Most vessels fishing under the CDQ program also participate in the non-CDQ fisheries. The size of the haul, fishing operations, and catch-handling process do not tend to differ compared to the non-CDQ fisheries. For this reason, CDQ is not a recommended aggregation factor for estimating DMRs under the revised estimation method.
- Revise the DMR estimation methodology for consistency with the sampling protocols instituted in 2013 through the restructured Observer Program. The Observer Program randomizes sampling of fishing trips within operational groupings, sampling of hauls within fishing trips, and sampling of biological data within hauls. Basing halibut DMR estimation on a sampling design consistent with Observer Program sampling protocols should reduce the potential for sampling bias, improve data on operational causes of variation in post-capture halibut viability, and promote the ability for NMFS to make timely improvements to halibut DMR estimation in the future.
- Incorporate the use of vessel operations into DMR estimation methodology. This incorporates data about the viability (likelihood to survive) of discarded halibut into DMR calculations. Data based on different vessel operational categories, such as sorting practices, handling practices, gear type, and processing sectors (i.e. CVs, CPs, and CVs delivering to motherships), provide better information on halibut viability. NMFS expects that incorporating this information into the DMR estimation methodology will yield a more precise estimate of actual mortality.
- Remove the use of target fishery. Fishery targets do not necessarily characterize statistical and/or vessel operational differences in the sampling or handling of halibut PSC. Using fishery target aggregations may have reduced the quality of DMR estimates due to small sample sizes or by combining vessel operations with very important differences in sampling and handling characteristics.
- Change the reference timeframe for DMR calculations. Rather than using 10-year average rates, the revised methodology estimates DMRs based on initial 3-year average rates. Using 2013 as the starting year is more responsive to, and better aligns DMR calculation methodology with, the 2013 restructured Observer Program's sampling protocols. Using 2013 as the base year, NMFS and the Council will evaluate the timeframe each year. Evaluating the timeframe each year will enable NMFS and the Council to update the methodology and the halibut DMRs based on the best available information.

The working group's discussion paper also included a comparison of the total amount of halibut mortality that accrues using current DMRs versus the working group's recommended DMRs. Calculating the 2015 halibut mortality using specified DMRs yielded 2,312 mt of halibut mortality, whereas using the recommended DMRs yielded 2,299 mt of halibut morality (a less than 1% decrease). Calculating the 2016 halibut mortality (through September 2016) yielded 1,701 mt of halibut mortality, versus 1,663 mt of halibut mortality when applying the recommended DMRs (a 2% decrease).

Table 2 Pacific halibut DMRs for the BSAI.

Gear	Sector	Halibut DMR (percent)		
		2016	2017	2018
Pelagic trawl	All	63 - 90 depending on target and CDQ	100	100
Non-pelagic trawl	Mothership and CP		85	84
Non-pelagic trawl	CV		52	60
Hook-and-line	CP	9 - 11 depending on target and CDQ	8	8
Hook-and-line	CV		14	17
Pot	All	1 - 41 depending on target	6	9

Table 3 Pacific halibut DMRs for the GOA.

Gear	Sector	Halibut DMR (percent)		
		2016	2017	2018
Pelagic trawl	All	58 - 76 depending on target	100	100
Non-pelagic trawl	Mothership and CP		85	84
Non-pelagic trawl	CV Rockfish Program		67	62
Non-pelagic trawl	CV		65	67
Hook-and-line	CP	10	11	10
Hook-and-line	CV	10	12	17
Pot	All	15	10	7

1.3.3 Halibut PSC Accounting Including Recent Reductions

NMFS calculates halibut PSC mortality based upon groundfish observer data. Observers sample hauls and then estimates of the ratio of halibut to groundfish are applied to the official total catch of groundfish for each sampled haul. Observers have sampled catch in the Alaska Federal groundfish fisheries since the early 1990s and routinely collect lengths and weights of the sampled catch. The observer data are provided to the NMFS Alaska Region CAS. Rates for the amount of halibut caught are developed from the sampled hauls. Factors to determine which rates apply to which hauls include vessel type, whether sampled hauls occurred on the same vessel, processing sector, nearness in time, trip target, gear type, FMP area, reporting area, special areas, management program, and observer selection method. These factors are applied to algorithms to give a rate of halibut caught to every haul. This rate is then applied to the official total catch of each haul. Once the estimated halibut catch for every haul is calculated, estimated DMRs are applied to estimate the amount of halibut PSC mortality accrued by every haul.

A decrease in halibut biomass has been shown in the BSAI[4]. Amendment 80 reduced the halibut PSC allocated to the Amendment 80 sector starting in 2009. The allocation of halibut PSC to the Amendment

[4] Described in more detail in Section 3.3.1.1 of the Environmental Assessment/ Regulatory Impact Review For 2018 Pacific halibut catch limits and associated management measures in International Pacific Halibut Commission Regulatory Areas: Area 2C (Southeast Alaska), Area 3A (Central Gulf of Alaska), Area 3B (Western Gulf of Alaska), and Area 4 (subdivided into 5 areas, 4A through 4E, in the Bering Sea and Aleutian Islands of Western Alaska). Available from the NMFS Alaska Region website at http://alaskafisheries.noaa.gov.

80 sector was reduced 50 mt a year from 2009 to 2012 ultimately resulting in an annual reduction of 200 mt of halibut PSC from the Amendment 80 sector. In 2011, the 50 mt reduction was allocated to the CDQ sector. The halibut PSC allocation under Amendment 80 resulted in a total reduction of the annual trawl halibut PSC limit by 150 mt. BSAI halibut PSC limits were reduced 21% with the implementation of Amendment 111 to the BSAI FMP (81 FR 24714, May 27, 2016; Table 4). This reduction may provide additional directed fishing opportunity in a climate of reduced halibut biomass.

Table 4 Changes in BSAI halibut PSC limits (mt) from 2015 to 2016 as a result of Amendment 111.

	Amendment 80	BSAI TLAS	Hook-and-line fisheries	CDQ	Total PSC limit
2015	2,325	875	833	393	4,426
2016	1,745	745	710	315	3,515

GOA halibut PSC limits were reduced 7% with the implementation of GOA FMP Amendment 95 (79 FR 9625, March 24, 2014). The reduction of PSC limits also may create additional harvest opportunities in the directed fisheries at a time of declining halibut biomass. This amendment reduced GOA halibut PSC limits by 7% for the hook-and-line CP sector, 15% for the hook-and-line CV sector, and 15% for the trawl sector.

1.3.4 Halibut Discard Requirements

Before incidentally caught halibut are returned to the sea, at-sea observers must estimate halibut and groundfish catch amounts. Regulations in 50 CFR part 679 assure that observer estimates of halibut and groundfish catch are credible and accurate, and that potential bias is minimized. For example, NMFS requires Amendment 80sector fishing vessels to make all catch available for sampling by an observer; prohibits vessel crew from tampering with observer samples; prohibits vessel crew from removing halibut from a codend, bin, or conveyance system prior to being observed and counted by an at-sea observer; and prohibits fish (including halibut) from remaining on deck unless an observer is present.

Regulations at § 679.2 and Table 2b to part 679 define halibut caught incidentally to directed fishing for groundfish as PSC. Halibut PSC in the directed groundfish fisheries of the GOA and BSAI are managed under regulations at § 679.21. These regulations require that all vessels minimize catch of prohibited species and that all vessels discard PSC with a minimum of injury after allowing for sampling by an observer. The requirement to discard halibut caught with trawl gear was first implemented in 1977 as a requirement for the foreign fishing fleet (42 FR 9297, February 15, 1977). Subsequent actions in implemented requirements applicable to the foreign fishing (43 FR 59292, December 19, 1978) and domestic trawl fisheries of the GOA (43 FR 52709, November 14, 1978) and BSAI (46 FR 63295, December 31, 1981) that required vessels to sort catch and minimize harm to PSC. These requirements were intended to minimize the incidental catch of halibut in the trawl fisheries, as well as minimize the mortality of discarded halibut.

Halibut discard requirements state that an observer must first have access to sample the catch prior to sorting and discard. The specific point of discard and catch handling procedures may vary depending on each vessel's configuration, but generally, since the implementation of monitoring requirements for the Amendment 80 Program and the Central GOA Rockfish Program (Rockfish Program), vessels are allowed only one operational line for the mechanized movement of fish from the scale used to weigh catch and the location where the observer collects species composition samples.

The Observer Sampling Manual[5], published annually by the North Pacific Observer Program (Observer Program), details sampling techniques and protocols for the most common vessel configurations.

1.3.5 Deck Sorting EFP

In the mid-1990s, cooperative research was proposed to return halibut to the water while viable. In 1999, Groundfish Forum developed the "halibut mortality avoidance program" proposal to allow deck sorting on its trawl CPs fishing for flatfish. Unfortunately, neither proposed program could be implemented because the needed monitoring and accountability measures were unavailable at the time. The catch handling procedures for trawl CPs currently require all catch to go over the flow scale to allow for complete accounting of weight and catch composition by the observer in the factory. Regulations do not allow the crew to sort out the halibut on deck and return them to the sea. Absent changes in regulations, deck sorting can only be done under EFPs. The BSAI and GOA FMPs and the implementing regulations at § 600.745(b) and § 679.6 allow the NMFS Regional Administrator to authorize, for limited experimental purposes, fishing that would otherwise be prohibited. To explore the feasibility of modifications to catch handling procedures to sort and account for halibut on deck, five EFPs have been granted by NMFS over about a 10-year period. These EFPs, as well as the EFP applications, are available on the NMFS Alaska Region website (https://alaskafisheries.noaa.gov/) and are incorporated here by reference. Summaries of the EFPs are provided in Table 5 and this section.

[5] The Observer Sampling Manual is available on the AFSC Website: https://www.afsc.noaa.gov/FMA/document.htm

Table 5 Summary of deck sorted EFP history, 2009 through 2019.

Year	Management Area	Participating Sectors	Number of Vessels	EFP Fishing Months	Sampling	Halibut Discard Estimate Method	EFP Halibut Mortality Rate (percent)[6]	Halibut Mortality Savings (t)[7]
2009	BSAI	A80 CPs	3	May, June	2 sea samplers (+ 2 observers)	Deck and factory census, length and viability for every halibut	45	17.15
2012	BSAI	A80 CPs	4	May - September	Same as 2009	Deck: systematic random sample of 1 in 5 halibut, length and viability; census on 20% of EFP hauls; Factory: observer species composition sample	57	10.77
2015	BSAI	A80 CPs	9	May - November	Same as 2009, 2012	Same as 2012, except crew census of halibut in the factory	49	151.6
2016	BSAI	A 80/CDQ CPs[8]	12	May - December	3 observers	Same as 2015	45	290
2017	BSAI	A 80/TLAS/CDQ CPs	17	January - December	2 -4 observers; vessel choice	Deck: same as 2015; Factory: observer species composition sample + census by crew	55	599
2018/2019	BSAI, GOA	A80/TLAS/CDQ CPs	TBD	January - TBD	Same as 2017	Deck: Collect lengths on first 15 fish then length and viability of 1 in 5 systematic random sample; Factory: observer species composition sample	TBD	TBD

[6] Includes factory and deck sorted halibut. The rate is divided by the total catch in the EFP.

[7] Source: Final reports prepared by the EFP Principal Investigator. Reports available online at: https://alaskafisheries.noaa.gov/fisheries/efp

[8] Note, the TLAS sector was included in the EFP, however no deck sorting was conducted during TLAS fisheries.

2009 EFP

In March 2009, an Amendment 80 cooperative (Best Use Cooperative) submitted an application to the NMFS Alaska Region for an EFP to explore ways to reduce halibut mortality rates on trawl CPs targeting flatfish and Pacific cod in the Bering Sea. The EFP was approved by NMFS in late April 2009. The field work was performed in May through June of 2009.

The main objective of the 2009 EFP was to evaluate the potential for reducing halibut DMRs by modifying the halibut handling procedures currently on Amendment 80 vessels. For the EFP, catch handling procedures were modified so that halibut were sorted out of the codend on deck and returned to the sea from the deck via a chute constructed for this purpose. Procedures for the EFP required full accounting of the number and length of each halibut via a census of halibut collected on deck and in the factory, as well as an assessment of viability for each halibut collected in the two locations. The EFP vessels carried two sea samplers in addition to each vessel's two regular observers to complete these duties. Sea samplers had to be observers, but were employed by the EFP holders and trained by the EFP principal investigator to perform additional EFP-related tasks that were outside of the normal duties of observers. Observers completed their normal duties as defined in the Observer Sampling Manual.

In addition to investigating reducing halibut mortality, the EFP collected data on the fraction of the halibut catch that could be sorted out on deck, the time needed to complete sorting, and halibut viability assessment under the procedures of the EFP. The EFP also examined how much extra effort deck sorting would take and how alternative accounting methods for halibut catches and mortality rates might work on Amendment 80 vessels.

The EFP demonstrated that halibut mortality rates on Amendment 80 vessels could be reduced by sorting halibut out of the catch on deck. Most of the modified halibut handling procedures appeared to be feasible for the participating vessels. The EFP operations occurred in relatively low-volume target fisheries and in fisheries with a relatively large difference in halibut size relative to target fish. The EFP also occurred at times of the year with relatively good weather.

Any halibut mortality savings realized by the entire fleet during the EFP, was to be used to allow participating EFP vessels the ability to use that savings while fishing later in the year. However, this additional halibut PSC was not needed by the fleet to allow them to completely harvest the target species later in the year.

The EFP found that collecting lengths and viabilities on every halibut on deck may have biased mortality rates. While crew were generally able to sort out most of the halibut in as little as ten minutes, the measurement and viability assessment for each fish took considerably longer. This was because only one sea sampler was available to account for halibut lengths and viability and therefore halibut sometimes sat in a holding trough awaiting measurement and viability assessment. The EFP did not include collection of time out of water data for each halibut to avoid further delaying return of halibut to the water.

The EFP also evaluated the feasibility and efficacy of using a video monitoring system to monitor adherence to the deck sorting and halibut handling/discard protocols during the EFP. A thorough review of the imagery showed that halibut could be reliably identified and counted in the discard chute. Crew handling procedures for halibut could also be easily assessed using the video monitoring systems.

2012 EFP

In October 2011, an Amendment 80 cooperative, Alaska Seafood Cooperative (AKSC), submitted an application to the NMFS Alaska Region for an EFP to continue research on ways to reduce halibut mortality rates on Amendment 80 vessels through modifications to fishing practices and catch handling procedures.

The 2012 EFP expanded upon the 2009 EFP to conduct testing on a wider subset of Amendment 80 fisheries, vessel sizes, and weather conditions over a longer time span to gain further insight into the feasibility of incorporating sorting halibut from the catch on deck and returning them to the sea as soon as practicable.

Many of the sampling procedures for this EFP were the same as the 2009 EFP. All the EFP vessels used their own groundfish and halibut PSC allocations for the fishing done during the EFP. The EFP vessels again carried two sea samplers in addition to each vessel's two observers. Sea samplers once again had to be observers.

There were three key differences to the 2012 EFP.

First, the sample design was changed to use a stratified random sample to select every fifth halibut for length and viability assessment. One of the key variables affecting halibut viabilities is the time the fish spend out of water. Time of out water was the time between the codend reaching the stern ramp and the halibut length collection. Collecting halibut data from every halibut was time consuming in the 2009 EFP, and on some hauls backlogs of halibut awaiting length and viability assessments affected the mortality. Using this sampling methodology for viability assessments enabled the return of halibut to the water at nearly three times the pace compared to the 2009 EFP. To evaluate the precision and accuracy of the sample-derived halibut weight estimates, all halibut were collected post sampling for a portion of the EFP hauls to compare census versus sample-derived weight estimates of deck-sorted halibut.

Also new for this 2012 EFP, time stamps were recorded for all sampled halibut to evaluate the effects of time out of water on halibut condition. Because sea samplers sampled every fifth halibut instead of completing a census this allowed them to collect each halibut's time out of water without adversely impacting halibut viability.

Finally, EM was not used during this EFP because the efficacy of the system had been proved during the 2009 EFP and additional funds to further test EM were not available.

The EFP again showed that sorting halibut on deck could reduce halibut mortality rates and gained information about the viability of halibut based on time out of water.

Any halibut mortality savings realized by the entire fleet during the EFP, was to be used to allow participating EFP vessels the ability to use that savings while fishing later in the year. However, this additional halibut PSC was not needed by the fleet to allow them to completely harvest the target species later in the year.

Participants attempted to sort all of the halibut on deck no matter the time it took to complete sorting. Because of this practice, it was learned that the fraction of fish in excellent condition decreased after 20-25 minutes. Halibut viability dropped substantially after 25 minutes out of the water.

There were also several challenges encountered.

First, vessels were not allowed to switch back and forth between EFP and normal fishing once EFP fishing began. Vessels were expected to follow deck sorting procedures on all hauls during a trip. Vessel operators chose to participate in the EFP during fisheries with smaller haul sizes and where larger, easier to sort halibut are encountered. The major issue for EFP participants was that deck sorting in high volume fisheries with low halibut bycatch or smaller halibut that were difficult to detect would offer less benefit given the time and effort necessary for minimal halibut mortality reductions. Also, harsh weather during certain fisheries could restrict the ability to deck sort. Some vessel operators chose not to participate in the EFP at times of the year when the weather may not permit extended crew and sea sampler time on deck. This limited the ability to test the efficacy of sorting halibut on deck across a broader range of vessels and fisheries.

Having only one sea sampler available reduced factory production. The EFP did not allow vessels to run fish out of the live tanks unless a sea sampler was present. When fish were brought onboard, sorting in the

factory was halted so that the sea samplers could sample on deck. Following the completion of halibut sorting on deck, the sea sampler moved to the factory to account for and assess viabilities for all halibut missed during deck sorting. Once the sea sampler was present at the sorting belt in the factory, the processing crew could begin running fish out of the live tank. While the cessation of sorting in the factory did not completely halt production, vessels did alter their fishing and processing strategies to minimize slowdowns in production.

2015 EFP

In January 2015, AKSC members submitted an application to the NMFS Alaska Region for another EFP to continue research on ways to reduce halibut bycatch mortality rates on Amendment 80 vessels through modifications to fishing practices and catch handling procedures. The EFP was issued in March 2015.

The principle objective of 2015 EFP was to the test the feasibility of deck sorting for higher volume fisheries.

Based on what was learned during the 2012 EFP, deck sorting was limited to sorting for 20-25 minutes instead of sorting every fish as in the previous EFP. Another element of the EFP was the ability for vessels to "toggle" out of the EFP for some hauls when weather conditions or other factors impeded deck sorting efforts. Finally, the 2015 EFP was designed to help define the management and monitoring measures that would form a regulated program in the future. This included definitions of catch handling and sampling procedures based on earlier EFPs, with the intent that those procedures would serve as an early strawman to start the regulatory process to implement deck sorting. As part of looking at eventual implementation, a requirement was added for cameras on deck to begin evaluating the monitoring of deck sorting.

Besides the changes mentioned above, the procedures on deck and in the factory were nearly identical to the 2012 EFP. Vessel owners did make significant changes to the work stations on deck so that sea samplers were able to collect samples without prolonged kneeling. In addition, for any hauls where a vessel operator did not deck sort on an EFP trip, observers collected halibut data through the standard observer sampling protocol and sea samplers were not involved in data collection. For EFP hauls, sea samplers measured all halibut found in the factory. A default DMR of 90% was assigned to all halibut found in the factory, based on the results from the 2009 and 2012 EFPs' halibut mortality rates. Finally, for vessels to make use of the ability to "toggle" out of deck sorting, a one-hour notice to sea samplers was required prior to bringing an EFP haul onboard. The EFP also included a seven-day advance notice for participation in the EFP and a 72-hour notice to NMFS to allow scheduling of a briefing for observers on EFP trips. Finally, the 2015 EFP provided vessel specific halibut mortality rates based on the viability assessments found on deck for that haul plus the halibut found in the factory.

This new combination of procedures worked to create more halibut mortality savings than previous EFPs and demonstrated again that deck sorting has large potential for generating savings in halibut mortality. Additionally, deck sorting was generally feasible for participants in a wider variety of flatfish target fisheries, including yellowfin sole. The EFP again found that the most critical determinant of halibut viability is time out of water. The data suggested that viability declines if the fish is not returned to the water within 20-25 minutes of when the net is brought onboard.

For higher volume fisheries, the biggest obstacle for vessels participation in the EFP was that catch could not go over the flow scale until deck sorting was completed and the sea sampler was in the factory.

EFP 2016 (with extension into 2017)

On May 6, 2016 NMFS issued an EFP to the AKSC to continue halibut deck sorting. There were several modifications to the 2016 EFP to help determine if implementation of deck sorting would be feasible in a regulated program. Many procedures for conducting deck sorting did not change from the 2015 EFP. The new changes to the 2016 EFP included:

1) The EFP expanded to all Amendment 80 vessels, CPs in the TLAS fisheries, and motherships taking deliveries from TLAS CVs. CDQ hauls by Amendment 80 vessels were included in this EFP. The purpose was to simplify procedures aboard vessels that may participate in any of these fisheries during a single trip. It made complying with the requirements of the EFP clearer for the vessels and easier for catch accounting and collecting the data elements aboard the vessel.

2) Given that the 2016 EFP was issued mid-year, the EFP applicants were interested in gathering more data from the beginning of the year to determine if halibut deck sorting would be feasible earlier in the year, during more severe weather conditions. Therefore, the EFP permit was valid until April 2017.

3) Instead of sea samplers, three observers completed the halibut viabilities on deck and monitored halibut accounting in the factory. The use of observers reduced complexity by establishing a single set of observer duties and work areas, instead of dividing duties between sea samplers and observers. In addition, all data were entered directly into the NMFS Alaska Region Catch Accounting System (CAS). Observers worked 12 hour shifts. Observers used the same stratified random sampling methods as the 2015 EFP for halibut counts and viability on deck. Appendix B was added to the EFP to detail the observer duties for deck sorting.

4) Accounting for halibut found in the factory also changed. Halibut found in observer species composition samples were used to derive the halibut PSC estimate for the haul. Crew also collected all the halibut in the factory and observers counted and collectively weighed the halibut. This allowed for a comparison of extrapolated amount of halibut from observer sampling to the amount of halibut collected by crew in the factory. A mortality rate of 90% was assigned to halibut found in the observer's composition sample in the factory. The sum of the mortality of deck sorted halibut for a haul and mortality of factory halibut for the same haul comprised the total halibut mortality for the haul.

5) The long hours and tedium involved with overseeing the crew's collection of halibut in the factory was problematic for sea samplers in the 2015 EFP. Additionally, no fish could be run over the flow scale until a sea sampler was available in the factory to monitor sorting. In this 2016 EFP, observers were not responsible for overseeing the crew's collection of halibut in the factory. Fish could run over the flow scale without the observer present in the factory as long as the observer was not on deck to collect data during deck sorting (i.e., the flow scale could not run when deck sorting was occurring).

6) To facilitate monitoring of the sorting out of halibut in the factory, video monitoring systems were installed in the sorting area to record crew activities associated with the collection of factory halibut and its placement into a designated bin/tote. The camera systems for monitoring crew sorting on deck were still required for the 2016 EFP.

7) For any haul where deck sorting did not occur due to weather, all halibut mortality accounting used the observer's sample from the factory. Additionally, the crew sorted out, counted, and weighed all halibut found in the factory for that haul following the procedures described above. The 90% mortality rate was applied to the observer sample extrapolation for non-deck sorted hauls during an EFP trip.

8) The requirement for limiting deck sorting to 20-25 minutes was removed. Since vessels were no longer required to attempt to sort every halibut on deck and were instructed to only sort until the viability of halibut decreased, a time limit on deck sorting was not warranted.

9) In order to facilitate training of observers deployed on vessels in the EFP, as well as to ensure the observers had the additional equipment needed to conduct sampling during halibut deck sorting, two notifications were required. First, the EFP required the observer provider to be notified that the vessel would be entering the EFP so that they could deploy the additional observer for those trips. In addition, the EFP required the Observer Program be notified so that the observers could be briefed on the additional duties required for halibut deck sorting. Additionally, vessel personnel were required to conduct a meeting with the observers prior to the first EFP trip with a new observer to discuss their vessel specific fishing protocols and responsibilities.

Again, this 2016 EFP demonstrated that significant halibut mortality savings could be realized through sorting halibut on deck. It also showed that observers could follow the sampling protocols laid out in Appendix B. The initial results also showed that there was no significant difference between the observer estimate of halibut mortality in the factory and the census conducted by the crew. However, the AKSC still remained concerned about the observer sampling to determine the amount of factory halibut on hauls where deck sorting has made halibut a rarer species and was interested in gathering more data.

Some challenges did occur. First, the logistics of deploying the additional observer and ensuring the observers had the proper briefing were sometimes difficult and at least one vessel could not participate in the EFP for a trip because an observer was not available or a briefing could not be conducted. Also, confusion sometimes occurred between the vessel crew and the observer which resulted in some deck sorted hauls not being observed. There were also some occurrences where fish were run over the flow scale in the factory when the observer was on deck. Finally, with the removal of the limit of 20-25 minutes on deck sorting, some vessels deck sorted for extended periods of time (up to 2 hours). This resulted in little halibut mortality savings and increased safety issues for both the observers and crew.

In addition, testing of a chute camera system occurred aboard two vessels. The testing of this system was to determine if the cameras could automate measurement of halibut so the need for observers on deck could be reduced. The testing was limited because of design challenges and the need to modify areas on deck to accommodate the chute camera system. The system showed promised and continued testing and refinement were warranted.

The permit holders, as well as NMFS Alaska Region, realized several permit modifications would help streamline and provide better compliance with the 2016 EFP. These modifications to the permit were approved by NMFS Alaska Region on January 10, 2017.

Many vessels found that the factory operations did not require a second observer on duty. The permit was modified to allow the vessels to choose the number of observers they carried on EFP trips. Each vessel had to have at least two observers, but could have up to four observers aboard during EFP trips. If two observers were aboard, no fish could be run over the flow scale when the observer was on deck for halibut deck sorting. If three observers were aboard, the captain could coordinate with the observers to determine an 8 hour shift where one observer could be deck sorting while the second observer could conduct factory sampling duties and fish could run over the flow scale. If four observers were aboard, deck sorting and running fish over the flow scale could occur simultaneously at all times.

Also, some vessels did not have an adequate table for the observers to assess halibut on deck. The EFP was modified to specify table dimensions and clarified that halibut needed to follow a single path to the observer.

Finally, when exempting vessel operators from requiring halibut to be returned to sea immediately to allow for sorting on deck, the EFP also exempted them from an unintended portion of the regulations. The modified EFP clarified that vessel operators must not lift halibut by the caudal peduncle, throw halibut, or otherwise cause additional injury to halibut. Furthermore, prohibited species other than halibut are not exempted from this prohibition and must be returned to the sea immediately, with a minimum of injury, regardless of condition.

In January 2017, the EFP holders requested that the 2016 EFP (that was modified on January 10, 2017) be renewed without any changes. NMFS renewed the EFP on February 17, 2017 with no changes and extended the EFP until December 31, 2017.

Based on the results from deck sorting operations since January 2017, deck sorting continued to generate significant reductions in halibut bycatch mortality in BSAI non-pollock trawl fisheries. These reductions were achieved in a wider set of non-pollock trawl target fisheries than had occurred in previous EFPs. Additionally, the EFP found that when weather allows, deck sorting could be conducted during winter months. Prior to 2017, deck sorting had never been attempted early in the year due to concerns that there would not be a sufficient number of days with weather allowing for it. The 2017 results showed that deck sorting is workable in winter months even accounting for the times when weather does not allow for it.

Allowing vessel operators to determine the number of observers used for deck sorting was also advantageous as it allowed vessel to adjust the number of observers based on participants' catch volumes, factory production speed, and other factors affecting the way deck sorting was done on their specific vessels.

Sorting on deck beyond the time halibut were viable on deck continued to be a problem for the duration of 2017. Vessel operators may have been using deck sorting to reduce the number of halibut found in the observer's sample in the factory and thereby the observer's extrapolation of halibut bycatch to the haul, rather than the EFP's stated objective of reducing halibut mortality.

2018-19 EFP

The 2018-19 EFP is currently underway. The focus of this EFP is to address outstanding issues that remain important to both the fishery managers and the fishery participants to demonstrate that the eventual implementation of a regulatory program would be successful. The 2018-19 EFP maintains the crew catch handling and other rules from the February 17, 2017 EFP and incorporates new elements intended to allow the fishery managers and the fishery participants to gain experience critical to the upcoming implementation of regulated deck sorting program. The following are the modifications and new elements to the 2018-19 EFP:

1) Each vessel is required to have a deck safety plan that details how safe passage and safe working conditions for observers are incorporated into deck sorting operations. These plans are reviewed and approved by NMFS (Alaska Region and the Observer Program) prior to beginning fishing under the EFP.

2) Some vessels participating in past EFPs fished both in the BSAI and the GOA during the same voyage. Switching back and forth between the BSAI and the GOA created challenges for vessel operators to ensure that halibut are handled correctly under EFP rules governing their BSAI operations and non-EFP rules governing their GOA operations. Differences in procedures on the same voyage can create confusion for crew and observers and increase the potential for incorrect halibut handling. This 2018-19 EFP expanded deck sorting to the GOA for eligible vessels. This will test the feasibility of deck sorting in the GOA given the differences in volumes of catch, size of halibut, and other conditions from previous deck sorting EFPs. To date, no EFP vessels have used deck sorting in the GOA.

3) The objective of deck sorting is to reduce halibut mortality rates; deck sorting is not to be used for reducing the number of halibut found by the observer sample in the factory. A 35-minute maximum time

limit for deck sorting operations was added to help to keep participants focused on the objectives of deck sorting.

4) All EFP vessels must use a single chute and maintain a single flow of fish to move halibut from the deck to the table where the observer collects data from sampled fish. A few vessels with multiple paths for fish in past EFPs created challenges for the observers to identify which halibut was to be sampled. Chutes with upper and lower pathways also reduced the observer's ability to keep track of the overall number of halibut sorted per haul.

5) All observer sample tables on deck are equipped with metal length strips attached. This should limit the need for the plastic length strips. The plastic length strips can cause delays by wearing out or being lost overboard in inclement weather.

6) The requirement for completing of a census of halibut in the factory has been removed. Prior EFPs required a census count of halibut in the factory to allow for comparison to the extrapolation of the observer species composition sample in the factory. The results of these comparisons demonstrated that the two numbers track reasonably well over the course of longer periods of time for vessel-specific comparisons and for the EFP overall. Additionally, collecting halibut in the factory was time consuming for the crew and the observer and required additional space in already tight factories. Observers continue to record any halibut encountered in their composition samples. Observers will also return to collecting halibut viability assessments in the factory at the point of discard. The cameras added to the factory to monitor sorting and storage of halibut for the census of halibut are also no longer required by the EFP.

7) The EFP will continue to test the use of electronic length boards, automated vision-based length measurement technology, and possibly scales for use on deck. These tools may increase sample size, accuracy, and reduce the time required of observers to collect data, which could speed the transfer of halibut back to the water and improve viability.

8) Pre-deployment briefings with NMFS staff were removed and the pre-cruise meeting requirements already in regulations were re-emphasized. Vessel no longer have to wait for the availability of NMFS staff to begin an EFP. Vessel operators must notify NMFS when they have a new observer aboard to schedule a pre-cruise meeting. However, if NMFS staff is unavailable the vessel will be notified that they have met the permit requirement and may begin fishing under the EFP.

1.3.6 CAS Halibut PSC Accounting for Vessels Participating in Deck Sorting EFP

When halibut deck sorting occurs on a non-pollock trawl CP, 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

When deck sorting occurs, the observer identifies a sample of halibut for taking length and viability measurements. In 2018 for example, a systematic random sample, one out of every five halibut, of discarded fish is selected (20%) and in addition the first 15 halibut are sampled, unless the observer is able to sample additional fish. 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 systematic random sample; note that the additional 15 fish are not included in the computation of mortality rate. 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.

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*. The appropriate DMR is applied based on gear, sector, and year to calculate a PSC halibut mortality weight.

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

1.4 Description of Management Area

This action would affect trawl CPs when operating in non-pollock groundfish fisheries off Alaska. (Figure 1).

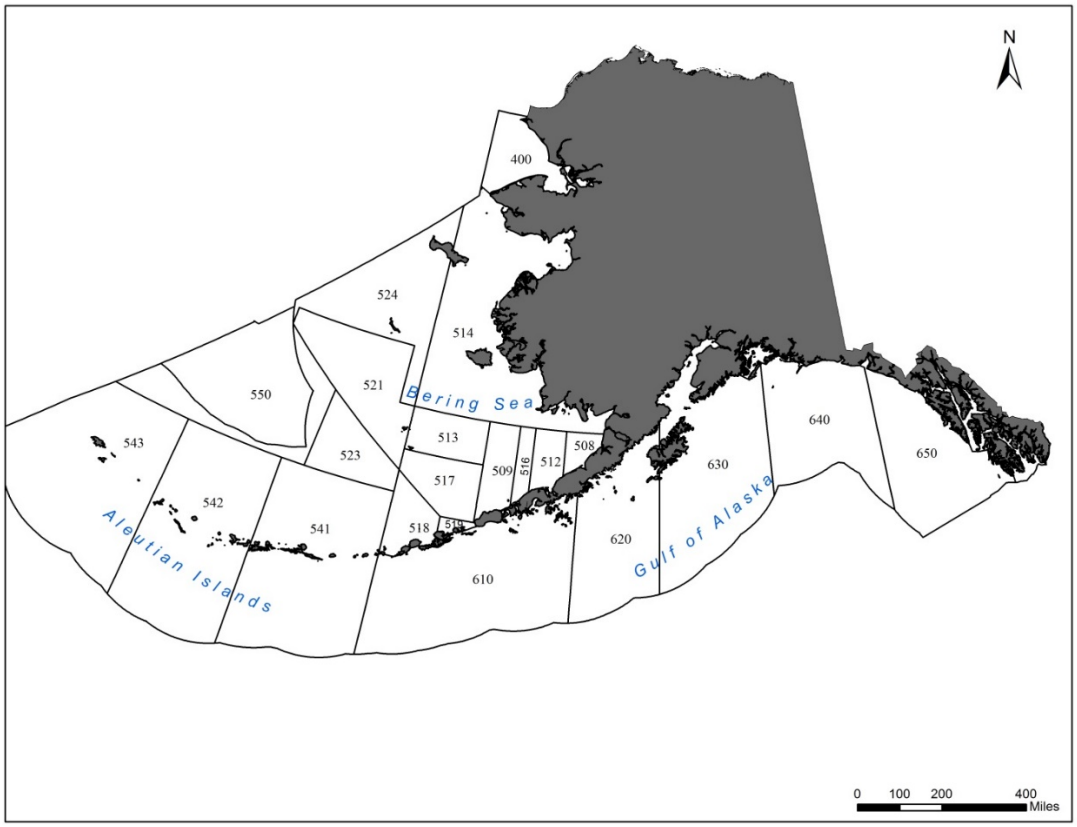


Figure 1 **Bering Sea, Aleutian Islands, and Gulf of Alaska reporting areas.**

2 Description of Alternatives

NMFS identified two alternatives for analysis including (1) a no action alternative (Alternative 1) and (2) an action alternative (Alternative 2).

2.1 Alternative 1: No Action

Under Alternative 1, halibut must be discarded after running over the flow scale in the factory. Observers would continue to assess halibut at the point of discard in the factory to determine halibut mortality. Halibut deck sorting could continue under EFPs. EFPs are a tool to allow industry to test fishing practices and procedures and must be approved by NMFS.

Under this alternative, regulations would not be changed. Sorting catch on deck would not be allowed. Crew would be required to return halibut to the sea with the minimum of injury after sampling by the observer is complete. Observers would complete normal sampling duties and would assess halibut viability at the point of discard in the factory. The halibut DMR would be based on IPHC published rates; and subsequently published by NMFS in the annual harvest specifications. Fleet-wide DMRs would be used to calculate the fleet's halibut PSC limit. Existing catch handling and monitoring requirements are designed to ensure observers have access to unsorted catch in the factory. Observer sampling duties on deck would be limited to monitoring the haulback and catch sampling would continue to occur in the factory, limiting an observer's exposure to safety risks on deck.

An EFP could continue to be used to conduct further research on methods to reduce halibut mortality. Each additional EFP would require an application from the fleet and NMFS review and approval. EFPs are meant to research and test new methods and are not meant to be used as a long-term fisheries management solution. This would mean that additional deck sorting EFPs could occur in the future, but without rulemaking deck sorting would not continue indefinitely.

2.2 Alternative 2: Voluntary Deck Sorting

Allow trawl CPs and motherships participating in non-pollock groundfish fisheries to voluntarily sort and discard halibut on deck.

> Option 1: Apply to vessels while operating in the BSAI Management Area.
>
> Option 2: Apply to vessels while operating in the BSAI and GOA Management Areas (not including the F/V Golden Fleece).

This alternative would allow non-pollock groundfish trawl CPs to sort and discard halibut on deck. Participating vessels would be required to comply with halibut deck sorting monitoring requirements at all times during trips when deck sorting may occur. A vessel would be required to install equipment as necessary and comply with catch handling procedures to ensure an observer has the ability to safely complete halibut deck sorting sampling duties.

Monitoring requirements would be designed to ensure accurate accounting of halibut PSC sorted from the catch on deck. Monitoring requirements may include:

- Catch handling requirements to ensure an observer can complete halibut sampling duties on deck.
- A sampling station near the point of halibut discard to allow observers to count halibut discarded and obtain halibut length and viability assessments.
- Video monitoring to verify all halibut are discarded in view of the observer and that only halibut are discarded on deck.

- Deck safety plans to ensure observers have safe passage to and from the sample station and to document any potential hazards while sampling in the location where halibut are discarded on deck.

Halibut DMRs would be calculated differently for vessels participating in deck sorting and those not participating in deck sorting. This would allow the use of a more haul-specific DMR to calculate halibut PSC for vessels participating in deck sorting.

Deck sorting would require significant changes to how catch is handled onboard the participating vessels, including potentially costly deck modifications, development of deck safety plans, and potentially slower processing. Due to differences in vessel configurations, it may be more costly or less feasible for some vessels to adapt to the equipment and monitoring requirements. Severe weather conditions, such as high seas, heavy icing, and extreme winds, may also make sorting on deck unsafe at certain times of the year. Finally, halibut deck sorting may not be beneficial for vessel operators in fisheries where halibut bycatch is very low and the costs of deck sorting outweigh the benefits.

2.3 Alternatives Considered but not Analyzed Further

2.3.1 Increase Halibut PSC Limits

The use of halibut PSC limits in the groundfish fisheries reduces halibut bycatch and promotes conservation of the halibut resource. Halibut bycatch in the groundfish fisheries may affect commercial, sport, and subsistence halibut fishing opportunities by decreasing the amount of halibut available for those fisheries. Therefore, the Council and NMFS establish halibut PSC limits to balance the needs of fishermen, fishing communities, and U.S. consumers that consume halibut and groundfish.

A decrease in halibut biomass has been shown in the BSAI[9]. Amendment 80 reduced the halibut PSC allocated to the Amendment 80 sector starting in 2009. The allocation of halibut PSC to the Amendment 80 sector was reduced 50 mt a year from 2009 to 2012 ultimately resulting in an annual reduction of 200 mt of halibut PSC from the Amendment 80 sector. In 2011, the 50 mt reduction was allocated to the CDQ sector. The halibut PSC allocation under Amendment 80 resulted in a total reduction of the annual trawl halibut PSC limit by 150 mt. BSAI halibut PSC limits were reduced 21% with the implementation of Amendment 111 to the BSAI FMP (81 FR 24714, May 27, 2016; Table 4). An objective of these reductions was to provide additional directed fishing opportunity in a climate of reduced halibut biomass. The circumstances that led to these reductions have not changed; therefore, this alternative to increase the halibut PSC limits was not further considered.

2.3.2 Require Halibut Excluders

Currently, halibut excluders are allowed but not required. Halibut excluders may not be effective for all vessels because (1) excluders do not exclude small halibut that are similar in size to target catch and (2) excluders may become clogged with mud in certain fisheries, negatively impacting fishing efficiency. Therefore, this alternative was not further considered.

2.3.3 Require Participation in Halibut Deck Sorting

Participation in deck sorting would require significant changes to how catch is handled onboard the participating vessels, including potentially costly deck modifications, development of deck safety plans,

[9] Described in more detail in Section 3.3.1.1 of the Environmental Assessment/ Regulatory Impact Review For 2018 Pacific halibut catch limits and associated management measures in International Pacific Halibut Commission Regulatory Areas: Area 2C (Southeast Alaska), Area 3A (Central Gulf of Alaska), Area 3B (Western Gulf of Alaska), and Area 4 (subdivided into 5 areas, 4A through 4E, in the Bering Sea and Aleutian Islands of Western Alaska). Available from the NMFS Alaska Region website at http://alaskafisheries.noaa.gov.

and potentially slower processing. Due to differences in vessel configurations, it may be more costly or less feasible for some vessels to adapt to the equipment and monitoring requirements. Severe weather conditions, such as high seas, heavy icing, and extreme winds, may also make sorting on deck unsafe at certain times of the year. If deck sorting were required during all hauls and the weather created unsafe conditions to perform these activities, this could either limit vessel fishing activity to good weather days, or create situations of non-compliance. Finally, halibut deck sorting may not be beneficial for vessel operators in fisheries where halibut bycatch is low and the costs of deck sorting could outweigh the benefits. Therefore, NMFS chose to move forward with this program by making voluntary.

2.3.4 Require Advanced Technologies, Such as Scales on Deck, Chute Cameras on Deck, or Electronic Length Boards

Advanced technologies, such as electronic length boards; automated vision-based length measurement technology; chute cameras; or on deck scales to increase sample size, improve accuracy, and reduce the time required for observers to collect data could speed up the return of halibut back to the water and improve viability as well as reducing the time crew and observers were required to be on deck. Any of these advanced technologies could be implemented in the future once adequate testing for accuracy and reliability has been conducted. At this time, these technologies are still in the research and development phase and could be further explored and tested under Alternative 2.

3 Description of the Fisheries

The purpose of this section is to provide a baseline synopsis of conditions in the affected fishery under the status quo conditions. This information is then available to allow comparison of the potential effects of the action alternatives on fishery participants with baseline conditions. In this case, the proposed action does not directly affect fishery revenue, allocations, markets, consumers, or communities. The analysis of impacts of the action alternative relies on very limited survey data and comments provided by current EFP participants to characterize the potential compliance costs and operational implications of halibut deck sorting. Thus, the background information provided here is limited to a brief description of the fishery that is excerpted from the Fleet Profiles prepared by Council staff in 2012 (NPFMC 2012), from the Amendment 80 Economic Data Report section of the 2017 Groundfish Economic SAFE (AFSC 2017), from the public review draft of a 2017 Council analysis of regulatory changes in the BSAI TLAS Fishery (NPFMC 2017a), and from The Rockfish Program Review conducted by the Council in October of 2017 (NPFMC 2017b). These documents are all incorporated by reference here.

Amendment 80

The Bering Sea flatfish fisheries, along with the Atka mackerel and Pacific ocean perch fisheries in the Aleutian Islands, have been prosecuted mostly by a fleet of trawl CP vessels that do not target pollock. This fleet is known as the Amendment 80 fleet. Typically, the fish are processed either with the head and guts removed, or frozen whole. Discarding had long been a management concern for this fleet. Historically, in the multi-species flatfish fisheries, the lower valued fish (less valuable species, smaller fish, and fish without roe) were discarded, and only the more valuable fish retained. Vessels did not have meal plants to accommodate low value fish resulting in discards at sea. The race for fish exacerbated this economic discarding as less valuable fish used up processing time and limited freezer space.

To address these discards, the Council required full retention of pollock and Pacific cod, and a minimum groundfish retention standard of 85%, which was later removed due to difficult enforceability and the fleet achieving a retention rate higher than the standard once operating under a cooperative program. To provide the tools for the fleet to increase retention, the Council initiated development of cooperatives in October 2002, and took final action to adopt the program in June 2006, under Amendment 80 to the BSAI Groundfish FMP. The final rule implementing Amendment 80 published on September 14, 2007 (72 FR 52668). Prior to final action, participation in these fisheries was defined by Congress in Section 219 of the Consolidated Appropriations Act of 2005, thus defining the sector and the participants in the Amendment 80 program. To qualify, a vessel must not have been listed as an AFA trawl CP (i.e., non-AFA), be assigned a valid license limitation permit (LLP) with a BSAI CP endorsement, and have processed more than 150 mt of groundfish (other than pollock) during the period 1997-2002.

Among the goals of Amendment 80 is improving economic incentives to increase retention and utilization, and reduce bycatch by the commercial CP fleet using trawl gear in the non-pollock groundfish fisheries. The structure of the program was developed to encourage fishing practices and use of vessel capital with lower discard rates and to mitigate the costs of increased retention requirements by improving the opportunity to increase the value of harvest species while improving operational efficiency and lowering costs.

The BSAI non-pollock groundfish trawl CP sector is composed of vessel-entities representing the 28 CPs with history of harvesting groundfish in the BSAI, but that did not qualify to be listed in the rationalization of the CP pollock fishery under the AFA. Of the original 28 CPs eligible for the Amendment 80 catch share program, 27 elected to enroll, and there are presently 24 CPs participating. Species allocated to the Amendment 80 fleet include: Aleutian Islands Pacific ocean perch, BSAI Atka mackerel, BSAI flathead sole, BSAI Pacific cod, BSAI rock sole, and BSAI yellowfin sole. In addition, the Amendment 80 cooperatives and vessels receive allocations of Pacific halibut and crab PSC limits for use while fishing in the BSAI, and groundfish sideboard limits and halibut PSC limits for use in the GOA.

Amendment 80 allocates the six target species and five prohibited species in the BSAI to the CP sector and allows qualified vessels to form cooperatives. These voluntary harvest cooperatives coordinate use of the target allocations, incidental catch allowances and prohibited species allocations among active member vessels. From 2008-2010, 16 vessels formed a single cooperative (identified as the Best Use Cooperative, renamed AKSC in 2010), with the remainder operating in the Amendment 80 TLAS. In 2011, the Alaska Groundfish Cooperative formed with nine member vessels/LLP licenses. From 2011 to 2017, all vessels are in one of the two cooperatives, AKSC or Alaska Groundfish Cooperative. In 2018, all vessels are in one cooperative.

Production and value information displayed in Chapter 9 of the most recent annual Groundfish Economic SAFE report (AFSC, 2017) indicate that the total volume of finished production of the Amendment 80 fleet since 2008, aggregated over all Alaska fisheries, has varied between 181 thousand mt and 218 thousand mt per year, with gross wholesale revenue value varying between $289.7 million and $455.2 million over the period. Aggregate finished volume and value of the fleet over all Alaska fisheries during 2015 were 203.5 thousand t and $350.1 million, increasing from 2014 by 0.7% and 6.8%, respectively.

For Amendment 80 target fisheries, finished volume and value for the fleet in 2015 were 159 thousand t and $261.9 million, increased by 3.5% and 4.3% from 2014. On a median basis, production volume in Amendment 80 fisheries increased by 8% to 8.15 thousand t in 2015, and first wholesale value increased by 12% to $11.7 million. Amendment 80 fleet finished production volume from non-Amendment 80 target species catch in the BSAI declined by 3.6% to 31.8 thousand t for 2015, while first wholesale value increased by 29% to $58.7 million. In contrast, compared to 2014, production volume declined more substantially in median vessel terms, to 1.64 thousand t (-16%), and declined in wholesale value by nearly $500 thousand (-18%).

BSAI TLAS CPs

Starting in 2008, Amendment 80 established catch shares for several BSAI groundfish species. Amendment 80 also limited access to harvest of Amendment 80 species, including PSC species, by AFA CPs, AFA CVs, and non-AFA CVs creating the BSAI TLAS fishery. The Council's intent of establishing the BSAI TLAS fisheries was to provide harvesting opportunities of some Amendment 80 species by non-Amendment 80 vessels (AFA CPs, AFA CVs, and non-AFA CVs). Each year, NOAA Fisheries allocates an amount of Amendment 80 species available for harvest, called the initial allowable catch (ITAC), and crab and halibut PSC to the Amendment 80 sector and the BSAI TLAS sector, with the TLAS allocations representing a small proportion of overall allocation of Amendment 80 species. Allocations made to the Amendment 80 sector are not subject to harvest by participants in other fishery sectors, while the Amendment 80 sector is precluded from participating in the TLAS fisheries (NPFMC 2007). Any portion of the BSAI TLAS fisheries not fully utilized may be reallocated to the Amendment 80 sector as cooperative quota on the approval of the NMFS Regional Administrator, but unused Amendment 80 allocations cannot be reallocated to the BSAI TLAS fisheries.

This action would allow CPs and/or Motherships operating in the TLAS fishery to participate in halibut deck sorting. The eligible vessel list shown in 6 identifies the CPs that participated in the BSAI TLAS fishery in any year since 2008. In addition, all three AFA motherships are eligible to participate in the BSAI TLAS fishery but have not chosen to participate to date. These AFA motherships could choose to participate in the BSAI TLAS fishery and when doing so may also participate in halibut deck sorting.

Central GOA Rockfish Program CPs

The Rockfish Program has developed, over many years, from an open access program to a pilot management program, and finally to the present program, which is authorized through December of 2021. The Council designed the Rockfish Program to meet the requirements for limited access privilege programs (LAPPs) in section 303A of the MSA. The Rockfish Program includes some similar implementation, management, monitoring, and enforcement measures to those developed under the Pilot

Program. Measures that are similar to the Pilot Program are that the Rockfish Program (1) continues to assign quota share (QS) and rockfish cooperative quota (CQ) to participants for primary and secondary species, (2) allows a participant holding an LLP license with rockfish QS to participate in forming a rockfish cooperative, (3) allows holders of CP LLP licenses to opt-out of rockfish cooperatives for a given year, (4) includes an entry level longline fishery, (5) establishes sideboard limits, and (6) includes additional monitoring and enforcement provisions beyond those required under management of the LLP.

A total of 15 CP LLP licenses were issued primary species quota during the Pilot Program. Because of the change in the qualifying years, five of those LLP licenses were not issued QS under the Rockfish Program, and one CP LLP license that was not issued QS under the Pilot Program was issued QS under the Rockfish Program. These changes resulted in 11 CP LLP licenses being issued QS under the Rockfish Program.

Not all the CP LLP licenses that were issued quota during the Pilot Program were assigned to a cooperative. Modifying the program rules to create incentives for these LLP licenses to be assigned to a cooperative was a goal of the Rockfish Program. During 2011, 12 CP vessels and 12 CP LLP licenses were assigned to cooperatives.

Since the Rockfish Program was implemented in 2012 (76 FR 81248, December 27, 2011), two CP cooperatives formed each year and all the CP LLP licenses issued primary species quota were assigned to one of those cooperatives. The LLP licenses and vessels were assigned to the same cooperatives each year until 2017. During 2017, two LLP licenses were moved from the Best Use Cooperative to the Fishing Company of Alaska Cooperative. Those licenses were held by M/V Savage and American Seafoods, Inc. The movement between cooperatives was in part due to the sale of the Fishing Company of the Alaska and the need for one of the buyers to divest of an LLP license because the QS assigned to the LLP licenses they would have held would have put them over the ownership cap. In 2018 there is one CP cooperative.

Catch, value, and price data for the CP sector are provided in Table 10-2 of the 2017 Rockfish Program Review. Catch increased from 2003 relative to 2016 for Pacific ocean perch and dusky rockfish, but decreased for northern rockfish and sablefish. The increased catch of Pacific ocean perch is correlated to the increased Central GOA TAC, especially over the 2012 through 2016 period. Dusky rockfish catches were relatively stable during the Rockfish Program, ranging from 1,074 mt to 1,207 mt. Dusky rockfish catches were as low as 508 mt in 2016.

The first wholesale value derived from the reported species was greatest in 2011 ($11.73 million) and 2012 ($10.51 million). From 2011 to 2015 the real first wholesale value declined 22% to $9.06 million and was lowest in 2013 at $6.97 million. Values declined even though the catch of all the primary rockfish species increased. Reported sablefish catch only decreased by 3 mt over that period. The impact of the strong US dollar likely played a role in the decreasing first wholesale prices over that period. It is important to note that all eligible CPs under this action that participate in the Rockfish Program also participate in the Amendment 80 fleet. Thus, the revenue of these CGOA rockfish CP cooperatives represents a relatively small proportion of the overall revenue of these vessels.

4 Analysis of Impacts

4.1 Analysis of Impacts: Alternative 1, No Action

This section considers the impacts of the no action alternative under two conditions, with and without an EFP.

Vessels that would be eligible to participate in the deck sorting program operate in the BSAI Amendment 80 fisheries, non-pollock trawl CDQ fisheries, and as motherships and CPs in the non-pollock BSAI TLAS fisheries. CPs in the Rockfish Program would also be eligible to participate; all eligible CPs would also be able to conduct deck sorting during fisheries for which they are sideboarded in the BSAI and the GOA if they chose to opt out of the Rockfish Program. This section describes the monitoring and enforcement considerations under the status quo for these vessels.

This section also describes the monitoring and enforcement considerations for the affected vessels when they are not participating in the EFP, as well as when they participate in the deck sorting EFP. It should be noted that the additional monitoring requirements under the EFP are not required in regulations, but are a condition of the permit to participate. It should also be noted that the deck sorting EFP would likely not continue indefinitely, therefore, if the no action alternative is selected, the vessels monitoring and enforcement requirements reflected in this status quo description would not include the EFP permit conditions. Table 6 lists the currently operating vessels that are eligible to participate in the deck sorting program.

Table 6 List of vessels currently operating that are eligible to participate in a deck sorting program.

NAME	VESSEL ID	EFP Permit Holders
ALASKA OCEAN	3794	
ALASKA SPIRIT	3819	Y
ALASKA VICTORY	4093	Y
ALASKA WARRIOR	3423	Y
AMERICAN DYNASTY*	3681	
AMERICAN NO I	1879	Y
AMERICAN TRIUMPH*	4055	
ARAHO	34017	Y
ARCTIC FJORD*	3396	
ARCTIC STORM*	2943	
ARICA	3694	Y
CAPE HORN	2110	Y
CONSTELLATION	4092	Y
DEFENDER	4635	Y
ENTERPRISE	5822	Y
EXCELLENCE	4111	
GOLDEN ALASKA	1607	
ISLAND ENTERPRISE*	3870	
KATIE ANN*	1996	Y
KODIAK ENTERPRISE*	3671	
LEGACY	3367	Y
NORTHERN EAGLE*	3261	
NORTHERN GLACIER*	661	Y
NORTHERN HAWK*	4063	
NORTHERN JAEGER*	3896	Y

OCEAN PEACE	2134	Y
OCEAN PHOENIX	3703	
OCEAN ROVER*	3442	
PACIFIC GLACIER	3357	
REBECCA IRENE	1610	Y
SEAFISHER	3835	Y
SEAFREEZE ALASKA	2733	Y
SEAFREEZE AMERICA	34249	Y
SEATTLE ENTERPRISE*	3245	
STARBOUND	3414	
UNIMAK	3369	Y
US INTREPID	2800	Y
VAERDAL	2123	Y

The deck sorting program would be a voluntary program, therefore not all of these vessels would be expected to participate in the program. Any replacement vessel to the vessels listed or other vessels not currently fishing would also be eligible to participate in the program. * denotes vessels that have participated in the BSAI TLAS fishery in any year from 2008 to 2017.

4.1.1 Monitoring and Enforcement Considerations

Existing monitoring requirements under the status quo are designed to ensure that observers have access to unsorted catch in the factory. Accurate haul estimates are critical, as the total haul size is the foundation of the estimation of catch and bycatch. Currently, trawl CPs are required to weigh all catch on a motion compensated flow scale to determine a total haul size. This would change under halibut deck sorting. The accuracy of these measurements via flow scale are in the order of +/- 3%. During deck sorting, halibut are removed from the catch before they are weighed on the flow scale. In order to determine the total haul size, the total weight of deck sorted halibut have to be added to the weight of remaining catch that is measured by the flow scale.

The collection of composition data by observers in the trawl fishery has been established to support the various data needs of fisheries managers and other data users such as stock assessment scientists. NMFS Alaska Region relies on observer data collections to generate catch and bycatch estimates for the trawl CPs operating in the BSAI and GOA. These processes are outlined in Conners et al. (2009).

Species composition data include a documented observation of the identity, number, and weight of organisms encountered within a small section of a haul. This is often referred to as a species composition sample. The proportion of these organisms to each other within the sample can then be extrapolated to the total haul size to estimate the overall makeup of a haul. For trawl vessels, a weight of every organism within a sample is needed for the extrapolation process to function as designed.

With the exception of salmon census data in the pollock fishery, observer species composition data collections on trawl CPs are designed to provide accurate estimations for catch and bycatch at a fishery level. For an individual haul, observer species composition data collection is limited by overall diversity and availability of unsorted catch. As a result, sample fractions tend to be small which produce estimations with high variance at the haul level. However, when combined over many hauls the estimation process generates more accurate results and can be relied on to represent the actual catch and bycatch amounts for the fishery over time. This sampling approach also compensates for the absence of haul specific composition data when an observer is unable to sample a haul for any reason such as sickness or injury. Figure 2 shows a sampling design used by the Observer Program for estimations for catch and bycatch at a fishery level.

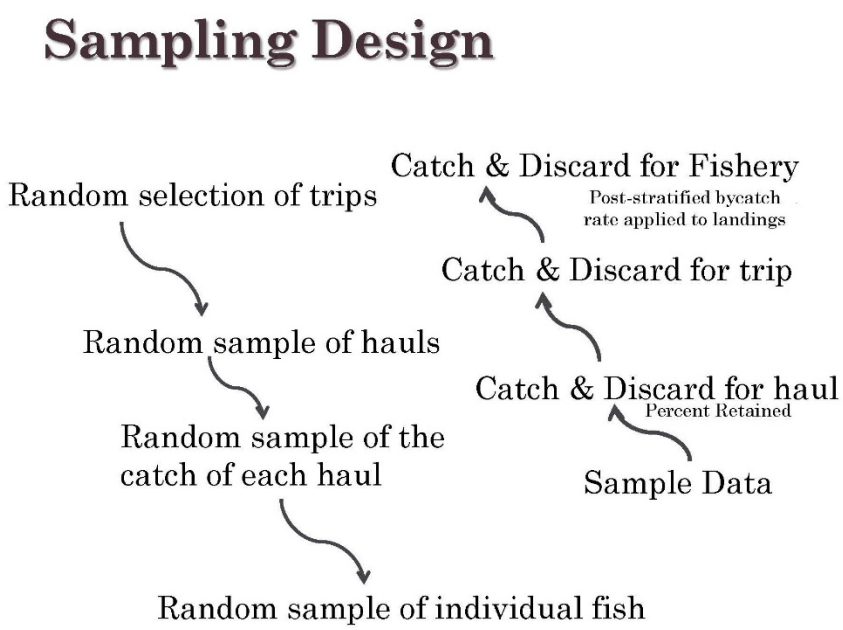


Figure 2 North Pacific Observer Program sampling design. (Figure credit: J. Cahalan, March 2018)

Under EFPs, observers have been able to successfully collect these data the majority of the time, but situations have been encountered where the data were lacking. In the absence of observer data, an alternate source of information to accurately quantify the deck sort is not available. This creates a unique situation where the unavailability of the observer to complete their duties associated with deck sorting interferes with the vessel's ability to conduct a deck sort for a haul. In addition, should the observer's data be lost or found to be unusable due to collection errors, no other source of information exists to quantify the weight and viability of the halibut encountered on deck. This increases the pressure on the observers as the vessel's ability to complete deck sorting is limited by the observer's ability to be available to complete sampling on deck.

4.1.2 Monitoring Tools under Status Quo

Observer Coverage

Amendment 80 CPs and CPs acting as motherships, Rockfish Program CPs, and Rockfish Program CPs that are sideboarded in the month of July are required to carry two observers, one of which must have a lead level 2 (LL2) endorsement for a CP using trawl gear or mothership. Each observer's workload may not exceed 12 consecutive hours in a 24-hour period. If vessel operations require an observer to work more than 12 consecutive hours to complete sampling and data entry duties, additional observers are required. Motherships and CPs fishing in the BSAI TLAS must also meet these same observer coverage requirements.

CPs that choose to opt out of the Rockfish Program and Amendment 80 CPs fishing under sideboards in the GOA are required to carry one observer. This observer follows a random sampling table to determine which hauls to sample. Vessel operations are not modified to accommodate the observer's schedule.

Pre-cruise meeting

Vessel owners or operators of Rockfish Program and Amendment 80 CPs are required to notify the Observer Program by calling the Dutch Harbor (907-581-2060) or Kodiak (907-481-1770) field office at

least 24 hours prior to departure on a trip with an observer who has not deployed on that vessel in the last 12 months. This allows the Observer Program to adequately prepare the observer(s) to successfully collect the high quality data necessary for fisheries management.

Pre-cruise meetings provide an opportunity for vessel crew and observers assigned to discuss sampling and vessel operations prior to embarking on a trip. Observer Program participation in pre-cruise meetings allows staff to facilitate this conversation between the observer and vessel crew and resolve questions about sampling expectations, and vessel specific advice about anticipated sampling scenarios that the observer might encounter at sea. Pre-cruise meetings can help improve data quality, reduce conflicts between observers and vessel crew, and can assist vessel operators and managers to comply with observer related regulations.

Under the status quo operations outside EFP fishing, the Observer Program infrequently requires vessels to participate in these meetings and are typically only used to address specific sampling concerns that may arise on a case-by-case basis. Pre-cruise meetings are not required for motherships and CPs fishing in the BSAI TLAS or CPs that choose to opt out of the Rockfish program.

Motion Compensated At-Sea Flow Scale and Observer Sampling Stations

Motion compensated at-sea flow scales (flow scales) are required to be used in the Amendment 80, Rockfish Program, CDQ, and on motherships and CPs in the BSAI TLAS fisheries. Flow scales are required to allow all catch to be weighed. Because observer samples are extrapolated to the entire haul, catch from each haul is weighed separately on the scale. To facilitate separate weighing, catch from each haul cannot be mixed with other hauls.

Vessels are also required to provide an observer sampling station where an observer can work safely and effectively. Stations must meet specifications for size and location and must be equipped with a motion-compensated platform scale, a table, adequate lighting, floor grating, and running water. Additionally, the observer sampling station must have room to store at least ten observer sampling baskets. These vessels must also have only one operational line for the mechanized movement of catch.

Vessels subject to Amendment 80 sideboards in the GOA, as well as those vessels that opt out of the Rockfish Program, are not required to use a flow scale or have an observer sampling station. These vessels cannot mix hauls and must only have one operational line for the mechanized movement of catch. However, most vessels subject to the sideboards in the GOA do continue to use the flow scale and make the observer sampling station available for use by the observer.

Video Monitoring

All CPs and motherships required to use a flow scale must have a video monitoring system that shows all areas where catch moves across the flow scale, any access point to the scale that may be adjusted by vessel crew, and the scale display and fault light. These vessels are also required to have a monitor available to NMFS staff.

CPs and motherships participating in Amendment 80 or Rockfish Program fisheries may choose video monitoring of the inside of fish bins as one method of ensuring that catch is not selectively sorted inside the bins prior to observer sampling. Vessels subject to Amendment 80 sideboards in the GOA, as well as those vessels that opt out of the Rockfish Program, may also select this method. This video is used to ensure that fish are not pre-sorted from the catch prior to observer sampling. These vessels are required to have a monitor available in the observer sampling station.

AFA CPs and motherships that may participate in the BSAI TLAS are required to have video monitoring of all areas where salmon are sorted from the catch, of all crew actions in these areas, and provide a view of the salmon storage container. The video is used to ensure that all salmon are available to the observer to conduct a census of salmon at the end of each haul. These vessels are also required to have a monitor

available in the observer sampling station. System specifications for video monitoring requirements are detailed in regulation at § 679.28(e).

All the above video monitoring systems must meet the following technical specifications:

- The system must have sufficient data storage capacity to store all video data from an entire trip. Each frame of stored video data must record a time/date stamp in Alaska local time (A.l.t.). The system must record from the beginning of the first trip of the year until the end of the final haul or set for the year.
- The system must include at least one external USB (1.1 or 2.0) port or other removable storage device approved by NMFS.
- The system must use commercially available software that allows for conversion to an open source format such as mpeg.
- Color cameras must have a minimum 470 TV lines of resolution, auto-iris capabilities, and output color video to the recording device with the ability to revert to black and white video output when light levels become too low for color recognition.
- The video data must be maintained and made available to NMFS staff, or any individual authorized by NMFS, upon request. These data must be retained onboard the vessel for no less than 120 days after the date the video is recorded, unless NMFS has notified the vessel operator that the video data may be retained for less than this 120-day period.
- The system must record at a speed of no less than 5 frames per second.
- NMFS staff, or any individual authorized by NMFS, must be able to view any footage from any point in the trip using a 16-bit or better color monitor that can display all cameras simultaneously and must be assisted by crew knowledgeable in the operation of the system.

Catch Handling and Observer Sampling

CPs participating in Amendment 80, Rockfish Program, vessels subject Amendment 80 sideboards in the GOA, and vessels that choose to opt out of the Rockfish Program are required to comply with catch handling and monitoring requirements designed to ensure that an observer has access to unsorted catch after it has been weighed on a flow scale. Catch handling requirements defined in regulations at 50 CFR 679.84(c) and (d) and 50 CFR 679.93(c) and (d) define catch handling procedures, including allowing no more than one operational line or other conveyance for the mechanized movement of catch between the flow scale and the location where the observer collects species composition samples in the factory. On these vessels, no fish are allowed to remain on deck unless an observer is present, except for fish inside the codend and fish spilled from the codend during hauling and dumping. Fish spilled from the codend must be moved to the fish bin.

Motherships and trawl CPs participating in the BSAI TLAS fisheries are not subject to the above requirements specifically, but these vessels are designed with only one line prior to the flow scale and observer sampling collection point. There is no requirement for fish to remain inside the codend on deck unless an observer is present.

Vessel responsibilities at § 679.51(e) require a vessel operator to provide reasonable assistance to an observer in collecting samples as required by the Observer sampling manual.

Prohibitions at § 679.7(g) prohibit actions by vessel crew that could bias observer samples, such as physical or mechanical sorting or discarding of catch before sampling. Additionally, vessels are prohibited from tampering with, destroying, or discarding an observer's samples, equipment, or records. These prohibitions apply to all vessel affected by this action.

Trawl CPs and Motherships Participating in the EFP

Many Amendment 80 and CGOA Rockfish CPs, as well as trawl CPs and motherships participating in BSAI TLAS fisheries are currently participating in an EFP to allow halibut deck sorting. There are additional monitoring requirements in the EFP permit conditions with which these vessels agree to comply to allow them to sort halibut on deck. These requirements can be found in the 2018-19 EFP permit on the Alaska Regional office website: https://alaskafisheries.noaa.gov/fisheries/efp. In brief these additional monitoring requirements include:

- EFP participants must carry at least 2 observers (one of whom must have a LL2 endorsement for a CP using trawl gear or mothership) and may carry additional observers (up to 4) to allow sampling in the factory while sorting occurs on deck.
- Each vessel must conduct a pre-trip meeting to review the details of the EFP requirements with the key crew members and the observers. A pre-trip meeting was a tool used in prior years of the EFP to brief observers and vessel crew about operational details associated with the EFP. This is different than a pre-cruise meeting that is typically only required before an observer deploys on a vessel for the first time.
- Each vessel must notify NMFS and the observer provider at least 7 days prior to beginning EFP fishing for the year to allow timely deployment of observer trained in the EFP protocols.
- Each vessel must contact NMFS at least 24 hours prior to departure on a trip with an observer who has not deployed on that vessel in the last 12 months to conduct a pre-cruise meeting. The Observer Program would conduct this pre-cruise meeting if experimental equipment is deployed on the vessel or the Observer Program or vessel personnel have concerns about EFP sampling protocols aboard the vessel.
- EFP participants must use the motion compensated flow scale to weigh all catch, except halibut sorted on deck.
- The observer sampling station aboard participating vessels described at §679.28(d) is available to the observer at all times during EFP trips.
- Vessels must have video monitoring of all areas of the deck where fish could be removed from or discarded from the vessel.
- A vessel owner is required to provide a space on deck including a table that meets specifications outlined in the permit for the observer to use to collect data on deck sorted halibut.
- There must be a single pathway for halibut from the trawl deck to the observer's table on deck.
- The vessel crew must follow specific catch handling and sorting procedures, including limiting sorting time to 35 minutes, from the time the codend reaches the stern ramp to last halibut sorted on deck, careful handling of the halibut, and ensuring no sorting on deck occurs unless the observer is present.
- Each vessel must have a deck safety plan approved by NMFS that details safe passage for the observer to access and work at the deck sampling station.

4.1.3 Halibut Mortality

As discussed in Section 2.3.2, 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 information available in conjunction with the annual BSAI SAFE reports. NMFS revised methods for estimating DMRs and Table 2 shows the halibut DMRs for the BSAI for 2017.

Once the estimated halibut catch for every haul is calculated, estimated DMRs are applied to estimate the amount of halibut PSC mortality accrued by every haul. See Section 2.3.3 for additional information on halibut PSC mortality calculations.

Trawl CPs and Motherships Participating in the EFP

This section evaluates the effects of EFP deck sorting on halibut mortality. Data for 2016 and 2017 are provided here because they are available in CAS; earlier data are not available in CAS.

Table 7 includes all hauls identified as EFP deck sorting hauls in the observer data with deck sorting mortality and includes deliveries from CVs to motherships where deck sorting occurred. 12 vessels participated in the deck sorting EFP in 2016 and 17 vessels participated in 2017. Net savings, standard halibut mortality minus EFP halibut mortality, are shown in the final column. In 2016, the net savings of halibut mortality on EFP hauls was 267.6 mt. This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (596.9 mt) and the EFP mortality (329.3 mt). In 2017, the net savings of halibut mortality on EFP hauls was 620.9 mt. This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (1,633.1 mt) and the EFP mortality (1,012.2 mt).

There are differences between the values reported in Table 7 and the values reported for 2016 and 2017 in the Final 2017 EFP Report (Oliver et al. 2018). For example, NMFS reports 329.3 mt of halibut mortality in 2016 with a net savings of 267.6 metric tons, whereas the EFP Report indicates 331 mt and 290 mt of net savings, respectively. NMFS reports 1,012.2 mt of halibut mortality and 620.9 mt of net savings in 2017 compared to 1,108 mt and 599 mt. These differences exist because of differences in calculation methods. For example, NMFS uses observer data following debriefing. Debriefing may introduce small changes from the raw observer data. For this analysis, NMFS has chosen not to include hauls where mortality is attributed entirely to halibut recovered in the factory and there was no deck sorted mortality on to the haul. These hauls may be from vessels that are participating in the EFP during a trip but that did not deck sort for that haul or they may be hauls where deck sorting occurred but no halibut were encountered during sorting. By excluding these hauls, NMFS' estimation of total halibut mortality for the EFP hauls is lower. NMFS has calculated the 'standard' halibut mortality using DMRs in the harvest specification tables, which in 2016 differ from the 85% DMR used in the EFP Report for calculating theoretical mortality had deck sorting not occurred. These differences in EFP halibut mortality and standard halibut mortality in turn introduce differences in the net savings calculations.

Table 7 Comparison of halibut PSC mortality using EFP deck sorting DMRs and DMRs published in the *Federal Register* Harvest Specifications for 2016 and 2017.

Year Vessel	Groundfish Weight (mt)	Halibut Catch with No DMR[1] (mt)	EFP (Deck Sorting and Factory) Halibut Mortality[2] (mt)	EFP (Deck Sorting and Factory) Effective Mortality[3] Rate	Standard Halibut Mortality[4] (mt)	Net Savings[5] (mt)
2016						
ARICA	10,488.2	74.4	34.0	0.46	62.8	28.8
CAPE HORN	6,151.8	51.5	27.1	0.53	41.4	14.3
CONSTELLATION	9,669.2	63.9	31.5	0.49	52.5	21.0
DEFENDER	7,606.0	75.2	34.1	0.45	61.2	27.1
KATIE ANN	2,053.8	31.7	11.7	0.37	23.8	12.1
LEGACY	6,546.9	119.8	45.1	0.38	96.0	50.9
NORTHERN GLACIER	7,104.1	61.2	25.3	0.41	51.5	26.2
REBECCA IRENE	10,493.0	87.3	41.9	0.48	72.3	30.4
SEAFISHER	1,777.3	26.0	10.7	0.41	21.9	11.2
SEAFREEZE ALASKA	422.4	6.1	4.1	0.67	5.2	1.1
SEAFREEZE AMERICA	2,172.0	32.8	17.2	0.52	27.5	10.3
UNIMAK	9,394.0	96.2	46.5	0.48	80.9	34.4
ALL VESSELS	73,878.8	726.2	329.3	0.45	596.9	267.6
2017						
ALASKA SPIRIT	266.8	11.2	5.1	0.46	9.5	4.4
AMERICAN NO I	9,949.2	100.1	64.8	0.65	85.1	20.3
ARICA	16,384.1	172.8	98.0	0.57	146.9	48.9
CAPE HORN	13,629.1	125.3	59.8	0.48	106.5	46.7
CONSTELLATION	13,077.8	92.8	45.9	0.49	78.9	33.0
DEFENDER	12,681.1	130.4	66.0	0.51	110.8	44.8
ENTERPRISE	12,419.7	154.6	76.7	0.50	131.4	54.7
KATIE ANN	9,525.5	61.8	31.8	0.51	52.5	20.7
LEGACY	10,744.5	144.3	56.6	0.39	122.6	66.0
NORTHERN GLACIER	17,807.7	87.1	51.4	0.59	74.0	22.6
REBECCA IRENE	14,748.3	146.3	72.0	0.49	124.3	52.3
SEAFISHER	2,979.0	33.8	15.4	0.46	28.8	13.4
SEAFREEZE ALASKA	21,123.1	169.7	95.8	0.56	144.2	48.4
SEAFREEZE AMERICA	22,232.8	222.7	130.7	0.59	189.3	58.6
UNIMAK	20,494.8	199.5	103.8	0.52	169.5	65.7
US INTREPID	6,851.0	55.4	30.9	0.56	47.1	16.2
VAERDAL	1,851.1	13.6	7.3	0.54	11.5	4.2
ALL VESSELS	206,765.5	1,921.3	1,012.2	0.53	1,633.1	620.9

Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data

Note: Includes all hauls identified as EFP deck sorting hauls in the observer data with deck sorted mortality. Includes deliveries from CVs to motherships where deck sorting occurred. Some differences may exist between this summary and information provided in EFP Reports due to calculation methods. See additional explanation in text.

[1] Halibut catch includes deck sorted halibut and PSC estimates from halibut recovered in the factory. No DMRs have been applied.

[2] Based on haul specific DMRs, vessel or annual average DMRs for unsampled hauls, and a standard 0.90 DMR for factory halibut.

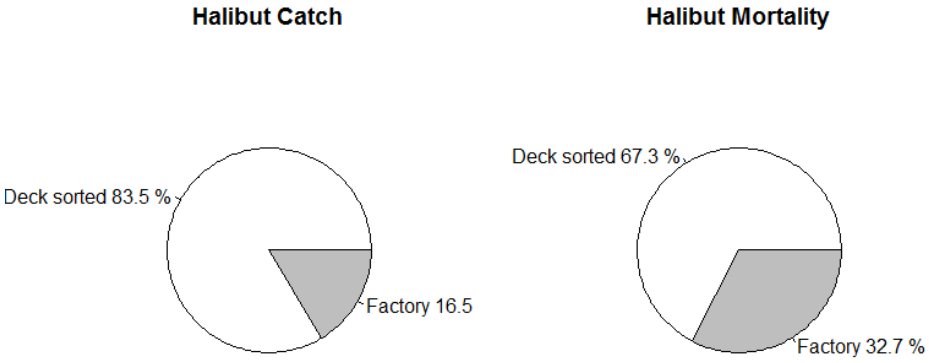
[3] EFP halibut mortality divided by halibut catch.

[4] Based on DMRs published in the *Federal Register* Harvest Specifications. 2016 DMRs applied based on FMP Area, Management Program (CDQ, non-CDQ), Gear, and Fishery. 2017 DMRs applied based on FMP area, gear, and sector.

[5] Standard halibut mortality minus EFP halibut mortality.

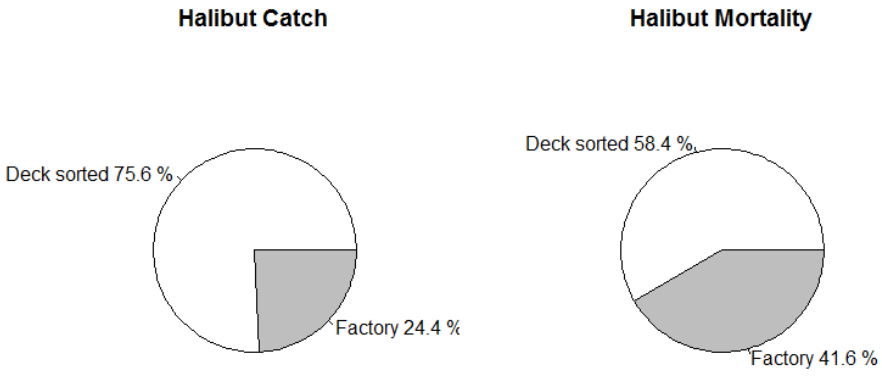
Figure 3 and Figure 4 illustrate the proportion of halibut in the CAS for 2016 and 2017 EFP deck sorted hauls that can be attributed to deck sorting or to estimates from halibut recovered in the factory. In the 2016 and 2017 "Halibut Catch" pie charts, DMRs have not been applied to the estimates of halibut and therefore reflect the total catch. In 2016, 83.5% of the halibut catch in EFP hauls was returned to the sea through deck sorting and in 2017 that amount was 75.6%. The 2016 and 2017 "Halibut Mortality" pie charts compare the proportion of halibut catch that are assessed to be dead after being released back into the sea. For deck sorted halibut, haul level DMRs based on observed viability were applied to the catch and for factory halibut standard mortality rates of 90% were applied. In 2016, 67.3% of the dead halibut were released back into the sea through deck sorting and in 2017 it was 58.4%. In addition to comparing 2016 and 2017, the pie charts illustrate the difference between catch and mortality within the year. Although 83.5% of the halibut catch on EFP hauls in 2016 were released after deck sorting, that only accounted for 67.3% of the halibut mortality. In 2017, 75.6% of the halibut on EFP hauls were released after deck sorting, yet that only accounted for 58.4% of the mortality.

Figure 3 Proportion of PSC halibut catch (with no DMR applied) and halibut mortality from deck sorting or from halibut recovered in the factory on EFP hauls in 2016.



Source: NMFS Alaska Region CAS PSC Data.
Note: Includes all hauls identified as EFP deck sorting hauls in the Observer Data with deck sorted mortality.

Figure 4 Proportion of PSC halibut catch (with no DMR applied) and halibut mortality from deck sorting or from halibut recovered in the factory on EFP hauls in 2017.



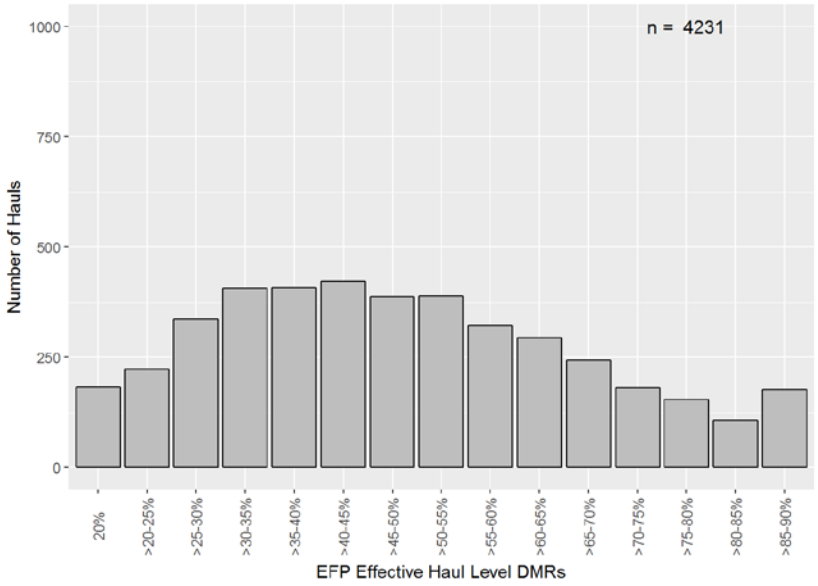
Source: NMFS Alaska Region CAS PSC Data.
Note: Includes all hauls identified as EFP deck sorting hauls in the Observer Data with deck sorted mortality.

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: the weight and mortality of halibut sorted on deck and the weight and mortality of halibut sorted in the factory (see Section 2.3.6). For Figure 5 through Figure 10, an "effective" mortality rate was calculated for each deck sorted haul. The effective mortality rate is a weighted average mortality rate based on both the halibut sorted on deck and the halibut sorted in the factory. The effective mortality rate was calculated as the total halibut mortality for the haul divided by the total halibut catch for the haul. The effective mortality rates for 2016 and 2017 ranged from 20% through 90%.

Figure 5 and Figure 6 compare the number of hauls under the deck sorting EFP in 2016 and 2017, respectively, within each range of effective DMRs. The effective DMR ranges in these figures were defined simply to facilitate graphing the information. In 2016, nearly 10% of the deck sorted hauls had an effective mortality rate greater than 40% and up to 45% (422 of 4,231 hauls). The largest bar in 2017 reflects effective mortality rates greater than 85% and up to 90% (1,007 of 10,704 hauls) and reflects nearly 10% of the deck sorted hauls. Five percent ranges of mortality rates are used in these figures to facilitate graphing the information.

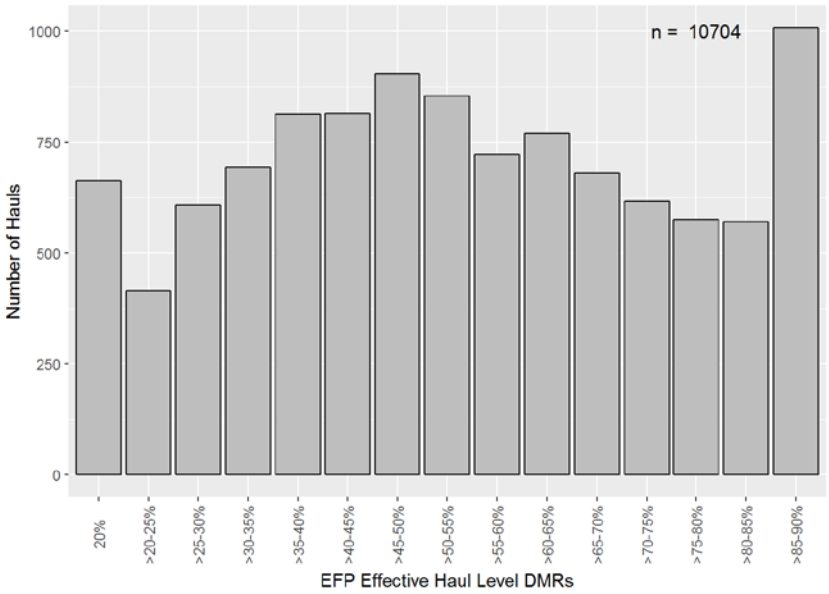
Figure 7 and Figure 8 summarize the amount of halibut catch (mt) on hauls within each range of effective DMRs under the EFP in 2016 and 2017, respectively. When comparing the proportion of halibut catch that occurred on hauls within each range of effective DMRs under the EFP in 2016 and 2017, respectively, over half (55.5%) of the halibut catch on EFP hauls occurred on hauls with effective mortality rates less than or equal to 45% in 2016. In 2017, approximately one third (39.2%) of the halibut catch on EFP hauls occurred on hauls with effective mortality rates less than or equal to 45%. This indicates a shift towards a larger proportion of the catch occurring on hauls with higher DMRs in 2017. Other potential reasons for differences between 2016 and 2017 are that deck sorting occurred during different months and different boats participated between the 2 years.

Figure 5 Frequency of EFP effective haul level DMRs in 2016.



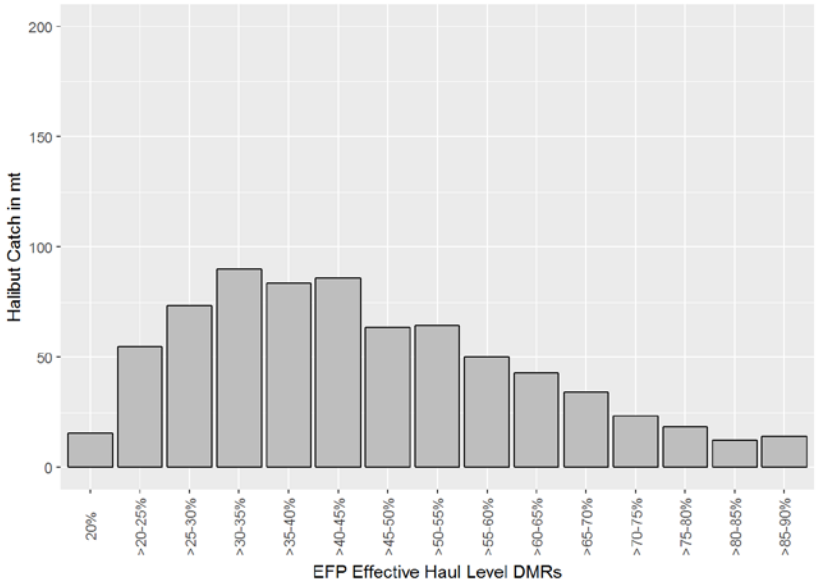
Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: The effective DMRs reflect deck sorted and factory halibut. Hauls with PSC halibut are included whether or not they were sampled for viability and as a result, whether the haul's EFP DMR, a vessel DMR, or an annual average DMR is used in CAS. The number of hauls with PSC halibut are indicated (n=).

Figure 6 Frequency of EFP effective haul level DMRs in 2017.



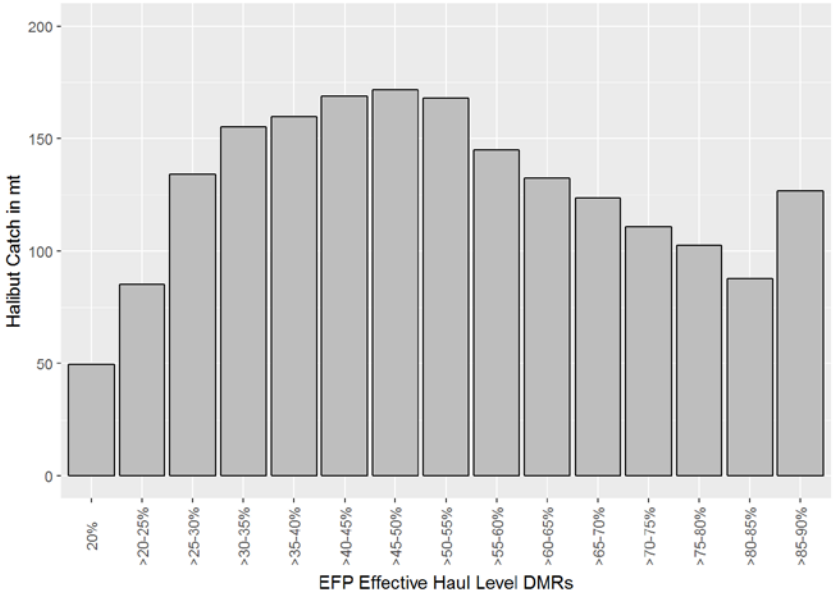
Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: The effective DMRs reflect deck sorted and factory halibut. Hauls with PSC halibut are included whether or not they were sampled for viability and as a result, whether the haul's EFP DMR, a vessel DMR, or an annual average DMR is used in CAS. The number of hauls with PSC halibut are indicated (n=).

Figure 7 Halibut catch by EFP effective haul level DMRs in 2016.



Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: The effective DMRs reflect deck sorted and factory halibut. Hauls with PSC halibut are included whether or not they were sampled for viability and as a result, whether the haul's EFP DMR, a vessel DMR, or an annual average DMR is used in CAS.

Figure 8 Halibut catch by EFP effective haul level DMRs in 2017.



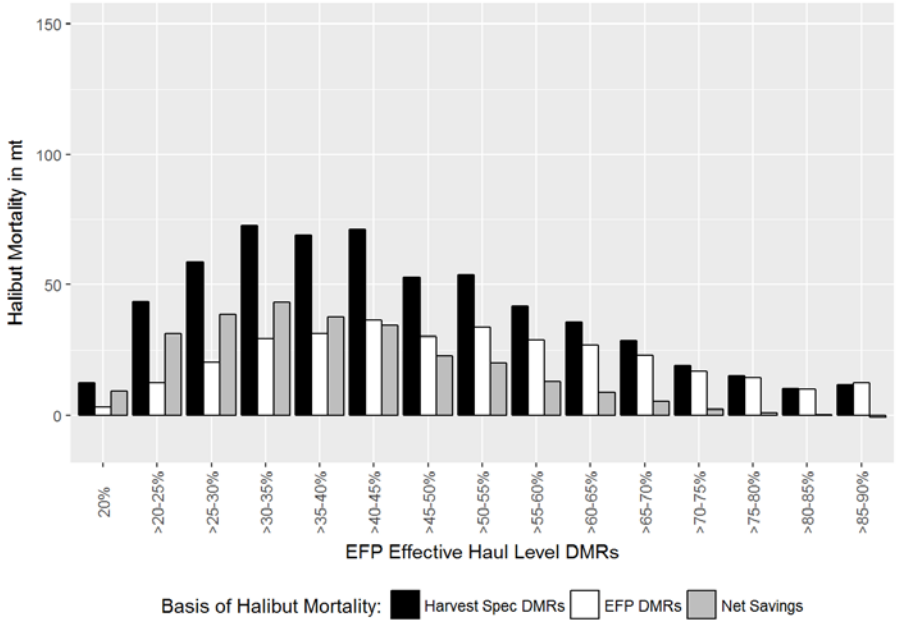
Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: The effective DMRs reflect deck sorted and factory halibut. Hauls with PSC halibut are included whether or not they were sampled for viability and as a result, whether the haul's EFP DMR, a vessel DMR, or an annual average DMR is used in CAS.

Figure 9 and Figure 10 compare the net savings of halibut mortality achieved by EFP hauls within each range of effective DMRs in 2016 and 2017. If deck sorting had not occurred, and all halibut were returned to the sea from the factory, the CAS would apply DMRs published in the harvest specification tables to halibut catch on a haul to calculate halibut mortality. Those values were calculated for each haul under the EFPs for a point of comparison in this analysis. The 'standard' mortality was aggregated for all of the hauls within a range of effective DMRs and depicted in Figure 9 and Figure 10 with black bars. This estimates the amount of dead halibut from these hauls had the deck sorting EFP not occurred. Because the EFP did occur, the CAS applied haul level DMRs to deck sorted halibut and a standard mortality rate to the factory halibut in each haul under the EFP to calculate EFP mortality. These mortality values were aggregated for all of the hauls within a range of effective DMRs and depicted in Figure 9 and Figure 10 with white bars. This estimates the amount of dead halibut on EFP hauls based on EFP effective DMRs. The difference between those two values are the net savings for each haul; this is the amount of halibut savings as a result of the EFP. The net savings were aggregated for all of the hauls within a range of effective DMRs and depicted in Figure 9 and Figure 10 with gray bars.

In 2016, the net savings of halibut mortality on EFP hauls was 267.6 mt (Table 7). This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (596.9 mt) and the EFP mortality (329.3 mt). As expected, the larger gains in halibut mortality savings occur on hauls with lower effective DMRs and taper off as mortality rates rise. A small net loss occurs in both years at the highest range of mortality rates where more dead halibut are encountered as a result of the EFP because the EFP mortality rates applied to the halibut catch are higher than they would be under the rates in the harvest specification tables.

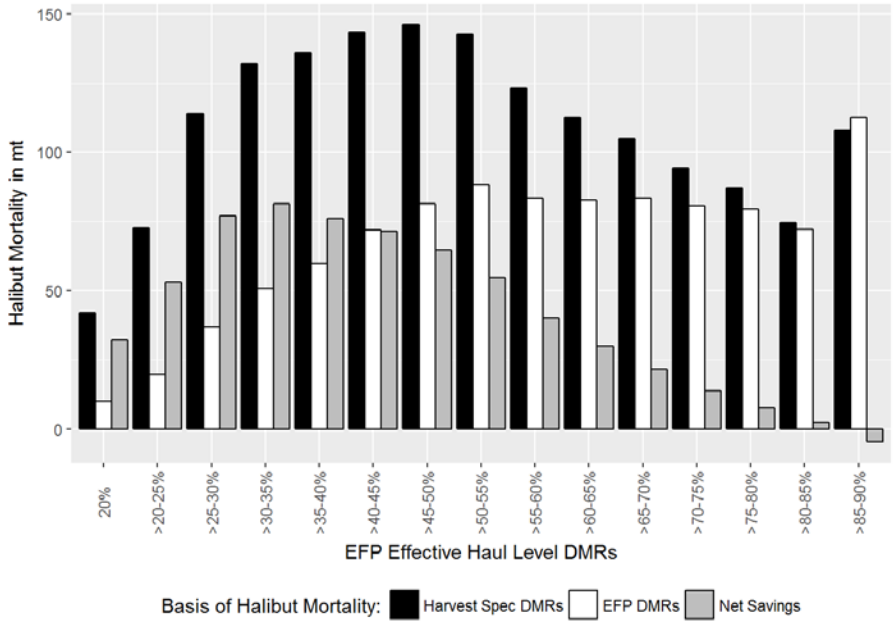
In 2017, the net savings of halibut mortality on EFP hauls was 620.9 mt (Table 7). This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (1,633.1 mt) and the EFP mortality (1,012.2 mt). This is more than twice the net savings in 2016.

Figure 9 Comparison of halibut mortality and halibut mortality net savings in 2016 by EFP effective haul level DMRs.



Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: The effective DMRs reflect deck sorted and factory halibut. Hauls with PSC halibut are included whether or not they were sampled for viability and as a result whether the haul's EFP DMR, a vessel DMR, or an annual average DMR is used in CAS

Figure 10 Comparison of halibut mortality and halibut mortality net savings in 2017 by EFP effective haul level DMRs.



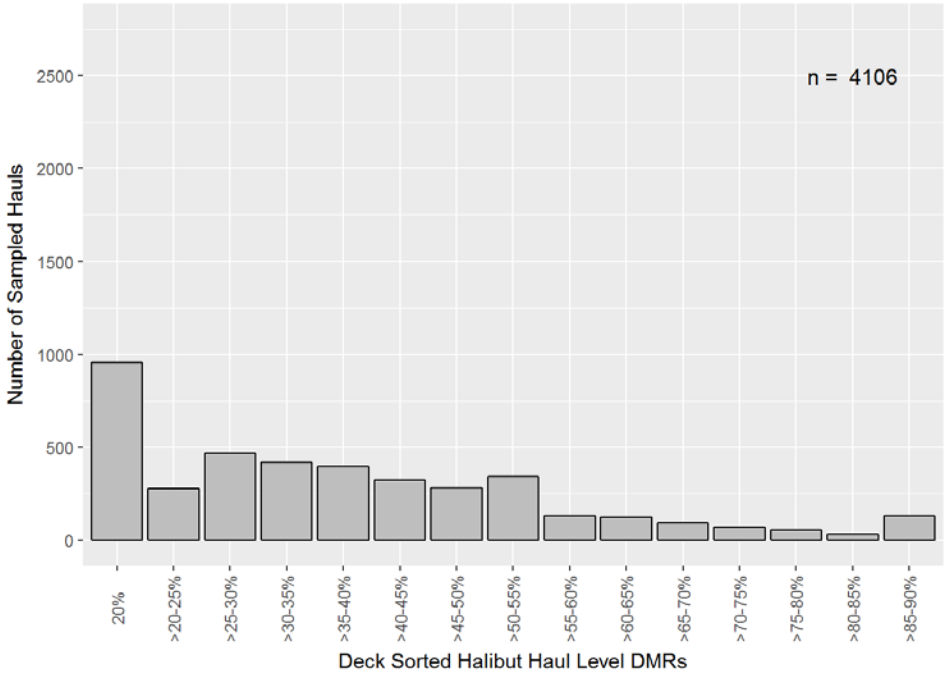
Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: The effective DMRs reflect deck sorted and factory halibut. Hauls with PSC halibut are included whether or not they were sampled for viability and as a result, whether the haul's EFP DMR, a vessel DMR, or an annual average DMR is used in CAS.

For Figure 11 through Figure 16, deck sorted halibut haul level DMRs are used to represent hauls. The deck sorted DMR is a weighted average mortality rate based on a random sample of deck sorted halibut assessed for their viability. The mortality rate is calculated based on the weight of halibut in a haul at each viability level. Halibut that are not deck sorted and recovered in the factory are not factored into this calculation. 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 in CAS. 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. Hauls in these instances, where viabilities are not sampled, are not included in Figure 11 through Figure 16. In 2016 and 2017 deck sorted DMRs were between 20% and 90%.

Figure 11 and Figure 12 compare the number of hauls under the EFP in 2016 and 2017, respectively, within each range of deck sorted halibut DMRs. In 2016, 23.3% of the deck sorted hauls had a mortality rate of 20% (956 of 4,106 hauls). In 2017, that rose to 27.4% (2,743 of 10,009 hauls). 80% of the halibut returned to the sea from these hauls are expected to survive. A larger proportion of hauls in 2016 have deck sorted DMRs between 20% and 45% than in 2017 (46.0% and 37.8%, respectively); however, a larger proportion of hauls in 2017 have deck sorted DMRs greater than 45% and up to 90% than in 2016 (34.8% and 30.7%, respectively).

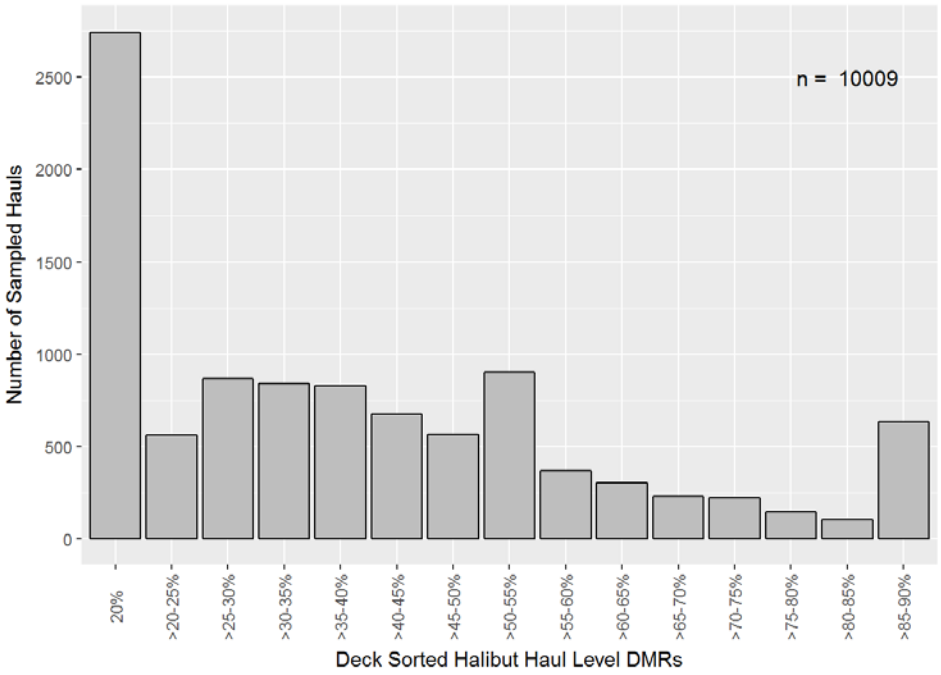
Figure 13 and Figure 14 summarize the amount of halibut catch (mt) on hauls within each range of deck sorted DMRs under the EFP in 2016 and 2017, respectively. Figure 13 and Figure 14 compare the proportion of halibut catch that occurred on hauls within each range of deck sorted halibut DMRs under the EFP in 2016 and 2017, respectively. In both 2016 and 2017, 13.7% of the halibut catch occurred on hauls with a 20% deck sorting mortality rate. However, a larger proportion of halibut catch in 2016 occurred on hauls with deck sorted mortality rates between 20% up to 45% than in 2017 (61.7 and 51.6%, respectively). Conversely, a larger proportion of halibut catch in 2017 occurred on hauls with deck sorted mortality rates greater than 45% and up to 90% than in 2016 (34.6% and 24.7%, respectively). This illustrates a shift towards a larger proportion of the catch occurring on hauls with higher deck sorted mortality rates in 2017.

Figure 11 Frequency of deck sorted halibut haul level DMRs in 2016.



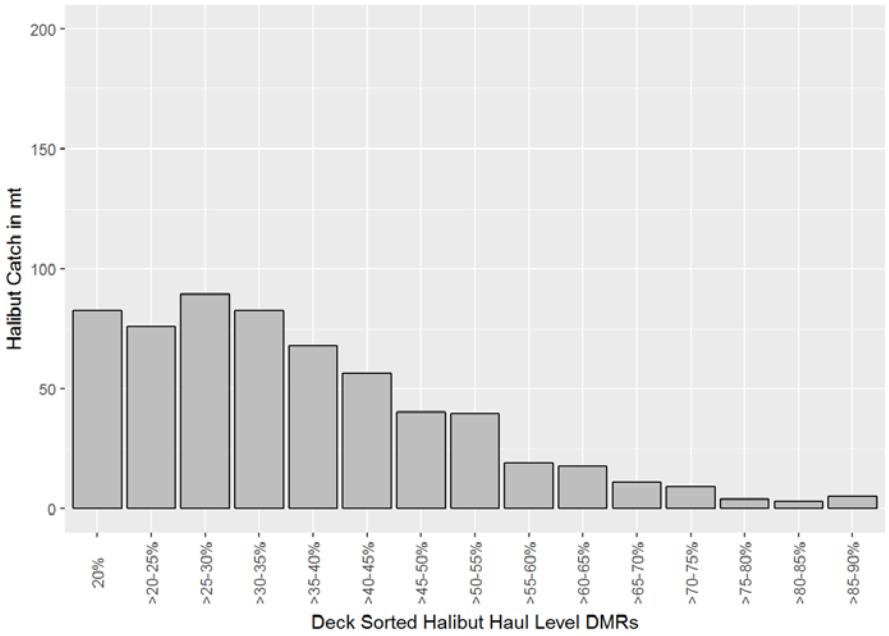
Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: When deck sorted halibut hauls are not sampled for viability, a vessel or annual average DMR is used in CAS. These unsampled hauls have been excluded from this figure. The number of sampled hauls are indicated (n=).

Figure 12 Frequency of deck sorted halibut haul level DMRs in 2017.



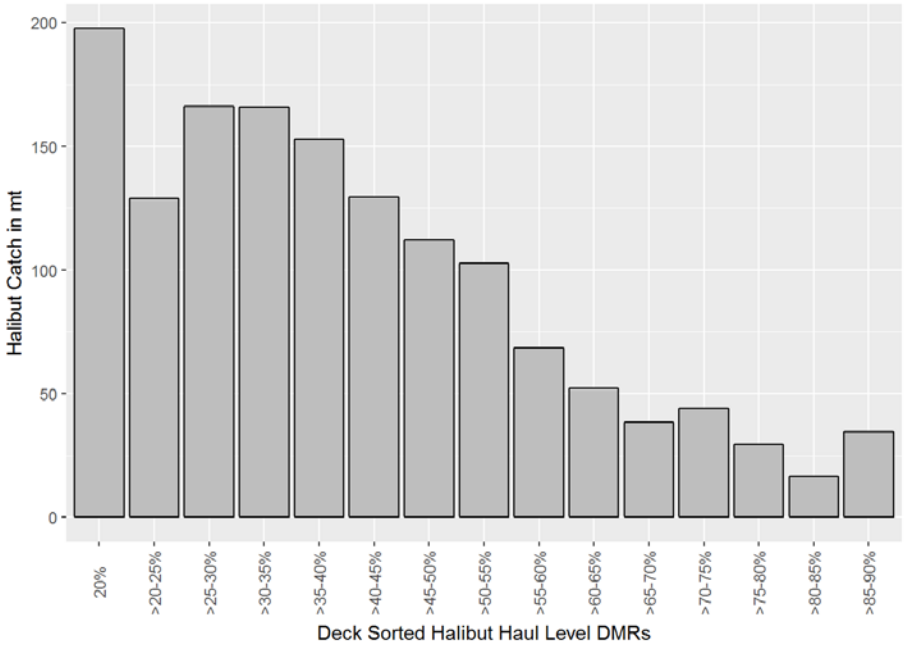
Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: When deck sorted halibut hauls are not sampled for viability, a vessel or annual average DMR is used in CAS. These unsampled hauls have been excluded from this figure. The number of sampled hauls are indicated (n=).

Figure 13 Deck sorted halibut catch by haul level DMRs in 2016.



Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: When deck sorted halibut hauls are not sampled for viability, a vessel or annual average DMR is used in CAS. These unsampled hauls have been excluded from this figure.

Figure 14 Deck sorted halibut catch by haul level DMRs in 2017.



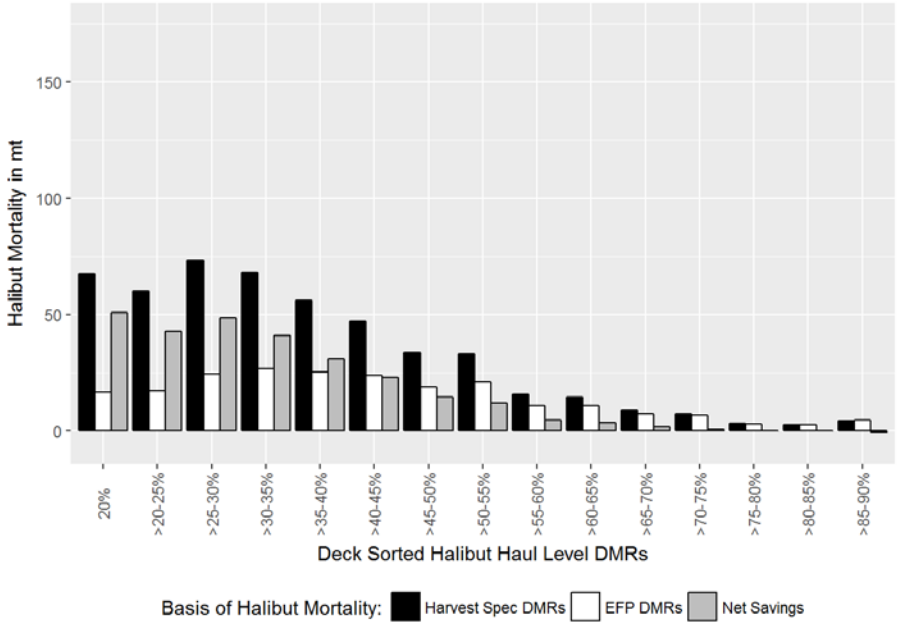
Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: When deck sorted halibut hauls are not sampled for viability, a vessel or annual average DMR is used in CAS. These unsampled hauls have been excluded from this figure.

Figure 15 and Figure 16 compare the net savings of halibut mortality achieved through deck sorting within each range of deck sorted DMRs in 2016 and 2017. If deck sorting had not occurred, and all halibut returned to the sea from the factory, the CAS would apply DMRs published in the harvest specification tables to halibut catch to calculate halibut mortality. Mortality was calculated for deck sorted halibut on hauls under the EFP using the harvest specification DMRs for a point of comparison in this analysis. The 'standard' mortality was aggregated for all of the deck sorted halibut on hauls within a range of DMRs and depicted in Figure 15 and Figure 16 with black bars. This estimates the amount of halibut mortality from these hauls had deck sorting not occurred and the fish been released back into the sea from the factory. Because deck sorting did occur, the CAS applied haul level DMRs to deck sorted halibut catch under the EFP to calculate deck sorted mortality. These mortality values were aggregated for all of the hauls within a range of DMRs and depicted in Figure 15 and Figure 16 with white bars. This estimates the amount of halibut mortality on EFP hauls after being deck sorted and released back into the sea. The difference between those two values are the net savings for each haul; the amount of halibut released in a viable condition as a result of the improved viability achieved through deck sorting. The net savings were aggregated for all of the hauls within a range of DMRs and depicted in Figure 15 and Figure 16 with gray bars.

In 2016, the net savings of deck sorted halibut mortality on EFP hauls was 276.1 mt. This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (497.8 mt) and the deck sorting mortality (221.7 mt). As expected, the larger gains in halibut mortality savings occur on hauls with lower DMRs and taper off as mortality rates rise. A small net loss occurs in both years at the highest range of mortality rates where more dead halibut are encountered as a result of deck sorting because the deck sorting mortality rates applied to the halibut catch are higher than they would be under the rates in the harvest specification tables.

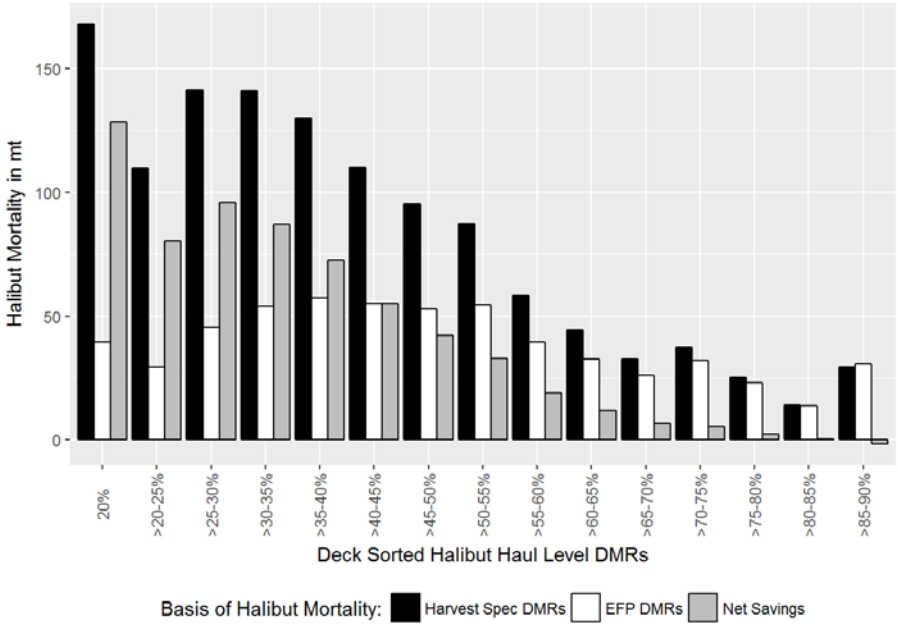
In 2017, the net savings of halibut mortality on EFP hauls was 644.3 mt. This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (1,235.2 mt) and the deck sorting mortality (590.9 mt). In spite of earlier discussion about how a larger proportion of hauls and a larger proportion of halibut catch occurred on hauls with higher deck sorting mortality rates than in 2016, the net savings in 2017 are more than twice that of 2016.

Figure 15 Comparison of deck sorted halibut mortality and deck sorted halibut mortality net savings in 2016 by haul level DMRs.



Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: When deck sorted halibut hauls are not sampled for viability, a vessel or annual average DMR is used in CAS. These unsampled hauls have been excluded from this figure. Mortality from halibut recovered in the factory is not included in this figure.

Figure 16 Comparison of deck sorted halibut mortality and deck sorted halibut mortality net savings in 2017 by haul level DMRs.



Source: NMFS Alaska Region CAS PSC Data and Alaska Fishery Science Center Observer Data.
Note: When deck sorted halibut hauls are not sampled for viability, a vessel or annual average DMR is used in CAS. These unsampled hauls have been excluded from this figure. Mortality from halibut recovered in the factory are not included in this figure.

4.1.3.1 Whale Interactions

Depredation by killer whales and sperm whales is common in the Alaska sablefish and halibut IFQ fishery (Sigler et al. 2008, Peterson and Hanselman 2017, Peterson et al. 2014). Killer whale depredation of sablefish and halibut generally occurs in the Bering Sea, Aleutian Islands, and Western GOA management areas, whereas sperm whale depredation tends to be more problematic in the Central and Eastern GOA (See Section 3.5.2 of Halibut Retention in Pots Initial Review Draft[10]). Of the stations sampled by in the AFSC longline survey, all instances of sperm whale depredation in the BSAI have occurred in the Aleutian Islands, and only male sperm whales have been observed taking fish from longlines (NMFS 2010, NPFMC 2017c). Killer whale depredation in the BSAI occurs where high-value longline fisheries overlap with regions supporting some of the greatest densities of "fish-eating" or resident killer whales in the world (Forney and Wade 2006, Fearnbach et al. 2014), and whales seem to target fishing grounds with higher catch per unit efforts (Peterson and Carothers 2013). Killer whales prey upon several groundfish species that are caught on longline gear in Western Alaska, including sablefish, Greenland turbot, arrowtooth flounder and Pacific halibut (Yano and Dalheim 1995, Peterson et al. 2013).

In reports presented to the Council in February 2016[11], and October 2017[12], the AKSC reported that killer whales had been sighted by some vessels participating in the halibut deck sorting EFP and that the presence of whales could mean the whales were feeding on the halibut discarded from the deck. The report noted that, anecdotally, the presence of killer whales alongside the vessels participating in the 2015 EFP during arrowtooth flounder trips increased compared to the presence of killer whales in the 2012 and 2009 EFPs. In 2015, some vessels fishing arrowtooth flounder were reported to have a continuous presence of killer whales over several days. Where this occurred, whales were at times observed to be near the chute used to discard halibut. To attempt to thwart the whales from consuming halibut, participating vessels tried deck sorting while moving the vessel at the speed normally used for transiting between fishing areas (approximately 8-10 knots). This appeared to successfully prevent predation because the whales generally opted not to follow the vessel. The effects on halibut mortality of returning halibut to the water while moving at this speed are not known.

Killer whale sightings were again reported around vessels participating in the 2017 EFP in the arrowtooth flounder fishery. Some vessels took evasive measures, such as steaming while sorting to reduce the likelihood of predation on deck sorted halibut. These reports from industry representatives indicate that whale depredation could impact the mortality of deck sorted halibut.

In data collected during EFP fishing during 2016 and 2017, observers reported 161 observations of killer whales on 8 unique vessels. The number of killer whales reported in observations ranged between 1 and 25. Observations were reported at the haul and trip level and recorded interactions of feeding on discards, feeding on catch, and one record of a killer whale killed by the propeller. The majority of these observations were reported from one vessel over the two-year period.

Whale depredation reduces catch rates and decreases the accuracy of fish stock assessments. Peterson and Carothers (2013) found that in direct response to depressed catch per unit effort associated with killer whale depredation, commercial longliners reportedly react in two ways: dropping their gear back down to "wait the whales out," or moving to a different fishing site to avoid the whales. Both avoidance measures result in reduced efficiency through increased operation costs and opportunity costs in lost time, such as

[10] INITIAL REVIEW DRAFT Environmental Assessment/ Regulatory Impact Review for Proposed Regulatory Amendment to allow Halibut Retention in Pot Gear in the BSAI, June 2018. Available at:

[11] Agenda Item C5: http://legistar2.granicus.com/npfmc/meetings/2016/2/934_A_North_Pacific_Council_16-02-01_Meeting_Agenda.pdf

[12] Agenda Item D1: http://legistar2.granicus.com/npfmc/meetings/2017/10/965_A_North_Pacific_Council_17-10-02_Meeting_Agenda.pdf

extended soak times and distances traveled (costs of avoiding whales are further discussed in Section 4.7.1 of Halibut Retention in Pots Initial Review Draft[13]).

The documented observations of whale interactions during EFP fishing may be incomplete for a number of reasons. Though monitoring for marine mammals is a high priority for observers when watching the retrieval of the net, during deck sorting activity, the observer is focused on collecting data on halibut sorted from the codend and may or may not be aware of the presence of whales. The location of the deck sampling station may not allow an observer to see if whales are present or if they are feeding on discarded halibut.

4.1.4 Safety

Observer data collection duties include monitoring the retrieval of gear to monitor for marine mammal and seabird interactions on deck. Observers also sample for species composition and collect biological data in the factory. Observers typically monitor the retrieval of gear from a designated location identified by vessel crew that is out of the way of moving equipment, minimizing time on deck and potential exposure to safety hazards such as falling overboard or injury due to moving equipment. Between 4 to 6 crew members work on deck during gear setting and retrieval and are exposed to safety hazards such as falling overboard or injury due to moving equipment during these time periods.

The risk of falling overboard for both observers and crew depends on the amount of time spent on deck. Deck sorting under the EFP increases the amount of time that an observer and vessel crew spend on deck. This could increase the risk of injury or death due to fishing related accidents. According to the 2017 Commercial Fishing Fatality Summary for the Alaska Region[14], fishing related fatalities from 2010-2014 in the groundfish trawl CP fleet were due to drowning as a result of falling overboard, and injuries sustained onboard the vessel. Recommendations for preventing fatality from a fall overboard include: wear a personal flotation device (PFD) on deck, use a man-overboard alarm system, add effective recovery devices and re-boarding ladders, and conducting man-overboard drills monthly. Recommendations for preventing onboard fatalities include installing safety devices, such as emergency stop buttons, on deck machinery.

During EFP fishing, observers and additional crew are present on the deck of the vessel performing deck sorting duties. When a vessel participates in EFP deck sorting activity, observers and crew are at greater risk for falling overboard because of the increased amount of time spent on deck. Observers are instructed to always wear a PFD when on the deck of any vessel[15].

During EFP fishing, the vessel captain may decide not to deck sort because of safety concerns. This may occur during bad or inclement weather when there might be a greater risk of falling overboard or injury on deck due to moving equipment. As part of the 2018-19 EFP, vessels are required to submit and have approved deck safety plans that describe safe procedures that the observer must follow to access the deck sampling station and while in the deck sampling station. The deck safety plans also include procedures for the observer to notify the captain or mate if they feel the weather conditions are unsafe for sampling on deck. The observer may also decline to deck sort if the vessel crew is not following the deck safety plan.

[13] INITIAL REVIEW DRAFT Environmental Assessment/ Regulatory Impact Review for Proposed Regulatory Amendment to allow Halibut Retention in Pot Gear in the BSAI, June 2018. Available under Agenda item C5 at: http://legistar2.granicus.com/npfmc/meetings/2018/6/982_A_North_Pacific_Council_18-06-04_Meeting_Agenda.pdf

[14] NIOSH report: https://www.cdc.gov/niosh/docs/2017-171/pdf/2017-171.pdf

[15] 2018 Observer Sampling Manual: https://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2018.pdf

4.2 Analysis of Impacts: Alternative 2

This section describes the monitoring and enforcement considerations for Alternative 2 – Allow trawl CPs and motherships participating in non-pollock groundfish fisheries (which includes Amendment 80, trawl limited access, CDQ, and any mothership activity to/from those vessels) to select requirements allowing the discard halibut on deck. This alternative includes two options: 1) deck sorting could occur while operating in the BSAI Management Area; and 2) deck sorting could occur while operating in the BSAI and GOA Management Areas (does not include the F/V Golden Fleece).

Trawl CPs that conduct deck sorting activities in the GOA trawl fisheries would be required to comply with the same monitoring requirements as vessels that conduct deck sorting activities in the BSAI. All vessels participating in the deck sorting program would be required to comply with these monitoring requirements while fishing in either the Amendment 80 or Rockfish Program sideboard fisheries in the GOA, the Rockfish Program, or vessels that choose to opt out of the Rockfish Program. The F/V Golden Fleece would not be eligible to participate in this program.

4.2.1 Monitoring and Enforcement Challenges under a Voluntary Deck Sorting Program

This section describes the impacts of Alternative 2 on observer data collection and the need for compliance monitoring tools. Monitoring requirements described in this section are designed to ensure an observer has access to sample halibut to get a representative sample that yields a reliable estimate of halibut PSC.

Observer Data Quality

Allowing halibut to be sorted and removed from the catch on the deck of the vessel reduces the probability of halibut being in the observer sample in the factory. Monitoring and enforcement considerations for this program must ensure that the observer has access to all halibut that would be sorted on the deck of a vessel for accurate catch accounting. These monitoring and enforcement tools are designed to achieve the management objective of returning viable halibut to the sea with minimal injury. The data collection protocols and handling of halibut must provide an accurate representation of the viability and total weight of the discarded halibut.

Increased Pressure on Observers

The collection of composition data by observers in the trawl fishery has been established to support the various data needs of fisheries managers and other data users such as stock assessment scientists. NMFS Alaska Region relies on observer data collections to generate catch and bycatch estimates for the trawl CPs operating in the BSAI and GOA. These processes are outlined in Conners et al. (2009).

Species composition data include a documented observation of the identity, number, and weight of organisms encountered within a small section of a haul. This is often referred to as a species composition sample. The proportion of these organisms to each other within the sample can then be extrapolated to the total haul size to estimate the overall makeup of a haul. For trawl vessels, a weight of every organism within a sample is needed for the extrapolation process to function as designed.

With the exception of salmon census data in the pollock fishery, observer species composition data collections on trawl CPs are designed to provide accurate estimations for catch and bycatch at a fishery level. For an individual haul, observer species composition data collection is limited by overall diversity and availability of unsorted catch. As a result, sample fractions tend to be small which produce estimations with high variance at the haul level. However, when combined over many hauls the estimation process generates more accurate results and can be relied on to represent the actual catch and bycatch amounts for the fishery over time. This sampling approach also compensates for the absence of

haul specific composition data when an observer is unable to sample a haul for any reason such as sickness or injury.

The use of the data collected during deck sorting deviates from the status quo and is intended to be applied at the haul level. Deck sorting is unique for each haul as there can be significant deviations in the total number of halibut sorted, the size of those halibut, and the condition of those halibut. The condition of halibut encountered on deck vary significantly as a result of various factors, such as total haul duration, haul size, temperature, time out of water, and overall catch composition. The total number of halibut encountered varies greatly by many factors, such as fishery, size of haul, size of halibut, haul speed, time of day, fishing depth, and crew efforts to remove as many halibut as possible during deck sorting. As a result, there is high variability between hauls and therefore extrapolations of halibut estimates from one haul to another is limited. This creates a unique situation where the inability of the observer to collect the data needed to define the total number, weight, and condition of deck sorted halibut would prevent the vessel from deck sorting.

In addition to the issues associated with the collection of composition data, removing catch prior to weighing changes how total haul size is measured. Accurate haul estimates are critical, as the total haul size is the foundation of the estimation of catch and bycatch. Currently, trawl CPs are required to weigh all catch on a flow scale to determine a total haul size. This would change under halibut deck sorting. During deck sorting, halibut are removed from the catch before they are weighed on the flow scale. In order to determine the total haul size, the total weight of deck sorted halibut have to be added to the weight of remaining catch that is measured by the flow scale. If the lengths collected from the halibut are lost or deemed unusable, no other method exists to obtain a total weight of the haul.

To account for the amount of halibut discarded, during deck sorting, and to estimate subsequent halibut mortality, enumeration of the number of halibut encountered, the total weight of those halibut, and an assessment of the condition of halibut at the time of discard is required. The number and size of the halibut encountered on deck is variable and dependent on many factors, such as areas fished, depth fished, time of day, haul duration, haul size, and weather conditions. The mortality rate of these fish is also dependent on many of the same factors, but may be more consistent from haul to haul for a specific vessel.

Just as described under Alternative 1, in the absence of observer data, an alternate source of information to accurately quantify the deck sorted halibut is not available. This creates a unique situation where the unavailability of the observer to complete their duties associated with deck sorting interferes with the vessel's ability to conduct a deck sort for a haul. In addition, should the observer's data be lost or found to be unusable due to collection errors, no other source of information exists to quantify the weight and viability of the halibut encountered on deck. This increases the pressure on the observers as the vessel's ability to complete deck sorting is limited by the observer's ability to be available to complete sampling on deck.

Observers are fully tasked with sampling for species composition and length and specimen data in the factory. Coordination between the observer and crew is essential to ensure the observer has the time to complete sampling duties in both locations. Observers sample for species composition in the factory using a systematic method by dividing the estimated weight of the haul into equal sized intervals. The timing for when an observer completes sampling in the factory versus monitoring deck sorting could be problematic if an observer is in the middle of a species composition sample and has to step away to monitor deck sorting activities. Also if an observer's intended sample is approaching, and deck sorting is about to begin, good coordination between factory crew, deck crew and the observer is essential to ensure the observer is able to collect that sample at the randomly chosen weight interval. To maintain high data quality, observers must receive assistance from the crew and not be rushed during deck sorting or while completing sampling duties in the factory. Each deck sorted haul could vary based on the size of the haul,

diversity of the catch, number of halibut caught, pace and duration of deck sorting activity, and the experience level of the observer.

During the 2016 EFP, no time limit existed for the sorting of halibut on deck. It was found that deck sorting in the winter months resulted at times in higher numbers of halibut being sorted. Sorting through and accounting for all these halibut resulted in longer sorting times on average than had been experienced before. Some hauls with very high numbers of halibut sorted on deck were sorted after about 35 minutes and comprised of a high fraction of dead halibut or halibut in "poor" condition, but sorting continued. From anecdotal information from some captains, NMFS learned some vessels were incentivized to deck sort to avoid the uncertainty of extrapolations from observer sampling in the factory.

This created several challenges for the observer. First, the observer was required to remain on deck for extended periods in potentially hazards conditions. The observer has many duties in addition to collecting halibut on deck and this reduced the amount of time the observer could complete these other essential duties. In addition, when an observer encounters several hundred halibut to count, collect a halibut viability assessment, and obtain a length, it can become overwhelming. This may result in the observer missing their intended sample or making errors that could affect the number, weight, and viability assessment of these halibut. High numbers of halibut on deck puts increased pressure on the observer to collect quality viability data quickly. The crew and observer's experience levels and demeanor can play a role on how they deal with the added pressure. Experience early in the 2018-19 EFP demonstrated that some vessel crews sorted the halibut in the catch within the time limit but the observers had several hundred halibut on which to complete counts, lengths and viability assessments after crew had completed sorting. Working quickly in a harsh environment could increase the potential for data errors and result in inaccurate estimates that do comply with the systematic sampling design. Communication between the observer and the crew is essential to make sure the pace of deck sorting is suitable for the observer to collect all the necessary information. Communication is also essential to ensure deck sorting is used to return viable halibut to the sea.

4.2.2 Monitoring and Enforcement Tools

The deck sorting program will impact three of the NMFS Office of Law Enforcement's (OLE) highest priority areas including observer data quality, halibut PSC management, observer work environments, and observer safety.[16]

Given these priorities and the challenges detailed in the previous section, NMFS is considering the following monitoring and enforcement tools and may consider additional monitoring tools to ensure effective monitoring and reporting after the opportunity to receive input from the public, Council, and after additional internal review.

Observer Coverage

Each vessel participating in the deck sorting program would be required to have at least two observers onboard during deck sorting trips to collect required data and conduct required sampling during all hauls. A vessel operator may elect to carry up to four additional observers to allow fish to be run over the flow scale while sorting of halibut occurs on deck.

If carrying two observers, the vessel would not be allowed to run fish over the flow scale while the observer is on deck during deck sorting or while catch is loose on deck. Each observer's workload, including both deck sorting duties and normal duties, would continue to be limited by the observer workload restriction at 50 CFR 679.51(a)(2)(iii) and may not exceed 12 consecutive hours in a 24-hour period.

[16] https://www.fisheries.noaa.gov/webdam/download/67304003

In addition to the general haul notification requirement at § 679.51(e)(1)(vi), the vessel would be required to notify the on duty observer at least 15 minutes prior that the crew would be conducting deck sorting on the haul.

If a vessel chooses to carry three observers, the vessel may designate a 12-hour period when the vessel intends to deck sort while also running fish over the flow scale. The vessel would notify the observers of this timeframe and the observers would determine a work schedule (each shift not to exceed 12 consecutive hours in a 24 hour period) to ensure that two observers are on duty during the designated period. If two observers are not on duty, the vessel would not be allowed to run fish over the flow scale while deck sorting is occurring on deck. During the 12-hour period designated by the vessel to allow simultaneous deck sorting and running fish over the flow scale, the vessel would be required to notify both observers at least 15 minutes prior to deck sorting.

A vessel may choose to carry four observers to allow simultaneous deck sorting and running fish over the flow scale for all hauls where deck sorting occurs. The vessel must notify both observers on duty at least 15 minutes prior to deck sorting activity. Having two observers on duty simultaneously will allow data collection activities to occur as described in the observer sampling manual. Each observer's workload, including both deck sorting duties and normal duties, may not exceed 12 consecutive hours in a 24-hour period.

Most vessels that would be subject to this action are already required to carry two observers. However, CPs that choose to opt out of the Rockfish Program and Amendment 80 CPs fishing under sideboards in the GOA are currently required to carry only one observer. This action would increase the observer coverage requirement for these vessels to at least two observers. These vessels may also choose to carry additional observers (up to four total).

These provisions are necessary to mitigate the impact of deck sorting on an observer's workload. Each additional observer increases observer coverage costs and requires an additional bunk space. Observers would face these challenges on a haul-by-haul basis and vessels could overwhelm an observer to reduce the accuracy of the observer's estimates and reduce the amount of halibut that accrues toward their PSC limit. Vessel crew would be required to provide observers with adequate coordination and reasonable assistance to assist the observer to complete sampling duties as necessary.

Pre-cruise Meeting

Vessels operating in the Rockfish Program and Amendment 80 fisheries are already subject to pre-cruise meeting notification requirements and, if notified to do so by NMFS, are required to participate in a pre-cruise meeting with the assigned observers. In recent years, pre-cruise meetings have not been conducted regularly because most observers are familiar with the operational requirements for these vessels and no changes have occurred to observer sampling duties of which the vessel operators would need to be informed.

Under Alternative 2, the frequency that the Observer Program would require pre-cruise meetings would likely increase, at least in the first year of implementation. This meeting would be used to ensure that observers deployed on a vessel participating in the deck sorting program are adequately prepared to sample as prescribed in the observer sampling manual. A pre-cruise meeting is also an opportunity for observers who will be collecting halibut deck sorting data for the first time on a vessel to ask questions, clarify duties, and understand vessel operations. A pre-cruise meeting would be an opportunity to discuss compliance with deck safety plans (described below) and reasonable assistance necessary to allow an observer to sample prior to departing on a trip. A pre-cruise meeting may also be required to familiarize observers and vessel crew when experimental equipment, such as chute cameras, are to be deployed aboard the vessel.

There is no minimum or maximum time requirement for how long a pre-cruise meeting must be. Typically, meetings can be as short as 30 minutes to an hour or as long as a couple hours if there are

specific sampling challenges to discuss or a high level of interest from vessel personnel. The intent is to allow observers to meet key vessel crew, discuss vessel operations and talk through sample locations, as well as allow observers to get answers to sampling questions from NMFS staff before the start of the fishing trip.

Regulations would be modified to require any vessel that will participate in the deck sorting program to notify the Observer Program when they will be carrying an observer who has not deployed on that vessel in the past 12 months. In the BSAI, this would mean that pre-cruise meeting notification requirements would be added for vessels that are fishing groundfish in TLAS fisheries and are not subject to Amendment 80 regulations. This notification would allow NMFS to determine if a pre-cruise meeting is necessary and for the NMFS to contact the vessel to arrange for a pre-cruise meeting.

NMFS would require a pre-cruise meeting as needed to adequately prepare an observer who may be deploying on a vessel for the first time that will be conducting deck sorting activity or as needed to resolve ongoing sampling challenges on a particular vessel. Pre-cruise meetings would be scheduled during a vessel's time in port. The increased use of pre-cruise meetings under the deck sorting program would increase the need to have Observer Program staff participate in pre-cruise meetings and could increase the demands on Observer Program field office staff resources.

Motion Compensating At-Sea Flow Scale and Observer Sampling Stations

As discussed in Section 5.1.2 flow scales are required to allow all catch to be weighed. Because observer samples are extrapolated to the entire haul, catch from each haul is weighed separately on the scale. To facilitate separate weighing, catch from each haul cannot be mixed with other hauls. Under Alternative 2, deck sorting participants must use the motion compensated flow scale to weigh all catch, except halibut sorted on deck.

Video Monitoring

Vessels that opt to participate in the deck sorting program would be required to provide video monitoring of the deck and all areas where fish could be removed from the catch or discarded from the vessel to ensure that no fish are discarded until the observer has collected data from halibut sorted from the catch and that only halibut are discarded. The system would be operating at all times when the vessel is fishing during a deck sorting trip. If the deck video monitoring system failed, the vessel operator would be prohibited from deck sorting until the system was repaired. The vessel operator would be required to notify NMFS when the video monitoring system failed. The system would be required to meet specifications at § 679.28(e).

The video monitoring system required by this alternative would have one or more color cameras, a digital video recorder (DVR) for storing the video, a monitor for reviewing the video, power sources, and cables to connect the different elements.

Video monitoring of the deck and all areas where fish may be removed from the catch or discarded by the crew will allow NMFS OLE to verify the vessel is in compliance with the deck sorting program requirements. With video, NMFS OLE may be able to verify reports from observers regarding challenges encountered with observer sampling.

All CPs and motherships required to use a flow scale already have video monitoring systems. Vessels subject to Amendment 80 sideboards in the GOA, as well as those vessels that opt out of the Rockfish Program, are not required to use a flow scale and are not required to operate the video monitoring systems while participating in those fisheries, but all these vessels participate in other fisheries that do require video monitoring systems. Vessels that have participated in the EFP fishing under the status quo have already installed cameras on deck for this purpose. Vessels that have not participated in the EFP in the past would need to install additional cameras on deck and may need additional hard drive storage to accommodate the additional video data.

Video monitoring systems for the deck sorting program would be required to be inspected and approved by NMFS staff on an annual basis. Ten business days' notice would be required for the inspection. These inspections would generally coincide with other annual video monitoring inspections. Any alterations to the video monitoring systems for the deck sorting program would require additional inspection and approval before continuing to deck sort. The addition of deck cameras may increase the length of time for the inspection, as well as the time for vessel personnel to prepare for the inspection.

The costs for vessels that have not participated in the EFP may include additional cameras and hard drive space. Most vessels with video systems aboard now carry one to two hard drives with at least a capacity of 1 terabyte of data. Based on internet research, these hard drives cost between $100 and $200. Many vessels already have computer monitors that meet the requirements and would not have to purchase one, but if a new monitor was purchased that was dedicated to the video system, it would cost about $100 based on current market prices. Depending on the type of cameras the vessels decide to use, their cost could range between $400 and $2,500 per camera. Some cameras available to the fleet come with stainless steel housing and high grade protective lenses. Other cameras simply meet the basic requirements and do not offer the protective housing. While either type of camera is acceptable for use, it is likely that the less expensive camera will need to be replaced more often, so the estimate of a spare parts package would likely be higher for vessels that chose this option. One estimate is that installation would likely cost between $2,000 and $5,000 (although, some vessel companies may seek to hold down the installation costs by doing the work themselves). As insurance against equipment failure, vessels are likely to choose to carry spare parts. A spare parts package might run $3,500. Also, typically included in the video monitoring system are power supply for the cameras that run between $100 and $500 and an uninterruptible power supply (UPS) for the DVR that can cost between $100 and $650.11.

Deck Sampling Station

To participate in the deck sorting program, a vessel owner would be required to provide a space on deck for a table to allow the observer to use to collect data on deck sorted halibut. The table would be required to meet the following specifications, unless otherwise approved by NMFS:

- be between 0.9 and 1.1 meters tall with a surface that is at least 0.6 meters deep and 1.2 meters wide and the entire surface must be available for use by the observer;
- have a barrier on at least two sides to prevent fish from sliding off;
- have a NMFS-approved length strip secured to the surface; and
- have a single pathway leading up to the table via a ramp, chute, or belt where halibut are slid from the deck and off the vessel.

This deck sampling station must be designed in such a way that reduces exposure to hazards on deck such as moving net reels, winches, and other large moving parts. Efforts and procedures to minimize hazards in the deck sampling station must be detailed in the deck safety plan described below. The deck sampling station would be required to have adequate space for an observer to complete data collection duties in a safe location.

Vessels that are participating in 2018-19 EFP fishing already have installed a sampling table that meets the above requirements. Additionally, all vessels that participate in the EFP are required to convey all halibut to the deck sampling station via a single pathway. A vessel that had not participated in EFP fishing would be required to install a table on deck and establish a safe space for the deck sampling station.

Deck sampling stations would be required to be inspected and approved by NMFS staff on an annual basis. Ten business days' notice would be required for the inspection. These inspections would be done by Observer Program staff and would generally coincide with the annual observer sampling station and

bin monitoring inspections. Any alterations to the deck sampling station would require additional inspection and approval before participating in the deck sorting program.

Catch Handling and Observer Sampling

A vessel operator would be required to comply with catch handling requirements designed to ensure the observer has access to all sorted halibut and to ensure that all other catch is transferred into the fish bins and weighed and sampled in the factory to create an authoritative record of catch and bycatch for each vessel. These catch handling practices are designed to ensure that observers can collect unbiased samples. Catch handling requirements would include the following:

- Deck sorting activity would not be allowed without the observer present on deck. For a haul that will be sorted on deck, the catch would be required to stay inside the codend on the deck and may not be removed from the codend for the purpose of deck sorting until the observer is present.
- Halibut removed from the catch would be required to be handled carefully to minimize injury prior to discard and provided to the observer at the deck sampling station for data collection through a single pathway. The single pathway from catch to discard will ensure the observer has access to all halibut removed from the catch during deck sorting activity. All halibut sorted on deck would be required to be discarded at a single point of discard after the observer work table.
- All halibut sorted on deck would be required to pass over the observer work table in the observer sampling station with the exception of very large halibut that would be too cumbersome to place on the work table for data collection. The observer must be provided access to these very large halibut prior to discard, and this process would be described in the deck safety plan.
- Deck sorting activities would be limited to no more than 20 minutes after the codend has been opened. After 20 minutes, all remaining catch must be transferred into the fish bins in the presence of an observer leaving no loose fish on deck. Both the observer and the captain will record the time spent deck sorting.
- During the deck sorting activities, the vessel crew sorting halibut on deck would be required to provide reasonable assistance to the observer without interfering with data collection duties. This could include adjusting the pace that halibut are given to the observer to allow the observer to complete all sampling duties as described in the Observer Sampling manual.

These catch handling requirements are designed to ensure that only halibut are removed from the catch prior to weighing and that an observer has access to all halibut removed from the catch during deck sorting. These protocols ensure the observer can collect unbiased samples and facilitate accurate catch and bycatch estimates.

These catch handling requirements are similar to those required in the 2018-19 EFP, but have been modified based on input from the fleet and to meet regulatory requirements. These would be requirements for all vessels participating in the deck sorting program.

Deck Safety Plan

Under Alternative 2, vessel operators must submit a deck safety plan for review and approval by NMFS annually before participating in the deck sorting program. When deck sorting, vessel crew and the observer will spend more time on the deck of the vessel which could increase exposure to safety hazards, such as falling overboard or moving equipment. Deck sorting also requires additional crew to enter the trawl alley to sort and handle halibut. Vessels would also be required to provide safe observer access to the deck and sampling station.

A deck safety plan would describe how the observer may access and transit the deck safely to access their deck sampling station. The deck safety plan would also include notations of potential hazards during the

transit, communication procedures that must be followed by vessel crew and observers during deck operations, descriptions of hazards that could be encountered in the deck sampling station, procedures to be followed by both the vessel crew and the observer to mitigate potential safety hazards, and procedures to address halibut too large for the sample table and discard path. These deck safety plans would include diagrams showing the access path to the deck sampling station noting any potential hazards. The vessel captain would be required to review the deck safety plan with each new observer and provide each observer a copy of the deck safety plan.

Deck safety plans would be created by vessel personnel and submitted to NMFS for review annually. Each deck safety plan would need to be inspected by NMFS staff and the vessel operator would schedule the inspection with at least 10 business days' notice. These inspections would be done by Observer Program staff and would generally coincide with the annual observer sampling station inspections. Any alterations to the deck safety plans would require additional inspection and approval.

Each vessel that plans to participate in the deck sorting program during the year would be required to have a NMFS-approved deck safety plan prior to embarking on a trip when deck sorting activity will occur. Review and approval of a deck safety plan would require at least 10 business days from the time it is submitted to NMFS. A vessel owner or operator would need to develop the plan and allow for the review time prior to departure on a deck sorting trip. The deck safety plan would include descriptions with diagrams or photos as appropriate of how the observer will access the deck sampling station and how hazards on deck will be mitigated during deck sampling activities.

Deck safety plans were implemented and approved for the all 2018-19 EFP participating vessels. Any vessels that had not participated in the 2018-19 EFP would need to create a deck safety plan and have it approved.

Reporting Requirements

Each vessel participating in the deck sorting program would be required to submit additional information to NMFS.

Vessel operators would be required to report in the electronic logbook which hauls are deck sorted. A new field would be added to the electronic logbook for this purpose. This enables OLE to determine which vessel catch handling requirements apply and NMFS to correctly apply the catch accounting programming to separate the halibut that were sorted on deck from the halibut encountered in the factory and apply the appropriate DMR to each group of halibut. If this field is not correctly completed, the inappropriate catch accounting methods might be applied and the vessel could receive the same factory DMR for both deck sorted and factory encountered halibut.

Advanced technologies

Advanced technologies, such as electronic length boards; automated vision-based length measurement technology; chute cameras; or on deck scales to increase sample size, improve accuracy, and reduce the time required for observers to collect data could speed up the return of halibut back to the sea and improve viability as well as reduce the time crew and observers are required to be on deck. At this time, these technologies are still in the research and development phase. If Alternative 2 is selected, any of these advanced technologies could be implemented in the future once adequate testing for accuracy and reliability has been conducted.

4.2.3 Halibut Mortality

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 information available in conjunction with the annual BSAI SAFE report. NMFS revised methods for estimating DMRs, as

discussed in Section 2.3.2; Table 2 shows the halibut DMRs for the BSAI for 2016 through 2018 and Table 3 shows the halibut DMRs for the GOA for 2016 through 2018.

When halibut deck sorting occurs on a non-pollock trawl CP, 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. The sum of the two estimates – halibut mortality from the deck sorted fish plus the mortality of fish from the factory – is posted in CAS. See Section 2.3.6 for additional information on halibut PSC mortality calculations.

Net savings in halibut mortality, similar to those seen under the deck sorting EFPs, are expected under Alternative 2. See Section 5.1.3 for more information.

4.2.3.1 Whale Interactions

As stated in Section 5.1.3.1, depredation by killer whales and sperm whales is common in the Alaska sablefish and halibut IFQ fishery (Sigler et al. 2008, Peterson and Hanselman 2017, Peterson et al. 2014). Killer whale depredation of sablefish and halibut generally occurs in the Bering Sea, Aleutian Islands, and Western GOA management areas, whereas sperm whale depredation tends to be more problematic in the Central and Eastern GOA (See Section 3.5.2 of Halibut Retention in Pots Initial Review Draft[17]). Of the stations sampled by in the AFSC longline survey, all instances of sperm whale depredation in the BSAI have occurred in the Aleutian Islands, and only male sperm whales have been observed taking fish from longlines (NMFS 2010, NPFMC 2017c). Killer whale depredation in the BSAI occurs where high-value longline fisheries overlap with regions supporting some of the greatest densities of "fish-eating" or resident killer whales in the world (Forney and Wade 2006, Fearnbach et al. 2014), and whales seem to target fishing grounds with higher CPUEs (Peterson and Carothers 2013). Killer whales prey upon several groundfish species that are caught on longline gear in Western Alaska, including sablefish, Greenland turbot, arrowtooth flounder and Pacific halibut (Yano and Dalheim 1995, Peterson et al. 2013).

During EFP fishing, feeding on discarded halibut has been observed, but it is not possible to accurately quantify the impact on halibut mortality at this time. Even though whale depredation may be an issue for some vessels some of the time, a specific suggestion for how to address the issue on a regulatory basis is not clear at this time.

The collection of these data requires the observer or vessel crew to first recognize the presence of marine mammals around the vessel, which may be limited by weather and light conditions. Once their presence is identified, the animals' behavior must be observed for a sufficient time period to identify their activities, which is complicated by the observer's requirement to focus on the deck sorting activity and associated data collections. In essence, an observer cannot be in two places at once. As a result of these data collection challenges, observer observations of marine mammals feeding on discarded catch are opportunistic and the ability to extrapolate the data to determine a total is unknown.

4.2.4 Safety

The impacts of the regulated deck sorting program would be similar to the impacts of the EFP under the status quo, but could be increased for vessels that may participate in the regulated deck sorting program and have not participated in the EFP. By limiting the maximum amount of time spent on deck sorting halibut, the risk of injury or falls overboard for observers and crew will be minimized.

Over time, observer data collections have been altered to minimize the need for an observer to be exposed to the trawl deck environment of large CPs. With the implementation of flow scales on most trawl CPs operating in Alaska, observers are no longer required to work around a codend on deck. Aside from data collections from marine mammals and seabirds that have been killed by the trawl gear, the time an

[17] INITIAL REVIEW DRAFT Environmental Assessment/ Regulatory Impact Review for Proposed Regulatory Amendment to allow Halibut Retention in Pot Gear in the BSAI, June 2018. Available at:

observer is required to be on deck is limited to monitoring the gear retrieval from a protected location, sheltered from the trawl gear. Collection of marine mammal and seabird specimen data can be achieved after the trawl gear has been secured which further limits the observer's exposure to the gear.

Deck sorting operations require the observer to be on deck for extended periods. During the deck sorting operation the vessel crew moves the codend to facilitate the movement of fish. These actions pose a risk to the observer and crew as the gear can shift, cables can part, and lines can break or otherwise present a hazard.

In order to mitigate safety concerns, deck safety plans were implemented in the 2018-19 EFP. The deck safety plan benefits the safety of the crew and observers in several ways. The deck safety plans outline when the observer will transit to the sample station, who will notify the observer when it is safe to do so, what are the approved routes to and from the sample station, and identify hazards in and around the sample station on deck. These plans require increased communication between the observer, vessel crew and captain regarding all aspects of safety on deck. The observer has the ability to decline to deck sort if the vessel is not following their deck safety plan. The observer has a clearly outlined method to address any safety concerns he or she might encounter, which includes any unforeseen concerns not addressed in the deck safety plan. Finally, the observer is provided direction about how he or she can be safe aboard the vessel. Deck safety plans would be required under Alternative 2.

4.2.5 Costs and Benefits

4.2.5.1 Methodology for analysis of impacts

The evaluation of impacts in this analysis is designed to meet the requirement of E.O. 12866, which dictates that an RIR evaluate the costs and benefits of the alternatives, to include both quantifiable and qualitative considerations. Additionally, the analysis should provide information for decision makers "to maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach." The costs and benefits of this action with respect to these attributes are described in the sections that follow, comparing the No Action Alternative 1 with the action alternatives. The analyst then provides a qualitative assessment of the net benefit to the Nation of each alternative, compared to no action.

To assess the potential costs of halibut deck sorting, and potentially some of the benefits of conversion of the EFP to a regulated voluntary halibut deck sorting program, a compliance cost survey was fielded in late 2017. This survey was developed using the existing EFP requirements to define cost categories. Survey questions sought information on costs associated with management of participation and compliance with the EFP, pre-trip meetings, observer requirements, onboard data management, equipment and vessel modification requirements, and deck sorting labor. Additionally, an open-ended question sought information documenting any additional costs the respondent may have incurred (e.g. vessel modifications or other operational changes) to participate in the halibut deck sorting EFP.

The compliance cost survey utilized the list of current EFP participants, which includes nine fishing companies operating multiple vessels. Initial telephone contact was made with EFP participant representatives to explain the purpose of the survey and to verify e-mail addresses. The survey was then e-mailed in late November of 2017, with an e-mail reminder sent in January of 2018. A total of two completed survey forms were returned. Additionally, one partial survey was conducted over the phone and two partial responses were received via email. Finally, one participant in the EFP that is not defined as a potential survey respondent provided an e-mail challenging the appropriateness of the cost of compliance survey and characterizing the cost of halibut deck sorting as an operational (loss of production) cost. Several other participants have indicated agreement with the characterization of costs as largely operational. While this information is helpful, and will be discussed further below, it is identified as a personal communication via e-mail (Gauvin, 2018) and is not a survey response.

The little data provided by EFP participants on compliance costs, nonetheless, show that it is not costless to prepare a vessel for deck sorting, nor is it costless for participating fishing companies to manage their compliance and data collection under the EFP. The data that were provided identified costs for multiple vessels; however, too few responses and the fact that vessels differ substantially in size and configuration prevent reporting statistical estimates. What is provided here are the ranges of potential costs that vessel operators may face when preparing a vessel for deck sorting maintaining necessary equipment, as well as estimates of the management cost of participation and compliance.

4.2.5.2 Implementation Costs

As discussed in the methodology section previously, a short cost of compliance survey of existing participants in the halibut deck sorting EFP was conducted. This section provides a summary of the information collected and is intended to exemplify the costs that would be associated with a vessel participating in halibut deck sorting.

EFP Management

Participation in the halibut deck sorting EFP requires labor associated with the Designated Representative serving as the main point of contact between the permit holder, the principal investigator, the vessel and crew, and NMFS. The Designated Representative also participates in EFP participant meetings and generally manages the day-to-day participation of the fishing company in the EFP. Potential survey respondents were asked to estimate annual labor cost of their Designated Representative associated with deck soring EFP management and compliance (total hours and average wage rate). Example costs were estimated at 40 hours, or one week of work, annually at a labor cost per hour ranging from $65 to $75 per hour, or approximately $2,600 to $3,000 in labor cost annually.

Pre-trip Meeting, Observers, and Data Management

It is a requirement of the EPF that pre-trip observer meetings be held to discuss the expectations and requirements for halibut deck sorting trips. These meetings involve the vessel master and potentially other vessel crew that may interact with the observers. Potential respondents were asked to estimate the labor cost of pre-EFP trip meetings (total hours and average wage rate). It is important to understand that most of the individuals that would be involved in these meetings do not generally receive an hourly wage, as crew share or a combination of base salary and crew share of trip revenue are common forms of compensation in the potentially affected fisheries. This fact was discussed with potential respondents in phone conversations and in the survey transmittal e-mail and it is acknowledged that these estimates are difficult to make. For that reason, the wage rate is defined as an average wage rate inclusive of all forms of compensation and the respondent's best estimate of that wage rate was requested. Current participants in the EFP who responded to this question indicate that the vessel master regularly meets with observers prior to the trip and that the EFP has not added any cost to those meetings.

Potential respondents were also asked to estimate any labor costs onboard the vessel associated with observer notifications of the intent to deck sort halibut, as well as whether they had carried additional observers onboard to facilitate deck sorting. Potential respondents were also asked to estimate the cost of vessel operator compliance with data management requirements under the EFP (hours per day when participating and average estimated hourly wage rate). No costs of observer notifications were indicated and only one respondent indicated carrying an additional observer for 148 days during 2017. The additional observer costs for this vessel were reported to be $350 per day, or $51,800 for the 2017 fishing year. Respondents estimated that data management compliance costs are derived from about 15 minutes of additional labor time per haul and costs are estimated to range from $50 per day to nearly $100 per day with reported time required being approximately one to two hours per day. Of course these costs will vary with the numbers of hauls completed on a vessel during deck sorting in any given day of fishing.

Video Monitoring and Additional Equipment Costs

Potential respondents were asked to estimate the cost of the installed deck sorting video monitoring system. Estimates of equipment cost, installation cost, and any ongoing operation and maintenance costs were requested. Additionally, estimates of the added cost of materials necessary to allow halibut deck sorting under the EFP (e.g. observer work table, ramps, chutes, belts etc.) were requested. Video monitoring equipment reportedly costs from $10,000 to $16,000 and can require between $1,000 and $4,000 in annual maintenance costs. Additionally, the cost to fit the vessel with the required deck sorting equipment ranged from approximately $12,000 to $20,000.

Deck Sorting Labor Costs

Potential respondents were asked to estimate the daily crew time and average wage rate per hour required to perform deck sorting as well as factory sorting if applicable. Deck sorting reportedly uses six people and the duration of the sorting per day depends on the number of hauls that can be completed given fishing conditions. Respondents estimated daily total time taken for deck sorting to be between one and two hours with total per day costs estimated to range from $200 to $500 per day. Factory sorting costs were identified as being the same with or without deck sorting.

4.2.5.3 Operational Costs

The last survey question provided potential respondents with an opportunity to describe any additional costs they may have incurred to participate in the deck sorting EFP (e.g. vessel modifications or other operational changes). This open-ended question was responded to by all respondents and one additional non-respondent in a personal communication. One respondent indicated an additional $2,500 in vessel costs, presumably for an additional observer. However, the general consensus of all respondents is that the real impact of halibut deck sorting is not the cost of compliance, equipment, or additional observers. To assess the full impact of halibut deck sorting one must consider the effect it has on the fishing operation and the factory operation.

Several respondents indicated that the on deck activities during deck sorting result in two direct effects on operations. The first is that the deck crew takes up to 30 minutes to sort through the catch and allow the observer to measure and evaluate halibut. Clearly, this is time that cannot be spent fishing. Further, no fish can be run over the flow scale while deck sorting is occurring, unless additional observers are present. This limitation significantly slows factory production. Respondents indicate that Amendment 80 CPs typically make between four and six hauls a day when not deck sorting, with operational ability likely constrained by vessel size and fishing conditions. The amount of time taken to deck sort per day is thus from two to three hours per day per vessel. Respondents indicate that this delay, along with factory slowdown, equates to one lost haul per day for each participating vessel.

The potentially forgone revenue impact from one lost haul per day per participating vessel is difficult to independently quantify with catch data and industry reported prices. Vessels participating in deck sorting fish for a variety of species at different times of the year and offload frozen packaged product for shipment to markets around the world. Identifying the value of an individual or “typical” haul is, therefore, problematic. Further, some fishing companies indicate that they shorten their haul length to improve product quality and to improve the viability of deck sorted halibut. Respondents who did provide estimates of these additional operational impacts as potentially forgone revenue indicated that the value can range from approximately $25,000 to $75,000 per haul, per day, and per vessel participating in deck sorting.

To mitigate the potentially forgone revenue due to lost fishing time when halibut deck sorting, vessels will fish longer each season. Participants in the Amendment 80 fleet who have testified to the Council regarding the costs of halibut deck sorting have indicated that the forfeit of one haul per day of production on average adds up to the loss of one month of production over the course of the season. In other words,

EFP participant vessels have had to fish/process an additional month per year during halibut deck sorting to achieve the same amount of finished product and a similar level of total annual gross revenue.

It is possible to use data provided by the Amendment 80 fleet in their annual Economic Data Reports to estimate the potential impact of the operational cost aspects of halibut deck sorting. Amendment 80 vessels have reported that the number of days fishing and processing by the median vessel in Amendment 80 fisheries in the BSAI in 2016 was 202 days (AFSC, 2017, Table 9.6 page 254). Thus, an additional 30 days of fishing, for the median vessel in the fleet, equates to roughly a 15% increase in the time spent fishing in order to mitigate potentially forgone revenue due to halibut deck sorting. The Amendment 80 median vessel reported annual wholesale value of final product of $11.67 million in 2016 (Table 9.7 page 257) and the fleet wide operating cost per vessel-day slightly exceeds $44,000 per day (Table 9.9, page 267). Applying fleet wide cost per vessel day to the 30 additional days reportedly needed to mitigate the effects of deck sorting results in approximately $1.3 million in added cost, which is a 15% increase in costs and represents roughly 11% of median vessel annual revenue in 2016. Thus, if halibut deck sorting results in the loss of one haul per day and an additional 30 days of fishing is required to mitigate that revenue, the added cost of mitigation, based on fleet wide averages, could exhaust net revenue in years where revenue is relatively low or for some vessels operating below median revenue levels. It is quite possible that some vessels may find participation in halibut deck sorting does not allow profitability in all fishing conditions and this may limit participation in the voluntary program.

As discussed above, EFP participants have indicated that losing a haul per day can extend their fishing operations within a season. More fishing days on the grounds will result in greater fuel consumption; however, harvest levels of target species, incidental catch, and PSC limits are all controlled by existing allocation regulations and NMFS In-Season Management and will not be affected by this action. In addition, all harvesting activity aboard participating vessels will continue to occur within presently defined season lengths established in regulation. Thus, vessels will not be operated outside of currently defined fishing seasons that they are allowed to operate within under the status quo condition. Thus, it is not anticipated that the lengthening of fishing operations within presently allowed fishing periods will result in environmental consequences not previously considered in establishing existing season lengths, harvest allocations, and management measures.

4.2.5.4 EFP Management Costs (non-participant)

In addition to the costs of compliance and operational costs of the halibut deck sorting EFP, there are also costs associated with management of the EFP by the principal investigator and staff of the AKSC, staff of NMFS Alaska Region, as well as Observer Program staff. The principal investigator identifies considerable time taken to monitor vessel activities under the EFP, answer questions from participants by satellite phone and email, and attend bi-weekly meeting with the NMFS Alaska Region and Observer Program to address problems and questions from vessels participating in the EFP. A “ball park” estimate of those costs for management the EFP is approximately $150,000, annually. Thus, conversion of the halibut deck sorting EFP to a regulated program would allow those resources to be used to more efficiently manage the operations and other research of the cooperative and are thus considered here to be an opportunity cost.

Additionally, several of the NMFS Alaska Region and Observer Program staff participate regularly in meetings with the EFP participants and the principal investigator. These staff costs are part of the overall program of fisheries management at NMFS and are not tabulated to identify specific costs of EFP management by Federal employees. However, conversion of the halibut deck sorting EFP to a regulated program would alleviate the labor burden to process, monitor, and manage the EFP, albeit while likely adding other elements of management, monitoring, and compliance including additional cost to NMFS OLE for compliance monitoring and investigations. Thus, these agency costs are also opportunity costs and elimination of the EFP will allow staff time to be utilized to more efficiently manage Alaska fisheries, albeit with some added cost of enforcement.

4.2.6 Potential Benefits of Halibut Deck Sorting

The primary benefit to participants in a halibut deck sorting program is reduced halibut mortality accrual against the applicable PSC limit. This benefit is realized via the estimation of reduced halibut DMRs, on a haul by haul basis, when halibut can be sorted from the catch on deck and observers can determine that deck sorted halibut have a higher viability than factory sorted halibut. The extent to which this benefit will accrue depends on many factors such as length of haul, time halibut spend out of the water, the volume of halibut sorted, and the overall volume of fish in the haul. For example, halibut deck sorting under the 2012 EFP in the high volume yellowfin sole fisheries proved to be problematic and improvement of methods in that target fishery was a specific objective of the 2015 EFP (EFP 15-02 final report[18]).

The incentive for participation in halibut deck sorting is that participants may gain access to the halibut mortality savings they achieve when deck sorting halibut. Within the Amendment 80 cooperative, member companies receive annual allowances of halibut mortality that they then use to harvest their directed fishing target species. Reduction in halibut mortality via deck sorting would theoretically provide access to more fishing opportunity and would become more important if either TAC for target species were to increase or if the halibut PSC limits were further reduced. In the other potentially affected fisheries, reduced halibut mortality accruing against PSC limits provides a similar incentive to participate.

Section 5.1.3, above, presents an analysis of the discard mortality of halibut within the EFP. Using CAS data, the net savings of halibut mortality as a result of the EFP were tabulated on a haul by haul basis. The net savings were then aggregated for all of the hauls within a range of effective DMRs and depicted in Figure 9 and Figure 10 with gray bars.

As discussed in Section 5.1.3, in 2016, the net savings of halibut mortality on EFP hauls was 267.6 mt (Table 7). This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (596.9 mt) and the EFP mortality (329.3 mt). As expected, the larger gains in halibut mortality savings occur on hauls with lower effective DMRs and taper off as mortality rates rise. A small net loss occurs in both years at the highest range of mortality rates where more dead halibut are encountered as a result of the EFP because the EFP mortality rates applied to the halibut catch are higher than they would be under the rates in the harvest specification tables.

In 2017, the net savings of halibut mortality on EFP hauls was 620.9 mt (Table 7). This is the difference between the standard halibut mortality based on DMRs published in the harvest specifications (1,633.1 mt) and the EFP mortality (1,012.2 mt). This is more than twice the net savings in 2016. The net savings of halibut on EFP hauls exemplifies the potential benefits, in terms of reduced halibut mortality, that participants in deck sorting of halibut may achieve under this action.

A secondary benefit of reduced halibut mortality in groundfish trawl fisheries that utilize halibut deck sorting is that the reduced halibut mortality accrues to the halibut biomass available to other users of the resource. Reduced halibut mortality in trawl fisheries may result in more halibut being available to IFQ halibut fishery participants as well as to subsistence, sport, and personal use harvesters. For example, in 2015, the AKSC set its target halibut mortality usage for the year substantially below its limit. This allowed the IPHC to set a higher directed fishing limit for halibut in the BSAI (Final EFP report 15-02[19]). The extent to which such secondary benefits may accrue will depend upon how many vessels ultimately participate in halibut deck sorting activities and on how successful they are, on a continuing basis, in achieving reduced halibut discard mortality accruals.

[18] Available at: https://alaskafisheries.noaa.gov/fisheries/efp

[19] Available at: https://alaskafisheries.noaa.gov/fisheries/efp

4.3 Summation of the Alternatives with Respect to Net Benefit to the Nation

Overall, this action is likely to result in net benefits to the nation. This action seeks to reduce halibut bycatch mortality in the affected trawl fisheries and thereby allow fishing operations to maximize their directed harvesting opportunities within regulatory halibut PSC limits that, while not presently constraining, may become constraining in the future. Maximizing fishing opportunities will also promote achieving optimal yield in the affected fisheries. Further, reduced halibut mortality in the affected trawl fisheries will potentially provide more of the harvestable biomass of the halibut stock to halibut directed fishery participants in the hook-and-line IFQ fisheries, as well to subsistence, personal use, and sport fisheries. Participation in the halibut deck sorting program is not without cost to industry, and in some instances participation may not be economically viable for a variety of reasons; however, the program will be voluntary and will allow industry flexibility to assess economic conditions. Presumably, industry will only conduct halibut deck sorting when the benefits of reduced mortality provide valuable fishing opportunity and the resulting operational cost of halibut deck sorting, measured in terms of mitigation of loss of production via increased fishing and processing time, does not exceed the benefits of halibut deck sorting.

5 Potentially Affected Small Entities

This section provides estimates of the number of small entities that would be directly regulated by this action. The thresholds applied to determine if an entity or group of entities are "small" 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 Alaska Region has considered CPs 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.

NMFS has determined that vessels that are members of a fishing cooperative, including members of the AFA cooperatives, Amendment 80 cooperatives, and Rockfish Program cooperatives are affiliated when classifying them for the RFA analyses. 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. NMFS has reviewed affiliation information for cooperative members and has determined that all CPs eligible for halibut deck sorting in the BSAI and/or GOA are large via cooperative affiliation.

The six Western Alaska CDQ entities are non-profit corporations, are not dominant in the BSAI non-pollock fishery, and are specifically identified as "small" entities in the regulations implementing the RFA. This proposed action directly regulates these non-profits, and NMFS considers them to be small entities for RFA purposes. Further, the CDQ entities' affiliations with other large entities do not define them as large entities. Revenue derived from groundfish allocations and investments in BSAI fisheries enable these non-profits to better comply with the burdens of this action, when compared to many of the large AFA affiliated entities.

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