DRAFT FOR INITIAL REVIEW

Social Impact Assessment for Bering Sea Chum Salmon Bycatch Management

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Abstract:

This document is Social Impact Assessment prepared to accompany the preliminary Draft Environmental Impact Statement analyzing proposed management measures to minimize chum salmon (*Oncorhynchus keta*) bycatch in the Bering Sea. The proposed measures would apply exclusively to participants in the Federal Bering Sea pollock (*Gadus chalcogrammus*) fishery which operates in the Bering Sea sub-area of the Bering Sea/Aleutian Islands Groundfish Fishery Management Plan area. The purpose of this action is to minimize chum salmon bycatch, but particularly the bycatch of Western Alaska origin chum salmon, consistent with the Magnuson-Stevens Fishery Management and Conservation Act, its National Standards, and other applicable law.

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1 Introduction

This Social Impact Assessment (SIA) was prepared alongside the preliminary Draft Environmental Impact Statement (DEIS) analyzing proposed management measures to reduce chum salmon (*Oncorhynchus keta, kangitneq, iqalluk, srughot'aye, dog salmon*).[1] bycatch in the Bering Sea pollock (*Gadus chalcogrammus*) fishery,[2] consistent with National Standard 9 of the Magnuson Stevens Fishery Conservation and Management Act (MSA), the National Standards, and all other applicable law. The North Pacific Fishery Management Council (Council) has also specified that a primary purpose of this proposed action is to minimize the bycatch of chum salmon originating from Western Alaska (WAK) river systems. For catch accounting purposes, the National Marine Fisheries Service (NMFS) monitors salmon bycatch as either "Chinook PSC" or "non-Chinook PSC." The non-Chinook catch accounting category includes four species of Pacific salmon – sockeye (*Oncorhynchus nerka)*, coho (*O. kisutch)*, pink (*O. gorbuscha)*, and chum salmon (*O. keta).*, **Over 99% of the salmon bycatch in the non-Chinook category are chum salmon** (see Table 4-2 in the preliminary DEIS). Thus, the preliminary DEIS and this SIA often use "chum salmon PSC" or "chum salmon bycatch" when referring to the non-Chinook category for ease of the reader.

As described in Section 1.1 of this SIA, the Council is considering this action in light of the ongoing declines in chum salmon run strength across Western and Interior Alaska which have resulted in reduced opportunities for subsistence, personal use, and commercial chum salmon harvests. Any additional chum salmon returning to Alaska river systems improves the ability to meet the State's spawning escapement goals which is necessary for the long-term sustainability of chum salmon fisheries. Chapter 4 of the preliminary DEIS contains a full description of the proposed alternatives (management measures) under consideration to meet the Council's purpose and need statement for this action. They are summarized in brief here for the reader directly below.

Under Alternative 1 (No Action), the current regulations at 50 CFR 679.21 for salmon bycatch management in the Bering Sea pollock fishery would remain in place (See Section 4.1 of the preliminary DEIS). Under Alternative 2, an overall chum salmon PSC limit (or hard cap) would be in effect during the B season fishery occurring during the summer months (June 10—November 1) when the majority of chum salmon are encountered by the Bering Sea pollock fleet (see Section 4.2 of the preliminary DEIS). The Council is also considering different options for indexing an overall chum salmon PSC limit to abundance of WAK chum under option 2 of Alternative 2. Under Alternative 3, an annual WAK chum

[1] Some traditional Alaska Native names for chum salmon are *kangitneq* (Central Yup'ik, used by coastal Kuskokwim communities, refers to migrating chum salmon headed to the headwaters), *iqalluk* (Central Yup'ik, used in lower/middle Kuskokwim communities, referring to adult migrating chum salmon), and *srughot'aye* (Upper Kuskokwim/Dinak'i, used in upper Kuskokwim communities, referring to adult migrating chum salmon). Dog salmon is another English name for chum salmon commonly used by Western Alaska Native peoples. Alaska is home to 229 sovereign Tribal governments and 23 distinct Alaska Native languages, many of which have multiple dialects and all of which are official languages of the state. *Kangitneq, iqalleq*, and *srughot'aye*, shared with Council staff for inclusion in this document by the Kuskokwim River Inter-Tribal Fish Commission through their role as a cooperating agency on this action, are just a few of the traditional names for chum salmon in Alaska. Additional Alaska Native languages' names for chum salmon, or salmon, were not included here because, recognizing the importance of language accuracy to respect culture, language-bearers, and Traditional Knowledge systems, Council and NMFS staff as non-Alaska Native language speakers wished to do no harm to Alaska Native language speakers by attempting to interpret all traditional names for chum salmon. An interested reader could find more information on Alaska Native languages at the Alaska Native Knowledge Network, and on respectfully working with Alaska Native languages in the Alaska Public Interest Research Group's Alaska Native Language Translation Protocols available here.

[2] While "bycatch" and "PSC" are often used interchangeably, these terms do have slightly different meanings. The Magnuson-Stevens Fishery Conservation and Management Act defines bycatch as fish which are harvested in a fishery but are not sold or kept for personal use including regulatory and economic discards. Certain species are designated as "prohibited species" in the Bering Sea Aleutian Island Groundfish Fishery Management Plan because they are the target of other, fully utilized domestic species. PSC species include Pacific halibut, Pacific herring, Pacific salmon, steelhead trout, king crab, and Tanner crab.

salmon threshold would be in place during the B season; Alternative 3 must be implemented in conjunction with Alternative 2 and only those WAK chum identified by genetic sampling would accrue to the threshold (see Section 4.3 of the preliminary DEIS). Alternative 4 would modify regulations at 50 CFR 679.21(f)(12) implementing the salmon bycatch Incentive Plan Agreements (IPAs) by requiring additional measures for the pollock industry to avoid WAK chum salmon (Alternative 4; see Section 4.4). All proposed management measures would apply exclusively to participants in the federal Bering Sea pollock fishery operating in the Bering Sea sub-area of the Bering Sea/Aleutian Islands (BSAI) Groundfish Fishery Management Plan (FMP) area.

The purpose of the preliminary DEIS and this SIA are to provide the necessary information for decision-making, which includes an analysis of the potential impacts of the proposed alternatives as well as information for the Council to further refine its alternatives, should it choose to do so. This SIA analyzes community and regional participation patterns in the Bering Sea pollock fishery, as well as subsistence and commercial chum salmon fisheries across Western and Interior Alaska. The description of these fisheries is used as a baseline for characterizing potential social and community impacts from 1) the no-action alternative (Alternative 1) and the proposed action alternatives as a group (Alternative 2-4). This SIA provides the Council and the NMFS a way to gauge the potential social and cultural impacts that could result from the proposed alternatives.

This SIA is organized to streamline information for the reader. **Chapter 1** introduces the action under consideration, and it provides the Council's Purpose and Need statement as well as the set of proposed alternatives to meet this statement. **Chapter 2** provides the regulatory context for completing an SIA. **Chapter 3** provides a general overview and approach for how this SIA was prepared including documents incorporated by reference and data that would have been helpful but were unavailable. The analysts have incorporated the methods used for the impact analysis under the relevant sections rather than as a separate section of this chapter.

Chapter 4 provides an overview of the potentially affected regions and communities. Section 4.1 provides information on those regions and communities that are engaged in or dependent on the Bering Sea pollock fishery through harvesting and processing B season pollock. Section 4.1.6 characterizes the six regions and 65 Coastal Western Alaska communities that are indirectly engaged in the Bering Sea pollock fishery through their CDQ groups. The relative dependence of these 65 communities on Bering Sea pollock is considered in this SIA in terms of the social and economic benefits the groups provide to their constituent communities. However, as discussed below, many CDQ communities are also engaged in or dependent on subsistence and commercial chum salmon fisheries.

Section 4.3 provides information on subsistence harvests by households and communities across Western and Interior Alaska as well as information on the economic role of subsistence in supporting mixed economies in rural communities and the cultural and spiritual importance of subsistence. Section 4.4 contains information on commercial harvests of chum salmon in Western and Interior Alaska including a summary of recent trends in fishery engagement and economic dependence, and the importance of commercial chum salmon fisheries to various regions and communities in Western Alaska to permit holders as well as more broadly within the regional economies. **Chapter 5** contains the analysis of potential impacts resulting from the proposed alternatives on the various communities, regions, and fisheries discussed in Chapter 4.

1.1 Purpose and Need

The purpose of this action is to minimize the bycatch of WAK origin chum salmon in the Bering Sea pollock fishery to the extent practicable under National Standard 9 and section 303(1)(11) of the Magnuson-Stevens Act while balancing the other National Standards. The Council has further specified that its intent is to balance the National Standards and maintain the objectives of prior salmon bycatch

management measures, namely Amendments 91 and 110 to the BSAI Groundfish FMP that established measures to reduce Chinook salmon bycatch.

The Council is considering this action in light of the ongoing declines in chum salmon run strength across Western and Interior Alaska. Amidst these changes in chum salmon stock abundance, the Council has received scientific reports outlining the impact of warming ocean conditions on salmon mortality at sea, as well as substantial public comment and input from Western and Interior Alaska Tribes, Tribal Consortia, and subsistence salmon fishermen describing the importance of chum salmon for the subsistence way of life which is integral to Alaska Native peoples' cultural practices, identity, and Traditional Knowledge (TK) systems. The Council has also received public comments and annual presentations from IPA representatives on the industry's efforts to minimize their bycatch of Chinook and chum salmon. Implementing additional chum salmon bycatch management measures could potentially have some positive benefit on the number of chum salmon that return to Western Alaska rivers. Any additional chum salmon returning to Alaska river systems improves the ability to meet the State's spawning escapement goals which is necessary for the long-term sustainability of chum salmon fisheries.

The Council adopted the following Purpose and Need statement to originate this action on April 8th, 2023.

> *Salmon are an important fishery resource throughout Alaska, and chum salmon that rear in the Bering Sea support subsistence, commercial, sport, and recreational fisheries throughout Western and Interior Alaska. Western and Interior Alaska salmon stocks are undergoing extreme crises and collapses, with long-running stock problems and consecutive years' failures to achieve escapement goals, U.S.-Canada fish passage treaty requirements, and subsistence harvest needs in the Yukon, Kuskokwim, and Norton Sound regions. These multi-salmon species declines have created adverse impacts to culture and food security and have resulted in reduced access to traditional foods and commercial salmon fisheries.*
>
> *The best available science suggests that ecosystem and climate changes are the leading causes of recent chum salmon run failures; however, non-Chinook (primarily chum) salmon are taken in the Eastern Bering Sea pollock trawl fishery which reduces the amount of salmon that return to Western and Interior Alaska rivers and subsistence fisheries. It is important to acknowledge and understand all sources of chum mortality and the cumulative impact of various fishing activities. In light of the critical importance of chum salmon to Western Alaska communities and ecosystems, the Council is considering additional measures to further minimize Western Alaskan chum bycatch in the pollock fishery.*
>
> *The purpose of this proposed action is to develop actions to minimize bycatch of Western Alaska origin chum salmon in the Eastern Bering Sea pollock fishery consistent with the Magnuson-Stevens Act, National Standards, and other applicable law. Consistent, annual genetics stock composition information indicates that the majority of non-Chinook bycatch in the pollock fishery is of Russian/Asian hatchery origin; therefore, alternatives should structure non-Chinook bycatch management measures around improving performance in avoiding Western Alaska chum salmon specifically.*
>
> *The Council intends to consider establishing additional regulatory non-Chinook bycatch management measures that reduce Western Alaska chum bycatch; provide additional opportunities for the pollock trawl fleet to improve performance in avoiding non-Chinook salmon while maintaining the priority of the objectives of the Amendment 91 and Amendment 110 Chinook salmon bycatch avoidance program; meet and balance the requirements of the Magnuson-Stevens Act, particularly to minimize salmon bycatch to the extent practicable under National Standard 9; include the best scientific information available including Local Knowledge and Traditional Knowledge as required by National Standard 2; take into account the importance of fishery resources to fishing communities including those that are dependent on Bering Sea pollock and subsistence salmon fisheries as required under*

National Standard 8; and to achieve optimum yield in the BSAI groundfish fisheries on a continuing basis, in the groundfish fisheries as required under National Standard 1.

The Council adopted the following set of alternatives for analysis on October 8th, 2023.

Alternative 1: Status Quo

All action alternatives apply to the entire Bering Sea pollock B season, the season in which chum salmon are taken as bycatch (prohibited species catch or PSC).

Alternative 2: Overall bycatch (PSC) limit for chum salmon

Option 1: Chum salmon PSC limit based on historical total bycatch numbers: range of 200,000 (~35,400 Western Alaska chum salmon) to 550,000 (~97,350 Western Alaska chum salmon).[3]

Option 2: Chum salmon PSC limit triggered by Western Alaska chum salmon abundance indices based on the prior years' chum salmon abundance. Suboptions below are mutually exclusive.

Suboption 1: Three-area chum salmon index based on Yukon River summer + Yukon River fall run abundance (950,000 + 575,000); Kuskokwim River composed of the Bethel test fishery CPUE (2,800); Norton Sound composed of summed escapement for the Snake, Nome, Eldorado, Kwiniuk, and North Rivers and total Norton Sound harvest (57,000)
If 3/3 areas are above index threshold, no chum salmon PSC limit the following year.
If 2/3 areas are above index threshold, chum salmon PSC limit the following year is X.
If 1 or no areas are above index threshold, chum salmon PSC limit the following year is X.

Suboption 2: Chum salmon index based on Yukon River summer + Yukon River fall run abundance

Suboption 2a: Yukon River summer chum salmon (950,000).[4]
If index is above threshold, chum salmon PSC limit the following year is X.
If index is below threshold, chum salmon PSC limit the following year is X.

Suboption 2b: Yukon River summer chum salmon (950,000) and fall chum salmon (575,000)
If 2/2 areas are above index threshold, no chum salmon PSC limit the following year.
If 1 or no areas are above index threshold, chum salmon PSC limit the following year is X.

Option 3 (must be selected with Option 1 or 2): PSC limits are apportioned among CDQ, catcher processor, mothership and inshore sectors (using a blended adjusted CDQ bycatch rate as with Amendment 91) based on:

Suboption 1: historical total bycatch by sector using the 3-year average (2020 – 2022)
Suboption 2: historical total bycatch by sector using the 5-year average (2018 – 2022)
Suboption 3: pro rata 25% AFA pollock allocation and 75% historical total bycatch (2020 – 2022)
Suboption 4: pro rata based on AFA apportionment.[5]

The sector limits are further apportioned at the cooperative level in proportion to each cooperative's pollock allocation. Chum salmon PSC can be transferred between sectors and among vessels within a cooperative. Reaching a limit closes the pollock fishery sector to which the limit applies.

[3] The values of 35,400 and 97,350 Western Alaska chum salmon are for context and represent approximations of the average number of WAK chum salmon that may be encountered by the Bering Sea pollock fishery under the two PSC limits specified in the motion. These are not values being considered as an annual WAK chum salmon threshold under Alternative 3.
[4] The Council's intent with suboption 2a is that no chum salmon PSC limit would be in place if the summer chum salmon run is above the index threshold. Across all three suboptions, no chum salmon PSC limit would be in place when indices meet their respective threshold(s).
[5] While this is the exact language in the Council's October 2023 motion for suboption 4 of option 3 of Alternative 2, it is staff's understanding that the Council's intent is for staff to look at each sector's AFA pollock allocation.

Alternative 3: Chum salmon PSC limit with an associated Western Alaska chum salmon bycatch annual limit

Establish an annual limit of 40,000 to 53,000 Western Alaska chum salmon PSC based on the 3-year average 2020-2022 range of historical bycatch numbers and an overall chum salmon PSC limit from Alternative 2. Both the overall PSC limit and the Western Alaska chum salmon annual limit will be apportioned according to the options considered under Alternative 2.

Each sector's portion of an overall chum salmon PSC limit of (option 1: 450,000 and option 2: 550,000) is in effect. If a sector exceeds its western AK chum salmon PSC annual limit in any three of seven consecutive years, the sector's portion of an overall chum salmon PSC limit of (option 1: 200,000 and option 2: 300,000) is in effect until Western Alaska chum salmon PSC does not exceed the sector annual limit for three years.

Alternative 4: Additional regulatory requirements for Incentive Plan Agreements (IPAs) to be managed within the IPAs

Option 1: Require a chum salmon reduction plan agreement to prioritize avoidance in genetic cluster areas 1 and 2 for a specified amount of time based on two triggers being met: 1) an established chum salmon incidental catch rate and 2) historical genetic composition (proportion) of Western Alaska chum salmon to non-Western Alaska chum salmon.

Option 2: Additional regulatory provisions requiring Incentive Plan Agreements to utilize the most refined genetics information available to further prioritize avoidance of areas and times of highest proportion of Western Alaska and Upper/Middle Yukon chum salmon stocks.

Industry should submit a detailed proposal of IPA changes under Alternative 4 for inclusion into the Initial Review analysis prior to the February Council meeting. The proposals should consider a process to include local and traditional knowledge from Western and Interior Alaska salmon users in the development of IPA measures. The following is a list of potential measures that could be developed for incorporation into the IPAs and/or through regulation.

- Option 1 trigger 1 and trigger 2 values
- Adjusted base rates to implement a closure
- Adjusted closure area size
- Adjusted closure duration
- Application of the closures to all vessels not just those above the base rate
- Genetic data
- Genetic cluster thresholds
- Additional vessel level incentives/penalties for chum salmon avoidance

2 Regulatory Context for Completing an SIA

This document is an assessment (or analysis) of the social impacts of the proposed alternatives on communities and regions engaged in or dependent on fisheries potentially affected by the proposed action. This SIA was prepared in response to National Standard 2—Scientific information under the provisions of the Magnuson-Stevens Act, National Standard 8 – Communities under the provisions of the Magnuson-Stevens Act, the National Environmental Policy Act (NEPA), Executive Order (E.O.) 12898, E.O. 13175, among other E.O.s that provide some direction on the consideration of economic and environmental justice related to underserved communities.

2.1 Magnuson-Stevens Action National Standard 2

National Standard 2 of the Magnuson-Stevens Act and its guidelines (see 50 CFR 600.315) specify that conservation and management measures shall be based upon the best scientific information available. Scientific information includes, but is not limited to, factual input, data, models, analyses, technical information, or scientific assessments (see 50 CFR 600.315(a)(4)). The best scientific information available also includes (see 50 CFR 600.315(a)(6)(ii)(C)):

> *"Relevant local and traditional knowledge (*e.g., *fishermen's empirical knowledge about the behavior and distribution of fish stocks) should be obtained, where appropriate, and considered when evaluating the BSIA [best scientific information available]."*

Local Knowledge (LK) and Traditional Knowledge (TK) relevant to this action are based on the diverse experiences people have working, living, and harvesting in the Bering Sea region, Western, and Interior Alaska (Huntington 2000; Johannes and Nies 2007; Mulalap et al. 2020; Raymond-Yakoubian et al. 2017; Stephenson et al. 2016; Thompson et al. 2020). This SIA uses the social science of LK and TK, particularly the research conducted by anthropologists and other social scientists, including the Alaska Department of Fish and Game's (ADF&G) Division of Subsistence, to describe the economic and cultural importance of chum salmon as part of the subsistence way of life and a series of traditions that connect people to a particular place and build or maintain relationships (see Section 4.3.5.1).

2.2 Magnuson-Stevens Act National Standard 8

National Standard 8 of the Magnuson-Stevens Act and its guidelines (see 50 CFR 600.345) specify that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act, take into account the importance of fishery resources to fishing communities by utilizing economic and social data that are based on the best scientific information available in order to **(1) provide for the sustained participation of such communities, and (2) to the extent practicable, minimize adverse economic impacts to such communities.**

This SIA considers "fishing communities" and "sustained participation" in line with National Standard 8 guidelines (see 50 CFR 600.345(b)(3) and 50 CFR 600.345(b)(4), respectively). Therefore, for purposes of this analysis, a fishing community is:

> *"…A community that is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew, and fish processors that are based in such communities. A fishing community is a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops)."*

The sustained participation of fishing communities is considered in terms of a communities' "continued access to the fishery within the constraints of the condition of the resource" (see 50 CFR 600.345(b)(4)). National Standard 8 guidelines provide further direction for this analysis because they require an examination of "the social and economic importance of fisheries to communities potentially affected by management measures" among other criteria (50 CFR 600.345(c).

2.3 Magnuson-Stevens Act National Standard 4

Under National Standard 4 (50 CFR 600.325), conservation and management measures shall not discriminate between residents of different states. This SIA considers National Standard 4 in this context, namely the participating entities in the Bering Sea pollock fishery have different regional and community

ties. The National Standard 4 guidelines go on to say that, if it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such an allocation shall be: 1) fair and equitable to all such fishermen; 2) reasonably calculated to promote conservation; 3) carried out in such a matter that no particular individual, corporation, or other entity acquires an excessive share of such privileges. Among other National Standard 4 guidelines:

> *An "allocation" or "assignment" of fishing privileges is a direct and deliberate distribution of the opportunity to participate in a fishery among identifiable, discrete user groups or individuals. Any management measure (or lack of management) has incidental allocative effects, but only those measures that result in direct distributions of fishing privileges will be judged against the allocation requirements of Standard 4 (see 50 CFR 600.325(c)(1)).*
>
> *An allocation of fishing privileges may impose a hardship on one group if it is outweighed by the total benefits received by another group or groups. An allocation need not preserve the status quo in the fishery to qualify as "fair and equitable," if a restructuring of fishing privileges would maximize overall benefits. The Council should make an initial estimate of the relative benefits and hardships imposed by the allocation, and compare its consequences with those of alternative allocation schemes, including the status quo. Where relevant, judicial guidance and government policy concerning the rights of treaty Indians and aboriginal Americans must be considered in determining whether an allocation is fair and equitable (see 50 CFR 600.325(c)(3)(i)).*

2.4 Social and Economic Analysis Under NEPA

Under NEPA, "economic" and "social" effects (also referred to as "impacts" interchangeably throughout the preliminary DEIS and SIA) are specific environmental consequences that must be examined (see 40 CFR 1502.16 and 1508.8). The environmental effects of the status quo regulations (Alternative 1, No Action) managing salmon bycatch and the potential effects of the action alternatives are examined throughout the preliminary DEIS; the economic effects of the status quo regulations and potential action alternatives related to non-community entities such as fishing sectors, vessels, or companies participating in the Bering Sea pollock fishery are also evaluated in the economic portions of the preliminary DEIS; the potential regional- and community-level social and economic effects of the status quo and proposed action alternatives related to communities engaged in or dependent on the Bering Sea pollock fishery as well as subsistence and commercial harvests of chum salmon are analyzed in this SIA. The description and analysis of impacts related to subsistence and commercial and chum salmon fisheries were incorporated into the SIA because of the close ties between subsistence and commercial fisheries as part of the mixed economy of rural and Alaska Native communities (Wolfe 1982; see Section 4.3.5.1).

2.5 Executive Order 13175 Tribal Consultation and Collaboration

E.O. 13175 of November 6, 2000, *Consultation and Coordination with Indian Tribal Governments* (see 65 CFR 67249) was promulgated:

> *"…in order to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes."*

The Presidential Memorandum of January 26, 2021, *Tribal Consultation and Strengthening Nation-to-Nation Relationships* (86 FR 7491) affirms a commitment to:

> *"…honoring Tribal sovereignty and including Tribal voices in policy deliberation that affects Tribal communities. The Federal Government has much to learn from Tribal Nations and strong communication is fundamental to a constructive relationship."*

This Presidential Memorandum does not change the definition of a federal agency as specified under E.O. 13175. The Council is not a federal agency, but rather a management body that derives authority from the MSA to make recommendations to set harvest quotas, set PSC limits, design ecosystem protections, develop community protection measures, among other things. NMFS is, and continues to be, the federal agency that is responsible for carrying out Tribal Consultations. The Council has previously expressed support for working with NMFS to receive the results of Tribal Consultations and engagement sessions as early as possible in its decision-making process.[6]

2.6 Executive Order 12898 Environmental Justice

E.O. 12898 of February 11, 1994, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Population*s (59 CFR 7629), directs federal agencies to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Guidelines on environmental justice also suggest that where an agency action may affect fish, vegetation, or wildlife, it may also affect subsistence patterns of consumption and indicate the potential for disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, and Indian or Alaska Native Tribes.

The reader can find information that is responsive to E.O. 12898 throughout this SIA. For example, Section 4.1.5 provides demographic and socioeconomic indicators, as well as a summary of traditionally used subsistence resources, for the subset of communities identified as being substantially engaged in or dependent on the Bering Sea pollock fishery. Section 4.1.6 provides similar information for 65 coastal Western Alaska communities that are eligible for the CDQ program; here the patterns of subsistence resources use is characterized at the regional level. Section 4.3 provides detailed information of subsistence harvests of salmon and non-salmon resources for households and communities across Western and Interior Alaska.

2.7 Executive Order 14096 Revitalizing Our Nation's Commitment to Environmental Justice for All

E.O. 14096 of April 21, 2023, *Revitalization Our Nation's Commitment to Environmental Justice for All*, outlines a government-wide approach to environmental justice (see 88 FR 25251). This E.O. provides direction that each federal agency should make achieving environmental justice part of its mission, consistent with Section -101 of E.O. 12898. Relevant to the preparation of analytical documents like this preliminary DEIS and SIA, Section 3 of E.O. 13898 states federal agencies shall, as appropriate and consistent with applicable law:

> *(i) identify, analyze, and address disproportionate and adverse human health and environmental effects (including risks) and hazards of Federal activities, including those related to climate change and cumulative impacts of environmental and other burdens on communities with environmental justice concerns.*

Section 3(viii)(B) directs agencies to carry out environmental reviews in a manner that:

[6] For more information see the Council's February 2021 motion related to the Community Engagement Committee here, and the Council's October 2023 motion adopting the LKTKS Protocol and onramp recommendations here.

Considers best available science and information on any disparate health effects (including risks) arising from exposure to pollution and other environmental hazards, such as information related to the race, national origin, socioeconomic status, age, disability, and sex of the individuals exposed.

2.8 Executive Order 13895 Advancing Racial Equity and Support for Underserved Communities Through the Federal Government

E.O. 13895 of January 20, 2021, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Governmen*t (86 FR 7009; January 25, 2021), addresses issues of equity for Indigenous and Native American persons, persons who live in rural areas, and persons otherwise adversely affected by persistent poverty or inequality, among other groups, as well as underserved communities in general. Specifically, under Section 2, Definitions:

For purposes of this order: (a) The term ''equity'' means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

(b) The term ''underserved communities'' refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list in the preceding definition of "equity."

Section 8, Engagement with Members of Underserved Communities, specifies that:

In carrying out this order, agencies shall consult with members of communities that have been historically underrepresented in the Federal Government and underserved by, or subject to discrimination in, Federal policies and programs.

2.9 Executive Order 14008 Tackling the Climate Crisis at Home and Abroad

E.O. 14008 of January 27, 2021, *Tackling the Climate Crisis at Home and Abroad* (86 FR 7619; February 1, 2021), under *Part II, Taking a Government-Wide Approach to the Climate Crisis*, includes language on securing environmental justice and spurring economic opportunity. Specifically, Section 219 states:

To secure an equitable economic future, the United States must ensure that environmental and economic justice are key considerations in how we govern. That means investing and building a clean energy economy that creates well-paying union jobs, turning disadvantaged communities—historically marginalized and overburdened—into healthy, thriving communities, and undertaking robust actions to mitigate climate change while preparing for the impacts of climate change across rural, urban, and Tribal areas.

Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human

health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.[7] [8]

As noted in Section 220, E.O. 14008 also amends Section 1-102 of E.O. 12898 (Creation of an Interagency Working Group on Environmental Justice), replacing it with the creation, within the Executive Office of the President, a White House Environmental Justice Interagency Council.

3 General Approach

3.1 Documents Incorporated by Reference

This SIA relies heavily on the information and evaluation contained in prior social and community analyses. These documents are incorporated by reference. The documents listed below contain information about the fisheries, marine resources, ecosystem, communities engaged in the Bering Sea pollock fishery as well as other BSAI groundfish fisheries, and subsistence harvests.

3.1.1 Annual Community Engagement and Participation Overview

The Annual Community Engagement and Participation Overview (ACEPO) is an annual report that provides an overview of communities that are substantially engaged in the harvesting and processing of groundfish or crab fisheries off Alaska. The ACEPO also contains detailed community sketches, some of which are used to describe communities that are substantially engaged in or dependent on the Bering Sea pollock fishery. This document is available from: https://meetings.npfmc.org/CommentReview/DownloadFile?p=6d14fc54-4e88-428b-8d49-278278b9cff5.pdf&fileName=D5%20ACEPO%20Report.pdf

3.1.2 Local Knowledge, Traditional Knowledge, and Subsistence Protocol

The Local Knowledge, Traditional Knowledge, and Subsistence Protocol (LKTKS) was adopted by the Council in October 2023. This document provides foundational information for how to appropriately identify, analyze, and incorporate LK, TK, the social science of LK and TK, as well as subsistence information. This document is incorporated by reference as it provided a framework for analysis for this SIA, and it is available from: https://www.npfmc.org/wp-content/PDFdocuments/Publications/Misc/LKTKSprotocol.pdf

[7] In the July 20, 2021 *Interim Implementation Guidance for the Justice40 Initiative,* Memorandum for the Heads of Departments and Agencies (M-21-28, Executive Office of the President, Office of Management and Budget, https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf), an "Interim Definition of Disadvantaged Communities" is provided that includes several variables that may apply singly or in varying combinations to some of the fishing communities that may be directly or indirectly impacted by one or more of the proposed action alternatives or the no action alternative. These include low income, high and/or persistent poverty; high unemployment and underemployment; linguistic isolation; high housing cost burden and substandard housing; high transportation cost burden and/or low transportation access; disproportionate environmental stressor burden and high cumulative impacts; limited water and sanitation access and affordability; disproportionate impacts from climate change; high energy cost burden and low energy access; and access to health care, among others.

[8] In September 2021, the United States Environmental Protection Agency (EPA) published *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts* (EPA 430-R-21-003. www.epa.gov/cira/social-vulnerability-report). As noted on page 4 of that document, however, "due to data limitations, this report does not analyze the impacts of climate change on socially vulnerable populations living in Hawai'i or Alaska." Primary climate change impacts that were analyzed in the document are: air quality and health; extreme temperature and health; extreme temperature and labor; coastal flooding and traffic; coastal flooding and property; inland flooding and property.

Additionally, this SIA used the LKTKS analytical template which was prepared as an onramp for better incorporating LKTKS information into the Council's decision-making process. https://meetings.npfmc.org/CommentReview/DownloadFile?p=3ddcb128-3595-490d-a892-ad9579297276.pdf&fileName=D1%20Onramps%20for%20LKTKS%20Recommendations.pdf

3.1.3 Social Impact Assessment for the Bering Sea and Aleutian Islands Halibut Abundance-Based Management of Amendment 80 Prohibited Species Catch Limit, Final Environmental Impact Statement

The SIA for the Bering Sea and Aleutian Islands Halibut Abundance-Based Management of Amendment 80 PSC limit Final Environmental Impact Statement provides decision-makers and the public an assessment of the communities substantially engaged in or dependent on the BSAI groundfish fisheries, subsistence halibut, and Area 4CDE halibut fisheries. There is some overlap in the communities engaged in or dependent on BSAI groundfish fisheries including communities participating in the CDQ Program. This document is available from: https://repository.library.noaa.gov/view/noaa/47919/noaa_47919_DS1.pdf

3.1.4 Baseline Commercial Fishing Community Profile Updates: Akutan and Unalaska, Alaska

Akutan and Unalaska/Dutch Harbor are communities identified in this SIA as being substantially engaged in or dependent on the Bering Sea pollock fishery. The Baseline Commercial Fishing Community Profiles for Akutan and Unalaska were updated in 2023. That document is available from: https://www.npfmc.org/wp-content/PDFdocuments/resources/Akutan_Unalaska_CommunityProfiles_2023.pdf

3.1.5 Comprehensive Baseline Commercial Fishing Community Profiles: Unalaska, Akutan, King Cove, and Kodiak, Alaska

The Comprehensive Baseline Commercial Fishing Community Profiles: Unalaska, Akutan, King Cove, and Kodiak, Alaska (2005) report provides information central to the understanding of community engagement in, and dependence on, the range of federally managed commercial fisheries. This document is available from: https://www.npfmc.org/wp-content/PDFdocuments/resources/AKCommunityProfilesVol1.pdf

3.1.6 Alaska Subsistence and Personal Use Salmon Fisheries 2020 Annual Report

The Alaska Subsistence and Personal Use Salmon Fisheries 2020 Annual Report (2020 Annual Report) is the most recent annual report on Alaska's subsistence and personal use fisheries. It was prepared by the Alaska Department of Fish and Game (ADF&G) Division of Subsistence. That document is available from: https://www.adfg.alaska.gov/techpap/TP494.pdf

3.2 Data that Would Have Been Useful but Were Unavailable

3.2.1 Usable Product Transfer Report Data

For this analysis, it would have been useful to have systematically collected time series data available for fishery support services provided to, and other economic activity associated with, CPs during port calls or product offloads. Examples of other economic activities it would be useful to have

information on include fuel purchases, services related to crew changes, cold storage use, longshoring and stevedore services, among others. **Additionally, it would have been useful to have reliable information available to understand the distribution and potential magnitude (i.e., amount of product) offloads across communities.**

Product Transfer Reports were identified as a potential data source because they are required to be completed for CP offloads and submitted to NOAA Fisheries Office of Law Enforcement. However, Product Transfer Reports are not a reliable source of information for either **a)** gauging the relative economic activity associated with a port call because Product Transfer Reports simply do not collect this information, and **b)** the magnitude of offloads across communities. On this latter point, a primary problem is with apparent errors in weights which are reported in pounds, metric tons, and kilograms. It is not uncommon for data entries to have been made in kilograms but with the units noted as metric tons, greatly overestimating the weight offloaded. Additionally, for the purposes of this analysis, Product Transfer Report data do not contain key fishery specific data that would have been useful.

3.2.2 Socioeconomic Information for Bering Sea Pollock Crew and Processing Facilities

For this analysis, it would have been useful to have comprehensive and updated information on socioeconomic indicators for crew members working aboard Bering Sea pollock vessels in each sector and the labor forces at shoreside processing facilities accepting deliveries of Bering Sea pollock. E.O. 12898 directs federal agencies to consider the impact of potential actions on minority and low-income populations, and the Interim Justice40 Guidance (E.O. 14008, *Tackling the Climate Crisis at Home and Abroad*) directs federal agencies to define communities as either "a group of individuals living in geographic proximity to one another or a geographically dispersed set of individuals (such as migrant workers, Alaska Natives, or Native Americans), where either type of group experiences common conditions."

There is some general information available that suggests the workforces at shorebased processing facilities and onboard Bering Sea pollock vessels (a primary focus appears to have been CPs) may typically be minorities (Downs & Henry 2023; PEIS 2004). However, there is no comprehensive, updated, and readily available information on the demographics of these workforces for all sectors of the Bering Sea pollock fishery. Companies or cooperatives may be able or willing to provide this type of information to the analysis, but coordinating this effort in a meaningful way under the analytical timeline for initial review was not possible. The analysts also acknowledge this is sensitive information that companies may not be able or willing to share for incorporation into a public document used to inform decision-making and may thus be unavailable regardless of the analytical timeline.

3.2.3 Patterns of AFA Vessel Crew Employment

More broadly, **it would have been useful to have information on patterns of crew employment including the communities where crew members for CVs, CPs, and motherships participating in the Bering Sea pollock fishery are from, the relative frequency of crew changes in Alaska communities, crew earnings from the fishery, among other information**. Had this information been available it would have been useful to provide a more comprehensive analysis of the human dimensions of the Bering Sea pollock fishery (e.g., a wider community footprint and social impacts associated with the proposed alternatives).

These data are distinct from NMFS observer records on the number of crew-persons onboard AFA vessels and the Chinook Salmon Economic Data Report (EDR) Program (often referred to as the Amendment 91 EDR Program). The Amendment 91 EDR was initially identified as a potentially useful source of information. This program is managed primarily by the Alaska Fisheries Science Center

(AFSC) with support from NMFS Alaska Region, and it is administered in collaboration with Pacific States Marine Fisheries Commission (PSMFC). The EDR is a mandatory reporting requirement for all entities participating in the Bering Sea pollock fishery (see 50 CFR 679.65). This includes all vessel masters and businesses that own or lease one or more AFA-permitted vessels active in fishing or processing Bering Sea pollock, CDQ groups receiving allocations of Bering Sea pollock, and representatives of sector entities receiving an apportionment of the Chinook salmon PSC limit. The Chinook Salmon EDR has three main elements comprised of separate survey forms: the Chinook salmon PSC Compensated Transfer Report, the Vessel Fuel Survey, and the Vessel Master Survey. These program elements do not contain the sought information related to patterns of crew employment that is linked to communities.

3.2.4 Understanding Shifts in Subsistence Species Replacements

It would have been useful to have comprehensive, consistent, annual composites of all subsistence harvests (e.g., salmon, nonsalmon fish, moose, caribou, and marine mammals) by region which includes the upper/middle/lower Yukon, upper/middle/lower Kuskokwim, Norton Sound-Port Clarence, and statewide. This would help to characterize the role chum salmon has played in the subsistence diet by region and across the state, as well as how and with what subsistence communities are replacing the absence of chum (and other species of salmon), or lesser amounts of chum and other salmon, with other species.

Salmon is part of a mix of wild food sources that support communities in rural Alaska. Harvesting a mix of wild foods helps to build resiliency to shortfalls in the harvest level of one particular species due to annual variability in abundance. Lower harvests of chum salmon might be replaced by a higher level of harvest of other types of fish or wildlife, but the magnitude of these changes across communities as well as the cultural preferences of communities is unknown.

It is also possible that other wild foods do not compensate for low subsistence harvests of chum salmon in a particular (poor) year (NPFMC 2017). Depressed local economies may result in an out-migration of families from the community and a loss of population when the harvests of other wild food sources are not, or cannot be, increased to compensate for reductions in subsistence harvests of salmon (Wolfe et al., 2010:14-15). There is some work that addresses communities' shifts in subsistence harvest in relation to Chinook declines (for example, Wolfe & Spaeder 2009; Moncrieff 2017). However, social science research on the recent chum salmon declines (2020-to present) across Western and Interior Alaska is not yet available.

3.2.5 Social Science of Local Knowledge and Traditional Knowledge Related to Salmon

The analysts would note that, compared to other fisheries or subsistence resources with a clear connection to federal fisheries management, there is a large body of social science research based on LK and TK focused on the importance (cultural, spiritual, and economic role) of salmon. **However, it would have been useful to have more published or publicly available sources of social science based on LK and TK related to chum salmon that could inform decision-making.** TK held by Alaska Native peoples is traditionally shared orally; is not always shared freely or regarded as public data by the knowledge holder; and only in recent decades has begun to be recorded in written, audio, and video forms. Since this analysis relies upon published, publicly available data, more social science on LK and TK observations about salmon, particularly chum salmon, would have aided the analysis of, for example, traditional and contemporary human-salmon relationships, the relative dependence of communities on chum salmon as a food source, and adaptations to historical and current chum salmon declines. It may also have added to Western scientific knowledge of the causes of declines of chum salmon.

3.2.6 Community Profiles for the Western and Interior Alaska Regions

It would have been useful to have salmon community profiles from the Western and Interior Alaska region, including up to date socioeconomic and demographic information alongside information on the subsistence harvests of various species. Profiles of individual communities within the region—or at least of key population hubs—would have aided analysts in providing more specificity of regional socioeconomic context that is supported by subsistence (and commercial) salmon fishing and other activities of the subsistence way of life.

4 Description Community and Regional Participation by Fishery

4.1 Harvests and Deliveries of Bering Sea Pollock (AFA and CDQ)

The following section characterizes patterns of community engagement and dependence on the Bering Sea pollock fishery (consistent with National Standard 8). In doing so, it provides decision-makers and the public the regional and community footprint of this fishery. First, a series of tables based on existing quantitative fishery information were developed to identify patterns of engagement (or participation) in the Bering Sea pollock fishery. The distribution and relative magnitude of community engagement in the Bering Sea pollock fishery was measured by information on a vessel's ownership address, which is listed in the Alaska Commercial Fisheries Entry Commission (CFEC) vessel registration files. Some caution is warranted for how vessel ownership information is interpreted because it is not unusual for these vessels to have complex ownership structures that involve more than one entity in more than one community or region. Additionally, the community identified by ownership address may not directly indicate where a vessel spends most of its time, purchases services, or hires its crew from.

However, information on a vessel's community ownership address does provide is an approximate indicator of the distribution and magnitude of ownership ties to a particular community and region. In this way, vessel ownership address can be used as a proxy for some level economic activity in the community that is associated with the fishery/sector that may be potentially affected by one or more of the proposed alternatives. The listed ownership address was also used in this analysis as a way to connect vessels to communities rather than other indicators, such as vessel homeport information, to be consistent with other SIAs prepared for FMP amendment analyses for the Council, and because prior SIAs have described the problematic nature of the existing vessel homeport data (AECOM 2010; NPFMC 2021).

Section 2.4 of the preliminary DEIS describes the shorebased processing component (also interchangeably referred to herein as the inshore or shoreside component) of the Bering Sea pollock fishery. The American Fisheries Act (AFA) substantially changed the way the Bering Sea pollock fishery was managed, including the formation of fishery cooperatives. The AFA (section 210(b)) only allows inshore cooperatives to form if an annual contract is signed by the owners of 80% or more of the inshore CVs that delivered the majority of their pollock for processing to a shorebased processor in the prior year. Eight inshore processors met the AFA eligibility criteria, of which six are shorebased processors – UniSea Seafoods, Westward Seafoods, and Alyeska Seafoods in Unalaska/Dutch Harbor; Trident Seafoods in Akutan, Trident Seafoods in Sand Point, and Peter Pan Seafoods in King Cove.[9] Two AFA eligible

[9] Although Trident's Sand Point facility qualified as an AFA inshore processor, it is not partnered with a cooperative. Trident Seafoods' Sand Point Plant has been characterized as more of a "relief valve" for the company's plant in Akutan during the pre-AFA race-for-fish years than as a primary delivery destination for Bering Sea pollock. Despite not being partnered with a cooperative, the plant still has access to up to 10% of the Bering Sea pollock allocated to individual cooperatives, along with Bering Sea pollock harvested in the inshore open access fishery. While it is common for some deliveries of Bering Sea pollock to be made at Trident Seafoods' Sand Point facility, within the analyzed period (2011-2022), no vessels made deliveries of Bering Sea pollock during the B season fishery.

inshore processors are floating processors—the *Arctic Enterprise* owned by Trident Seafoods, and the *Northern Victor* owned by Westward Seafoods (previously owned by Icicle Seafoods). Since the inshore sector began operating under the cooperative system in 2000, there have been seven inshore cooperatives formed between inshore CVs and their partner processors: the Akutan Catcher Vessel Association, Arctic Enterprise Association, Northern Victor Fleet Cooperative, Peter Pan Fleet Cooperative, Unalaska Fleet Cooperative, UniSea Fleet Cooperative, and the Westward Fleet Cooperative. The Arctic Enterprise Association has not been active since 2008.

To understand the distribution and relative magnitude of community engagement in the Bering Sea pollock fishery through the shorebased processing component, shorebased processors were identified in data provided by the Alaska Fishery Information Network (AFKIN) using the F_ID (intent to operate), SBPR (shorebased processor), and FLTR (floating processor codes). This approach provides information based on the operating location of the plant, rather than other indicators such as company ownership address. The physical location of a plant can be a relative indicator of the local volume of fishery-related activity, and a rough proxy for the relative level of associated employment and local government revenues. It is important to note, however, that there are some considerable limitations on the scope of quantitative information that can be provided for the shorebased processing component because of confidentiality restrictions. For example, Akutan and King Cove are each the site of one shorebased processor that accepts pollock deliveries. As such, information about the volume and value of pollock landings for these individual communities cannot be disclosed. This limits the quantitative information that can be provided as well as subsequent discussions of the potential impacts of the management alternatives being considered.

This portion of the analysis also includes a series of tables used to identify patterns of economic dependence on the Bering Sea pollock fishery for communities affiliated with the various sectors by ownership address and those Alaska communities where shorebased processing occurs, noting the analysts acknowledge that "dependence" is a complex concept with economic and social dimensions that could be considered in multiple ways. For communities affiliated with the Bering Sea pollock fishery by vessel ownership address, economic dependence is characterized by comparing the gross ex-vessel or first wholesale revenues earned from the pollock fishery to the total revenues generated by the same vessels in all other fisheries (species, gear, and areas).[10] The same general procedure is used for the shorebased processing component. Consideration of gross first wholesale and gross ex-vessel values in this SIA are treated the same as the other portions of the preliminary DEIS analyzing the economic impacts of the proposed alternatives, which is described in Section 5.3 of that document and not repeated here.

Some additional points of clarification on the approach are provided here. The first is that the series of tables based on quantitative indicators of fishery engagement and dependence are based on data from 2011-2022 because this is the year set the Council identified for analysis (April 2023). Second, all data is provided within the bounds of confidentiality restrictions. A primary tradeoff the analysts faced when preparing this analysis was whether to provide quantitative information organized by community at the annual level (i.e., A and B season pollock fisheries) or for the B season pollock fishery only. It would be possible to show the level of community engagement (or participation) in the Bering Sea pollock fishery annually and for the B season only. However, quantitative information on gross ex-vessel and first wholesale revenues cannot be provided annually and for the B season pollock fishery only. There are small differences in the number of vessels harvesting Bering Sea pollock annually compared to those that only participate in the B season. As such, it would be possible to discern the revenues of individual vessels in certain years. For this reason, and because the proposed action alternatives would only apply to the B season pollock fishery, the analysis prioritized providing information for the B season fishery.

[10] The first wholesale value is the value of seafood products when sold to buyers outside of a processor's affiliate network, so it is the raw fish plus the value added by the first processor. Ex-vessel value is the dollar amount received by fishermen for their catch when delivered to a processor.

Directly related to this point, a reader with general knowledge of the Bering Sea pollock fishery will notice the Alaska community of Sand Point is not included in this analysis. During the analyzed period, Trident's Sand Point facility did not accept deliveries of Bering Sea pollock during the B season. (This should not be taken to mean the plant did not operate at all during the B season months from 2011-2022.) A relatively small number of Bering Sea pollock deliveries are reported during the A season. This reality constrained what information could be provided for the shorebased processing component due to confidentiality constraints as it would be possible to determine the revenues attributed to Trident's Sand Point facility when comparing annual and B season information. In the portion of the analysis focused on the shoreside processing component, quantitative information related to the B season fishery was also prioritized.

4.1.1 Catcher Processors

Table 4-1 provides the count of CPs harvesting AFA pollock during the B season pollock fishery organized by the community listed as the vessel's ownership address (2011-2022). During the analyzed period, 16 CPs harvested AFA pollock during the B season. All CPs harvesting AFA pollock in the B season fishery have a registered ownership address in either Seattle or Anchorage, and the largest component of CP ownership is concentrated in Seattle (annually averaging over 92.77%).

Table 4-2 provides information on the gross first wholesale revenues and the estimated gross ex-vessel revenues for CPs that harvested AFA pollock and CDQ pollock during the B season pollock fishery (2011-2022).[11] For species harvested by CPs, there is no ex-vessel price generated from the sale of raw fish by a harvester to a primary processor because the harvester and primary processor are the same entity. However, approximate conversions can be made in order to compare a consistent metric across sectors. The gross ex-vessel revenues for CPs are estimated by using the annual average ex-vessel price paid by shoreside processors excepting deliveries of Bering Sea pollock and applying that price to the round weight of pollock harvested by CPs that year. The analysts acknowledge that the ex-vessel value estimates do not represent the full product values for CPs. The Council and the public should consider gross first wholesale revenues for CPs if the intent is to characterize the relative economic dependence of these CPs on Bering Sea pollock. However, the analysts took this approach so the Council and the public could compare the potential revenue impacts of the proposed alternatives across sectors using the same metrics. Therefore, both metrics are provided to allow for cross-sector comparisons, but the consideration of impacts within each sector should occur using the appropriate metric for the impacted sector. As shown, on average, these CPs earned $342.56 million in gross first wholesale revenues from AFA pollock harvested during the B season and $96.65 million in gross first wholesale revenues from CDQ pollock harvested during the B season.

Table 4-3 provides information on the relative economic dependence of CPs harvesting B season pollock (AFA and CDQ) on this fishery. Here, economic dependence is measured by comparing the gross first wholesale revenues these CPs earned from the B season fishery to the total gross first wholesale revenues earned from all other fisheries (areas, species, gear types) by those same vessels. As shown, the B season fishery accounted for 55.27% of the total gross first wholesale revenues.

Table 4-4 provides information on the relative economic dependence of the communities affiliated with these CPs on the B season pollock fishery. Here, a community's economic dependence on the fishery is measured by comparing the gross first wholesale revenues these CPs earned from the B season pollock to the gross first wholesale revenues earned by the "the community fleet" in all other fisheries. The "community fleet" is defined as all commercial vessels with an ownership address in the same

[11] It is common practice for the CDQ groups to lease their pollock quota to AFA-permitted CPs, although this is not required by regulation. An exception to this during the analyzed period occurred in the 2016 B season when one CV delivering to a mothership harvested CDQ pollock. As such, it is not anticipated that a different subset of communities would be identified.

communities identified by CP ownership address. As shown, the gross first wholesale revenues earned by CPs participating in the B season pollock fishery accounted for 20.51% of the total revenues earned by the Seattle and Anchorage community fleets (on average, 2011-2022).

Table 4-1 Number of catcher processors harvesting AFA pollock during the B season by community of vessel ownership address, 2011 through 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Vessels 2011-2022 (number)
Anchorage	1	1	1	1	1	1	1	1	1	1	1	1	1.0	7.23%	1
Seattle	14	13	13	14	13	13	13	13	12	12	12	12	12.8	92.77%	15
Grand Total	15	14	14	15	14	14	14	14	13	13	13	13	13.8	100.00%	16

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_SIA(1-4-23).

Table 4-2 Gross first wholesale revenue diversification for catcher processors harvesting AFA or CDQ pollock B season only, 2011 through 2022 (millions of 2022 real dollars)

	Program	2011	2012	2013	2014	2015	2016**	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022
Ex-Vessel Value*	AFA	114,872,174	119,339,597	108,210,339	111,094,084	111,950,919	104,392,504	94,981,926	103,561,738	102,978,619	92,588,758	98,158,540	94,340,475	104,705,806
	CDQ	30,284,240	34,321,093	30,962,923	32,158,057	32,019,038	29,399,263	26,579,480	29,716,220	28,946,377	23,615,045	28,316,752	27,456,850	29,481,278
	Total	145,156,415	153,660,690	139,173,262	143,252,141	143,969,958	133,791,767	121,561,406	133,277,958	131,924,997	116,203,802	126,475,292	121,797,325	134,187,084
Wholesale Value	AFA	391,553,114	387,712,195	333,479,830	343,363,542	352,238,293	366,171,965	346,292,568	321,481,295	366,738,891	295,241,303	314,647,826	291,918,492	342,569,943
	CDQ	103,293,394	111,584,224	95,426,615	98,931,327	100,813,703	104,404,540	97,250,773	92,598,306	103,634,107	75,777,651	91,065,303	85,086,752	96,655,558
	Total	494,846,508	499,296,419	428,906,445	442,294,868	453,051,997	470,576,505	443,543,341	414,079,601	470,372,998	371,018,954	405,713,129	377,005,244	439,225,501

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA SIA(1-4-23).
*Ex-vessel value is based on shoreside price provided by AKFIN.
**Includes CV targeted CDQ pollock delivered to a mothership in 2016.

Table 4-3 Gross first wholesale revenue diversification for catcher processors harvesting AFA or CDQ pollock during the B season, 2011 through 2022 (millions of real 2022 dollars)

Fishery	Annual Average Number of Vessels	Annual Average First Wholesale Revenues for Fishery	Annual Average Total Wholesale Revenues from All Area, Gear, and Species Fisheries	Annual Average First Wholesale Revenues of the Fishery as a Percent of Total Wholesale Revenues
AFA B Season	13.8	$342,569,943	$781,577,509	43.83%
CDQ B Season Pollock	11.6	$96,655,558	$675,777,007	14.30%
AFA B Season + CDQ B Season	14.3	$439,225,501	$794,711,920	55.27%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA SIA(1-4-23).

Table 4-4 Gross first wholesale revenue diversification for communities listed as the registered ownership address of catcher processors harvesting AFA or CDQ pollock during the B season, 2011 through 2022 (millions of real 2022 dollars)

Fleet	Community	Annual Average Number of Vessels in the B Season Fishery	Annual Average Number of All Commercial Fishing Vessels in those Same Communities	Annual Average First Wholesale Revenue for B Season Fishery	Annual Average Total First Wholesale Value from All Areas, Gears, and Species Fisheries for the Community Fleet	Participant Wholesale Value as a Percentage of Total Community Wholesale Revenue Annual Average
CPs	Seattle/Anchorage	14.3	523.9	$439,225,501	$2,141,770,565	20.51%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA SIA(1-4-23).

4.1.2 Floating Processors and Motherships

Table 4-5 provides the number of floating processors/motherships that received deliveries of Bering Sea pollock during the B season fishery by the community listed as the processing entity's ownership address (2011-2022). As shown, four unique floating processor/motherships operated during the analyzed period, all of which have a registered ownership address in Seattle of Dutch Harbor.[12] This information includes floating processors that operated outside of Unalaska/Dutch Harbor's city limits and accepted deliveries from inshore CVs and the motherships operating at-sea accepting deliveries from CVs participating in the mothership sector.

Table 4-6 provides the gross first wholesale revenues floating processors/motherships earned from deliveries of B season pollock organized by community of ownership address (2011-2022). On average, these entities earned $107.96 in gross first wholesale revenues from the B season fishery.

Table 4-7 provides information on the relative economic dependence of floating processors/motherships on B season pollock deliveries by comparing the total gross first wholesale revenues earned in this fishery to the total gross first wholesale revenues these entities earned from processing all other fisheries. As shown, B season pollock accounted for approximately 58.49% of these entities' total gross first wholesale revenues (on average, 2011-2022).

Table 4-8 provides information on the relative magnitude of these floating processor/motherships' economic dependence on the B season pollock fishery by considering the gross first wholesale revenues these entities earned from the B season pollock fishery as a percent of total revenues on an annual basis. As shown, the gross first wholesale revenues these entities earned from the B season pollock fishery typically accounted for 50-70% of these operations total revenues.

Table 4-9 provides information on the relative economic dependence of the communities (Seattle and Unalaska/Dutch Harbor) on B season pollock. As shown, B season pollock accounted for 33.09% of the total gross first wholesale revenues by the Seattle and Unalaska/Dutch Harbor community fleets.

[12] Dutch Harbor is the official name of the city of Unalaska's port, and it is also often applied to the portion of the city of Unalaska located on Amaknak Island, which is connected by bridge to the larger portion of the community, which is on Unalaska Island. They geographic feature of Dutch Harbor, which is adjacent to Amaknak Island, along with Amaknak Island itself, is fully contained within the municipal boundaries of the city of Unalaska (Downs & Henry 2023).

Table 4-5 Number of floating processors/motherships accepting B season deliveries of Bering Sea pollock by community of ownership address, 2011 through 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average Number	Annual Average as Percent of Total	Number of Unique Processors
Dutch Harbor	2	2	2	2	2	1	1	2	2	2	2	2	1.8	52.38%	2
Seattle	2	2	2	2	2	2	2	2	1	1	1	1	1.7	47.62%	2
Grand Total	4	4	4	4	4	3	3	4	3	3	3	3	3.5	100.00%	4

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_Floater_SIA(11-21-23).

Table 4-6 Gross first wholesale revenues for floating processors/motherships accepting B season deliveries of AFA pollock by community of ownership address, 2011 through 2022 (millions of real 2022 dollars)

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (millions)	Unique Processors 2011-2022 (number)
Dutch Harbor/ Seattle	$136.43	$131.75	$121.58	$127.66	$117.60	$128.70	$109.35	$122.75	$80.89	$70.29	$75.06	$73.47	$107.96	4

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_Floater_SIA(11-21-23).

Table 4-7 Gross first wholesale revenue diversification for floating processors/motherships accepting B season deliveries of AFA pollock, 2011 through 2022 (millions of 2022 real dollars)

Community	Annual Average Number of Processors	Annual Average First Wholesale Revenues B Season Pollock Only (millions 2022 real $)	Annual Average First Wholesale Revenues from All Area, Gear, and Species Fisheries	B Season AFA Pollock First Wholesale as a Percentage of Total First Wholesale Revenue Annual Average
Dutch Harbor/Seattle	3.5	$107.96	$184.59	58.49%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_Floater_SIA(11-21-23).

Table 4-8 Gross first wholesale revenues floating processors/motherships earned from AFA deliveries of B season pollock as a percent of total revenues, 2011 through 2022 (number of processors)

AFA B Season Pollock Revenue as a % of Total	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022
0-10%	0	0	0	0	0	1	0	0	0	0	0	0	0.08
10-20%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
20-30%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
30-40%	1	0	0	0	0	0	0	0	0	0	0	0	0.08
40-50%	0	1	1	1	1	0	0	0	1	0	0	0	0.42
50-60%	2	2	1	2	0	1	2	3	1	3	3	2	1.83
60-70%	1	1	2	1	3	2	1	1	1	0	0	1	1.17
70-80%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
80-90%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
90-100%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Grand Total	**4**	**4**	**4**	**4**	**4**	**4**	**3**	**4**	**3**	**3**	**3**	**3**	**3.5**

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_Floater_SIA(11-21-23).

Table 4-9 Gross first wholesale revenue diversification for communities listed as the registered ownership address of floating processors/motherships receiving deliveries of AFA B season pollock, 2011 through 2022 (millions of 2022 real dollars)

Geography	Annual Average Number of Processors	Annual Average Number of All Commercial Fishing Processors in those Same Communities	Annual Average First Wholesale Revenues from B Season AFA Pollock	Annual Average Total First Wholesale Revenues from All Areas, Gears, and Species Fisheries for the Community Fleet	B Season AFA Pollock First Wholesale Revenue as a Percentage of Total Community First Wholesale Revenue Annual Average
Dutch Harbor/Seattle	3.5	13.8	$107.96	$326.30	33.09%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_Floater_SIA(11-21-23).
Notes: Community fleet for motherships/floating processors uses the EEZO code, which includes processors only operating in the EEZ but may include CPs.

4.1.3 Catcher Vessels

The following section provides information on community engagement and participation for CVs harvesting AFA pollock during the B season. This information is relevant to both inshore and mothership CVs to streamline the information for the reader, but it is important to note these vessels do have operational differences. For example, mothership CVs harvest Bering Sea pollock and deliver full codends directly to the mothership for processing at sea. Mothership CVs operate as distinct fleets because they must cooperate with each other and coordinate their deliveries to the mothership to efficiently prosecute the fishery. Inshore CVs harvest pollock at sea and deliver to shorebased processing facilities in Alaska communities. This dynamic – making deliveries to shorebased processors—influences the fishing behavior of these vessels because shoreside processors have specific delivery requirements to maintain high quality products.

Table 4-10 provides the number of inshore CVs that harvested B season pollock and delivered to shorebased processing facilities organized by community of vessel ownership address (2011-2022). From 2011-2022, 83 unique CVs participated in this fishery. Of these vessels, 84.16% have a reported ownership address in a community in Washington State, but the majority of ownership is concentrated in the Seattle Metropolitan Statistical Area (or Seattle MSA) (80.20%).[13] Of all CVs, 9.03% have a registered ownership address in communities based in Oregon or California. Kodiak is an Alaska community affiliated with the highest number of inshore CVs.

Table 4-11 provides the number of CVs that harvested B season pollock and delivered to a mothership organized by community of ownership address (2011-2022). From 2011-2022, 17 unique CVs delivered to a mothership during the B season pollock fishery. The largest component of ownership was concentrated in the Seattle MSA (92.45%).

[13] In this analysis, the Seattle MSA grouping includes Bothell, Edmonds, Everett, Issaquah, Renton, Seattle, shoreline, Snohomish, Woodinville, and Woodway.

Table 4-10 Number of catcher vessels harvesting AFA pollock and delivering to shorebased processing facilities during the B season by community of vessel ownership address, 2011 through 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Vessels 2011-2022 (number)
Anchorage/Wasilla	0	0	0	0	0	0	0	0	0	0	0	3	0.3	0.37%	3
Kodiak	5	5	5	5	4	4	4	4	4	5	3	3	4.3	6.31%	6
Alaska	5	5	5	5	4	4	4	4	4	5	3	6	4.5	6.68%	9
Seattle	51	54	55	57	59	55	55	54	54	55	53	46	54.0	80.20%	65
Other WA	3	2	3	3	4	3	2	2	2	2	4	2	2.7	3.96%	7
Washington	54	56	58	60	63	58	57	56	56	57	57	48	56.7	84.16%	69
Newport	8	6	5	4	5	5	4	4	4	4	3	5	4.8	7.05%	10
Other OR/Other States	5	5	1	1	1	1	0	1	0	1	0	0	1.3	1.98%	7
Oregon/Other States	13	11	6	5	6	6	4	5	4	5	3	5	6.1	9.03%	16
Grand Total	72	73	69	70	73	68	65	65	64	67	63	59	67.3	100.00%	83

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SIA(12-18-23).
*Other WA includes Anacortes, Chinook, Mount Vernon, Neah Bay and Vancouver.
**Other OR/Other States includes Depoe Bay, Florence, Independence, Keizer, Port Ortford, Portland, South Beach, Oregon and Half Moon Bay, California.

Table 4-11 Number of catcher vessels harvesting AFA pollock during the B season delivering to a mothership by community of vessel ownership address, 2011through 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Vessels 2011-2022 (number)
Anchorage/Wasilla	0	0	0	0	0	0	0	0	0	0	0	1	0.08	0.63%	1
Kodiak	1	1	1	1	1	1	1	0	1	1	1	0	0.83	6.29%	1
Alaska	1	1	1	1	1	1	1	0	1	1	1	1	0.9	6.92%	2
Seattle MSA	13	14	13	12	14	11	12	11	12	12	12	11	12.3	92.45%	16
Other WA	0	0	0	1	0	0	0	0	0	0	0	0	0.08	0.63%	1
Washington	13	14	13	13	14	11	12	11	12	12	12	11	12.3	93.08%	17
Grand Total	14	15	14	14	15	12	13	11	13	13	13	12	13.3	100.00%	17

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SIA(12-18-23).
*Other WA includes Mount Vernon and Neah Bay.

Table 4-12 provides the gross ex-vessel revenues earned from AFA pollock harvested during the B season by community of vessel ownership address for inshore and mothership CVs combined (2011-2022). On average, approximately 86.60% of the gross ex-vessel revenues earned from CVs participating in the B season pollock fishery are concentrated in CVs with a reported ownership address in the Seattle MSA. Table 4-13 provides information on the relative economic dependence of CVs on the B season pollock fishery by comparing the gross ex-vessel revenues earned from this fishery to the total gross ex-vessel revenues these same CVs earned in all other fisheries (2011-2022). As shown, the gross ex-vessel revenues earned in the B season pollock fishery accounted for 48.00% of these vessel's total revenue across all fisheries.

Table 4-14 shows the relative economic dependence of the communities affiliated with CVs that harvested B season pollock by comparing the gross ex-vessel revenues from the B season pollock fishery to the gross ex-vessel revenues earned by "the community fleet" in all other commercial fisheries. The majority of CVs participating in the inshore and mothership sectors during the B season pollock fishery have a historical ownership address in the Seattle MSA, followed by Newport and Kodiak. The Seattle MSA, Newport, and Kodiak "community fleets" are large and diverse. As such, the relative economic dependence of these communities on the B season pollock fishery varies. For example, the gross ex-vessel revenues earned from B season pollock accounted for approximately 2.83% of the total gross ex-vessel revenues earned from the Kodiak community fleet compared to approximately 19.60% and 20.54% of the Seattle MSA and Newport community fleets, respectively.

Table 4-12 Gross ex-vessel revenues for catcher vessels harvesting AFA pollock during the B season fishery by community of vessel ownership address, 2011 through 2022 (millions of real 2022 dollars)

Fleet	Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (dollars)	Annual Average 2011-2022 (percent)
AFA Mothership Catcher Vessels	Total	30,818,145	29,722,721	27,201,537	28,677,478	27,944,466	26,092,885	23,421,627	26,886,743	25,762,894	25,849,732	26,507,533	25,160,662	27,003,869	100.00%
AFA Shoreside Catcher Vessels	Total	135,984,978	147,729,397	134,333,271	137,814,575	140,200,432	129,028,161	121,026,086	134,113,375	143,344,977	116,124,727	125,268,020	117,782,849	131,895,904	100.00%
AFA Vessels (All Sectors)	Anchorage/Wasilla	0	0	0	0	0	0	0	0	0	0	0	6,421,856	535,155	0.34%
	Kodiak	3,680,874	4,513,431	4,083,293	4,299,017	3,585,741	3,831,901	4,749,933	2,410,793	3,779,292	2,941,930	3,571,475	1,457,312	3,575,416	2.25%
	Alaska Total	3,680,874	4,513,431	4,083,293	4,299,017	3,585,741	3,831,901	4,749,933	2,410,793	3,779,292	2,941,930	3,571,475	7,879,168	4,110,571	2.59%
	Seattle	136,878,382	*	139,245,592	143,666,060	145,885,717	132,541,558	*	*	*	*	133,639,840	*	137,608,719	86.60%
	Other WA*	8,624,804	*	12,015,043	12,620,808	12,618,090	11,734,778	*	*	*	*	11,191,918	*	10,023,988	6.31%
	Washington	145,356,863	157,569,476	151,225,341	156,217,894	158,397,857	144,281,338	134,779,414	153,632,171	160,239,734	135,813,327	144,779,951	129,299,119	147,632,707	92.91%
	Newport	12,148,340	10,205,093	*	*	*	*	4,918,366	*	5,088,845	*	3,424,128	5,765,224	5,856,617	3.69%
	Other OR/Other States**	5,617,045	5,164,118	*	*	*	*	0	*	0	*	0	0	1,299,878	0.82%
	Oregon/Other States	17,765,385	15,369,211	6,226,174	5,975,142	6,161,300	7,007,806	4,918,366	4,957,154	5,088,845	3,219,202	3,424,128	5,765,224	7,156,495	4.50%
	Total	166,803,123	177,452,118	161,534,808	166,492,053	168,144,898	155,121,046	144,447,713	161,000,118	169,107,871	141,974,459	151,775,553	142,943,511	158,899,773	100.00%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SIA(12-18-23).
* Other WA includes: Anacortes, Chinook, Mount Vernon, Neah Bay and Vancouver
**Other OR/Other States includes: (Depoe Bay, Florence, Independence, Keizer, Port Ortford, Portland, South Beach) Oregon and Half Moon Bay California
Notes: "*" denotes fewer than three participants so values are not provided due to confidentiality restrictions. "0" values indicate no CVs with that community reported as its ownership address participated in the fishery that year.

Table 4-13 Gross ex-vessel revenue diversification for catcher vessels harvesting AFA pollock during the B season compared to the gross ex-vessel revenue of these vessels from all other areas, gear, and species fisheries by community of historical ownership address, 2011 through 2022 (millions of 2022 real dollars)

Fleet	Community	Annual Average Number of Vessels	Annual Average Ex Vessel Value from B Season AFA	Annual Average Total Ex Vessel Value from All Area, Gear, and Species Fisheries	Annual Average Ex-Vessel Revenue from B Season AFA as a Percent of Total
AFA Mothership Catcher Vessels	Total	13.3	$27,003,869	$55,569,410	48.59%
AFA Shoreside Catcher Vessels	Total	67.3	$131,895,904	$289,481,227	45.56%
AFA Vessels (All Sectors)	Anchorage/Wasilla	0.3	$535,155	$993,975	53.84%
	Kodiak	4.4	$3,575,416	$13,515,401	26.45%
	Alaska Total	4.7	$4,110,571	$14,509,376	28.33%
	Seattle	61.6	$137,608,719	$267,477,831	51.45%
	Other WA*	2.8	$10,023,988	$18,787,274	53.36%
	Washington	64.3	$147,632,707	$286,265,105	51.57%
	Newport	4.8	$5,856,617	$22,707,758	25.79%
	Other OR/Other States*	1.4	$1,299,878	$7,525,609	17.27%
	Oregon/Other States	6.2	$7,156,495	$30,233,367	23.67%
	Total	75.2	$158,899,773	$331,007,848	48.00%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT and NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_SIA(12-18-23).
Notes: The average gross ex-vessel revenues CVs earned from AFA pollock harvested during the B season, as well as the revenues earned from all other fisheries, are not suppressed because there are three or more unique vessels participating. In other words, while the average level of participation may be less than two, the unique count is not. Additionally, the reader might notice the annual average count of inshore and mothership CVs presented in Table 4-13 and Table 4-14 are not additive. This is because of the dual qualified CVs.

Table 4-14 Gross ex-vessel revenue diversification for communities with catcher vessels harvesting AFA pollock during the B season fishery, 2011-2022 (real 2022 dollars)

Fleet	Community	Annual Average Number of Vessels in the B Season	Annual Average Number of All Commercial Fishing Vessels in those Same Communities	Annual Average B Season Gross Ex-Vessel Revenue	Annual Average Total Ex-Vessel Revenues from All Areas, Gears, and Species Fisheries for the Community Fleet	Annual Average B Season Ex-Vessel Revenues as a Percent of Total Community Ex-Vessel Revenue
AFA Mothership Catcher Vessels	Total	13.3	862.6	$27,003,869	$933,869,524	2.89%
AFA Shoreside Catcher Vessels	Total	67.3	984.3	$131,895,904	$995,952,689	13.24%
AFA Vessels (All Sectors)	Anchorage/Wasilla	0.3	275.8	$535,155	$88,794,511	0.60%
	Kodiak	4.4	244.1	$3,575,416	$126,391,450	2.83%
	Alaska Total	4.7	519.9	$4,110,571	$215,185,961	1.91%
	Seattle	61.6	336.5	$137,608,719	$702,241,997	19.60%
	Other WA	2.8	94.6	$10,023,988	$37,697,531	26.59%
	Washington	64.3	431.1	$147,632,707	$739,939,528	19.95%
	Newport	4.8	14.9	$5,856,617	$28,515,794	20.54%
	Other OR/Other States	1.4	18.5	$1,299,878	$12,311,406	10.56%
	Oregon/Other States	6.2	33.4	$7,156,495	$40,827,200	17.53%
	Total	75.2	984.4	$158,899,773	$995,952,689	15.95%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT and NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA; AFA_SIA(1-4-24).

4.1.4 Shorebased Processors in Alaska Accepting B Season Deliveries of Bering Sea Pollock

This section of the analysis provides information on community engagement and economic dependence on the B season pollock fishery for those Alaska communities where an AFA qualified shorebased processing plant is located, and accepted B season deliveries during the analyzed period (2011-2022).

Table 4-15 provides the number of shorebased processors that accepted deliveries of B season pollock by community of operation (2011-2022). As shown, three Alaska communities and seven unique shorebased processors accepted deliveries of Bering Sea pollock during the B season (2011-2022). UniSea Seafoods, Westward Seafoods, and Alyeska Seafoods in Unalaska/Dutch Harbor; Trident Seafoods in Akutan; Peter Pan Seafoods in King Cove; and the *Northern Victor*. The *Northern Victor* was owned by Icicle Seafoods, but the processor was sold to Westward Seafoods in 2022.

Table 4-16 provides information on the gross first wholesale revenues shorebased processing facilities earned from B season pollock deliveries by community of operation, within the bounds of confidentiality restrictions (2011-2022). On average, these processing facilities earned $358.31 million in gross first wholesale revenues from this fishery. The tables showing the value of AFA pollock deliveries during the B season by community are reported as wholesale values converted from the ex-vessel price estimates of landed catch. This is a fairly new algorithmic process for AKFIN which has been implemented at the request of the Council.

Table 4-15 Number of shorebased processors in Alaska communities accepting deliveries of AFA pollock during the B season by community of operation, 2011 through 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average (number)	Annual Average (percent)	Unique Processors (number)
Akutan	1	1	1	1	1	1	1	1	1	1	1	1	1.0	18.75%	1
King Cove	1	1	1	1	1	1	1	1	1	1	1	1	1.0	18.75%	1
Dutch Harbor/Unalaska*	3	3	3	3	3	3	3	3	4	4	4	4	3.3	62.50%	5
Grand Total	5	5	5	5	5	5	5	5	6	6	6	6	5.3	100.00%	7

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SBPR_SIA(12-14-23).
*Includes Inshore Floating Processor that operated in Dutch Harbor in relevant years.

Table 4-16 Gross first wholesale revenues for shorebased processors in Alaska communities accepting AFA pollock deliveries during the B season by community of operation, 2011 through 2022 (millions of real 2022 dollars)

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average (millions)	Annual Average (percent)	Unique Processors (number)
Akutan/Unalaska Dutch Harbor/King Cove	$371.67	$401.12	$354.70	$365.92	$341.84	$351.46	$314.59	$341.58	$415.81	$336.74	$356.57	$347.74	$358.31	100.00%	7

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SBPR_SIA(12-24-23).

Table 4-17 provides information on the relative economic dependence of these processors on AFA pollock deliveries during the B season. The gross first wholesale revenues these processors earned from the B season pollock fishery is compared to the revenues earned by these same entities earned from processing operations for all fisheries (area, species, and gear types). As shown, B season deliveries accounted for approximately 43.72% of the total wholesale revenues earned by these processors (on average, 2011-2022).

The shorebased processing facilities accepting AFA pollock deliveries during the B season also participate in BSAI crab, halibut, non-AFA groundfish (or other BSAI groundfish), and commercial salmon fisheries. Unique to King Cove, the Peter Pan plant is more economically dependent on salmon fisheries than other processors and communities included within this analysis. While it is not possible to show quantitatively due to confidentiality restrictions, there have been shifts in these processor's economic dependence on the various fisheries over time. Perhaps the most noticeable trend during the analyzed period is the relative decline in wholesale revenues from BSAI crab processing which coincide with the recent Red King Crab and snow crab closures.[14]

Table 4-18 provides information on the relative magnitude of these shorebased processor's economic dependence on the B season pollock fishery. Dependence is conveyed by showing the gross first wholesale revenues these operations earned from the B season pollock fishery as a percent of the total revenues these facilities earned on an annual basis. On average, the majority of processors depend on this fishery for 40-50% of their total gross first wholesale revenues.

Table 4-19 provides information on the relative economic dependence of the communities where shorebased processors are located on the B season pollock fishery by comparing the gross first wholesale revenues earned from the B season fishery to the total first wholesale revenues earned by all processing entities from all processing operations for all fisheries within the same communities (2011-2022). As shown, B season pollock deliveries accounted for 34.85% of the total first wholesale revenues earned by all shorebased processing operations in these communities.

[14] AFKIN, ADFG/CFEC Fish Tickets; AFA_SBPR_Div(10-19-23).

Table 4-17 Gross first wholesale revenue diversification for shorebased processors accepting B season pollock deliveries, 2011 through 2022 (millions of 2022 real dollars)

Geography	Annual Average Number of Processors	Annual Average First Wholesale Revenues B Season AFA Pollock	Annual Average Total First Wholesale Revenues from All Area, Gear, and Species Fisheries	Annual Average First Wholesale Revenues from B Season AFA Pollock as a Percentage of Total Revenue
Akutan/Dutch Harbor Unalaska/ King Cove	5.3	$358.3	$819.6	43.72%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SBPR_SIA(12-14-23).

Table 4-18 First wholesale revenue dependence for shorebased processors accepting AFA pollock deliveries during the B season by AFA pollock B season revenue as a percent of total revenue, 2011 through 2022 (number of processors)

AFA B Season Pollock Revenue as % of Total	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2021
0-10%	1	0	1	0	1	1	1	0	0	0	1	1	0.58
10-20%	0	1	0	1	0	0	0	1	1	1	0	0	0.42
20-30%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
30-40%	1	0	0	0	0	0	0	0	0	1	1	0	0.25
40-50%	2	2	3	3	2	3	3	3	3	3	0	3	2.50
50-60%	1	2	1	1	2	1	1	1	2	1	4	1	1.50
60-70%	0	0	0	0	0	0	0	0	0	0	0	1	0.08
70-80%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
80-90%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
90-100%	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Grand Total	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**6**	**6**	**6**	**6**	**5.3**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SBPR_SIA(12-14-13).

Table 4-19 First wholesale gross revenue diversification for shorebased processors accepting deliveries of AFA pollock during the B season by community of operation compared to the first wholesale gross revenue these processors earn from all other fisheries, 2011 through 2022 (millions of 2022 real dollars)

Geography	Annual Average Number of Processors	Annual Average Number of All Commercial Fishing Processors in The Same Communities	Annual Average First Wholesale Revenues from B Season AFA Pollock	Annual Average Total First Wholesale Revenues from All Areas, Gears, and Species Fisheries for all Community Processing	Annual Average B Season Pollock First Wholesale Revenue as % of Total Community First Wholesale Revenue
Akutan/Dutch Harbor/King Cove	5.3	7.3	$358.3	$1,028.2	34.85%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; AFA_SBPR_SIA(12-24-23).

4.1.4.1 Community Processing Characterization

The following section describes the annual processing round and operations of the shorebased processors identified as being engaged in the B season pollock fishery (2011-2022) and is largely based on the recently updated Akutan and Unalaska community profiles by Downs & Henry (2023) and the Comprehensive Baseline Commercial Fishing Community Profile King Cove (EDAW 2005). The analysts would note this section does not fully capture the relationship between shorebased processing facilities and the communities in which they operate. Some of these dynamics include the employment opportunities at the plant (ranging from processing workers, administrative staff, among others) and the ways in which processing facilities become central hubs for economic activity. The presence of shorebased processing facilities can attract other related businesses and services, all of which can contribute to the local economies of these communities. An interested reader can find more related information in Section 4.1.5 .

Unalaska/Dutch Harbor

Unalaska/Dutch Harbor is unique in scale because it has multiple AFA qualified shorebased processing plants. Akutan is the only other community that had more than one active AFA inshore processing facility for several years (the *Arctic Enterprise*, a floating processor that operated outside of Akutan, has not been active since 2008). Current shorebased and floating processing operations in Unalaska/Dutch Harbor include three large multispecies shorebased plants (Unisea, Alyeska, and Westward) and the *Northern Victor.*

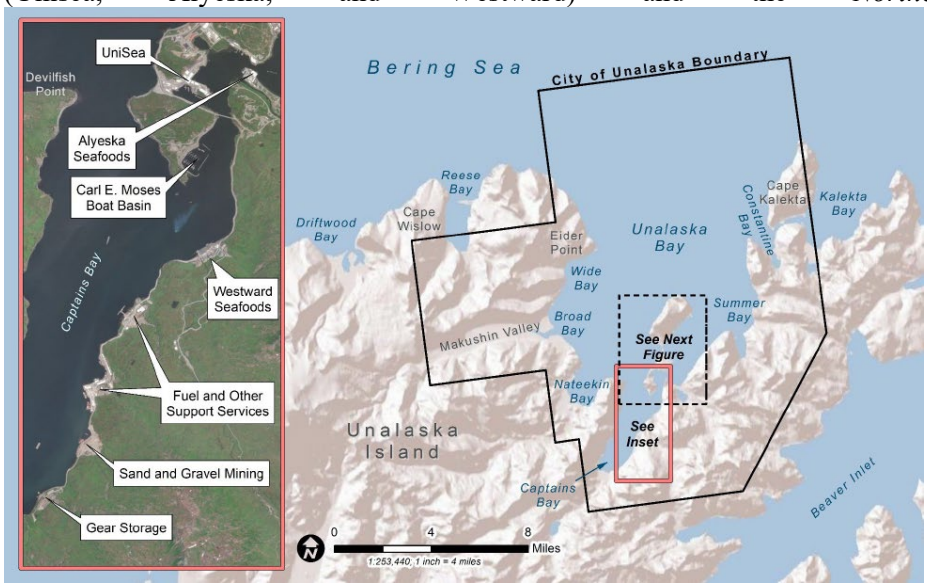


Figure 4-1Figure 4-1 provides an overview of the boundaries of the City of Unalaska as well as select geographic features in and around the community. Also shown in this figure is a detailed inset of Captains Bay which shows the location of the three major shorebased processors accepting B season pollock deliveries. Other selected fisheries related businesses and infrastructure are also depicted. Figure 4-2 provides a closer look at Amaknak Island, portions of the downtown City of Unalaska, and the location of select public buildings and fishery related support serves buildings/infrastructure including the shorebased processors.

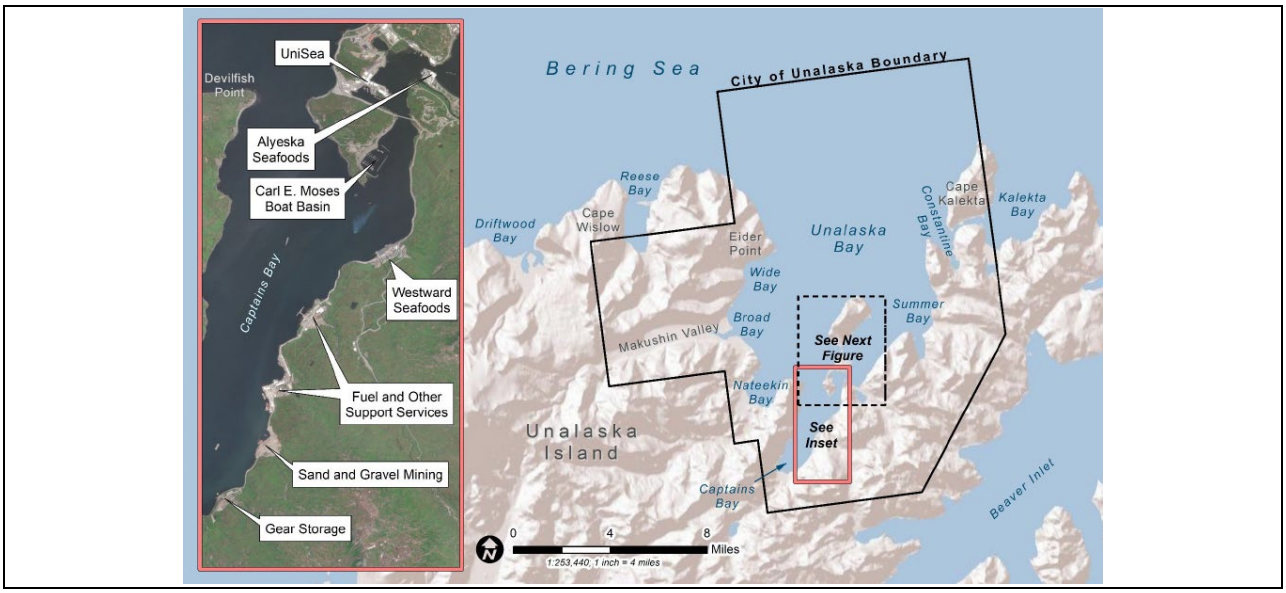


Figure 4-1 Detailed map of the City of Unalaska and Captains Bay
Source: Akutan and Unalaska community profiles (Downs & Henry 2023: 37).

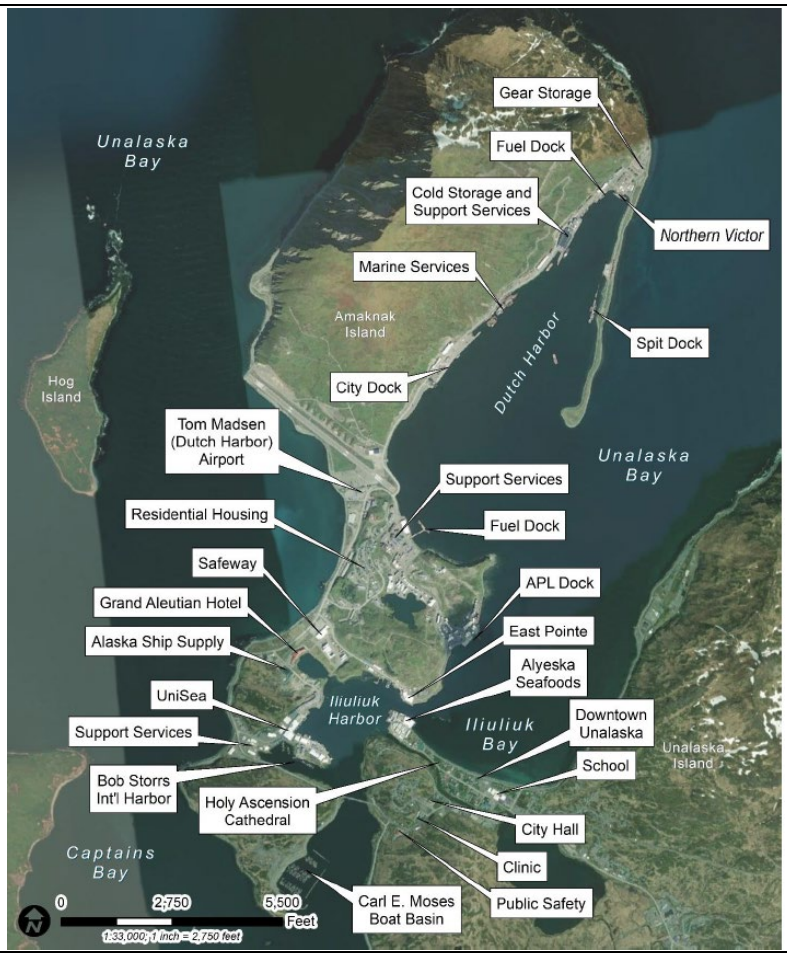


Figure 4-2 Inset of Amaknak Island and a detailed map of downtown Unalaska
Source: Akutan and Unalaska community profiles (Downs & Henry 2023: 38).

UniSea is a multispecies plant that is AFA qualified and accepted deliveries of B season pollock (2011-2022). The number of workers on site fluctuates throughout the year to meet processing demand. This facility can accommodate bunks for up to 1,200 employes. In 2019, this facility had approximately 1,100 employees from January to April (these include employees involved in processing, direct support, and other business functions). Processing labor demand ramps up quickly in January with the Pacific cod fishery opening on January 1, followed by A season pollock which has a regulatory opening of January 20, as well as other trawl and crab fisheries. In 2019, there were approximately 800 processing workers onsite during this period which decreased to less than 100 processing employees after the A season pollock fishery ended in early April. The total onsite employee count declined to between 300 to 400 individuals during the same period.

During slow season in May and June, activities focus on maintenance and fabrication as well as running halibut and black cod. Processing labor needs to increase to approximately 420 to 450 processing workers to meet the B season pollock fishery need (the regulatory opening of the B season pollock fishery is June 10). Between pollock and crab, that level of activity lasts until late September when the B season pollock fishery typically ends. There is a gradual decrease activity, followed by a very slow period in late November through December.[15] During the lowest point in December, there are still approximately 440 workers on site, including about 120 processing workers that are available to process intermittent deliveries but also help with offseason maintenance.

As is the case with other large multi-species plants in Unalaska, labor demand at UniSea depends on the mix of product forms being produced (e.g., surimi versus fillets), with some products being more labor intensive than others. Changes in technology and an emphasis on labor efficiency have also had an impact on employment levels, such that the plant has the ability to run that same product mix with fewer employees than in the past.

Alyeska Seafoods has accepted deliveries of B season pollock (2011-2022) and is a multispecies plant similar to UniSea adjacent to downtown Unalaska. The annual processing round is similar to that of other large plants in the community. There is a core crew of 60-65 employees at the plant year-round, including maintenance personnel, dock workers, as well as administrative, housing, galley, and other support staff that is augmented by seasonal processing workers that are hired on a "duration of season" basis.[16]

Alyeska has approximately 160 to 180 workers the first few weeks of January during the pot cod season before bringing in a peak of 400 workers from mid-January to mid-March to accommodate processing pollock, opilio crab, and trawl cod fisheries. Activity increases again in late May to early June with 220-230 processors on site, which drops to 100-150 in September and down to around 75 by Thanksgiving. Slow periods occur between April and early June and again from November through December when plant maintenance activities occur and full-time, year-round employees at the plant rotate out on vacations.

Westward Seafoods is a high-volume groundfish plant and a high-capacity crab plant that has an annual round like that of the other large multispecies plants in Unalaska. Fixed gear cod deliveries typically start in the first week of January, crab deliveries start closer to mid-January, and pollock and trawl cod deliveries start soon after their January 20 openers, making January to mid-April the busiest time of year.

[15] UniSea does provide idled processing workers with room and board during the slow wintertime if they choose to remain in the community for the upcoming season.

[16] Alyeska has housing for approximately 425 workers on site, but unlike other local processors owns offsite housing units as well, with a total of 24 two or three-bedroom housing units that include 12 townhouses in the downtown Unalaska area, a six-plex in Unalaska Valley, and three duplexes on Standard Oil Hill on Amaknak Island. Peak labor demand has decided over the years due to efficiencies gained through fishery rationalization and increased automation in the plant, such that Alyeska has not reached their bunkhouse capacity in recent years. As a result, the plant is in the process of converting some of their bunkhouse space into private rooms.

In 2019 there were 529 processing employees on site during this period and 637 employees overall when maintenance, office, galley, and housing workers are included.

Mid-April through June is the off season for pollock and trawl cod. With increased effort in the A season trawl cod fishery, B season cod openers have been very short and are completed before the finish of pollock. After the pollock and trawl cod deliveries end, production staff is reduced to 80 processors to have one shift per day to process the last of the fixed gear cod, as well as IFQ halibut and sablefish. The roughly 110 full-time employees also remain for a total of 190 employees in this period.

From June until the end of B season pollock in mid-September is another distinct period. In 2019, 267 processors and 370 employees total were on-site during this period. From mid-November (following the last of the red king crab and groundfish deliveries) through the end of the year Westward shuts down processing operations. During this time 110 full-time, non-processing employees remain (though some take vacation during this time), as well as roughly 15 processors who take temporary jobs in other departments.

The *Northern Victor* took deliveries of B season pollock as a floating processor operating in Bever Inlet (outside of Unalaska City limits) near Unalaska Island during some years in the analyzed period. However, in 2017, Icicle Seafoods moved the *Northern Victor* to Dutch Harbor (inside the Unalaska city limits) and converted it to a stationary processing facility by constructing a dock, permanently mooring the vessel by severing the connection between the engine and propeller and connecting the vessel to shoreside power. In 2022, Icicle Seafoods sold the *Northern Victor* to Westward Seafoods along with the 20-year lease agreement the company held with the City of Unalaska for an outfall easement in the city's tidelands.

Except for a small volume of Pacific cod, the *Northern Victor* exclusively processes pollock using a processing crew of 150-170 persons and a total employee count of approximately 220 individuals when support personnel (e.g., office, galley, laundry, maintenance) are included in the count. During the gap between the last A season pollock deliveries and the first B season pollock deliveries (i.e., from April through the start of June) Approximately 50 employees are on-site. The move from Beaver Inlet to Dutch Harbor simplified logistics for supporting processing operations and operating in a more sheltered area that is closer to the pollock fishing grounds was also a benefit to CVs that make pollock deliveries there. The move to Dutch Harbor saved approximately eight hours of transit time for CVs from the pollock fishing groups, and it improved these vessels' access to fuel, replacement crew members, and resupply provisions. Although a few employees who worked aboard the *Northern Victor* lived in bunkhouses ashore following the move to Dutch Harbor, almost all employees continued to live as well as work aboard the *Northern Victor* itself.

Akutan

Trident Seafoods owns and operates the major shorebased processing facility in the community of Akutan. Akutan is located on Akutan Island in the eastern Aleutian Islands, one of the Krenitzin Islands of the Fox Island group. Trident first opened a shorebased processing facility in the community in the summer of 1981, but the original structure was destroyed by fire in the summer of 1983. The plant was rebuilt later that year, and major expansions occurred in the 1990s. Like the large shorebased processing plants in Unalaska, the Trident Akutan plant is a multispecies processing facility that is AFA-qualified, and it accounts for a significant amount of regional crab processing as well as groundfish processing.[17]

[17] In 2022, Trident Seafoods announced plans to build a "next generation processing plant" to replace its existing facility in Akutan. According to company sources, Trident is working with third-part engineering firms to weigh the feasibility, costs and design options for expanding its footprint in Akutan versus building a new plant on Unalaska's Captains Bay on property it recently acquired through its subsidiary LFS.

Figure 4-3 provides an overview of the boundaries of the City of Akutan and selected geographic features in and around the city, as well as insets of the Akutan Harbor area, the processing plant complex, village of Akutan, and the airport.

Figure 4-4 provides a detailed look at the village of Akutan portion of the city. Also shown on this figure are the locations of selected public buildings, as well as those that are fishery related support service businesses and infrastructure.

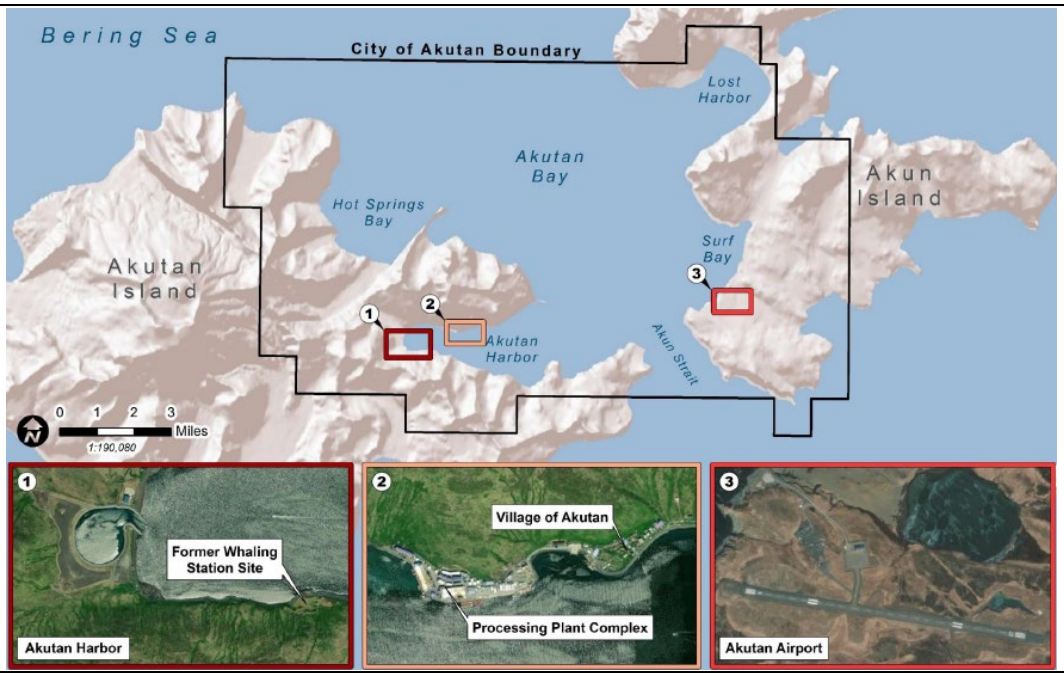


Figure 4-3 Overview of the City of Akutan and selected detailed inset maps
Source: Akutan and Unalaska community profiles (Down & Henry 2023: 4).

Figure 4-4 Village of Akutan, detailed map
Source: Akutan and Unalaska community profiles (Downs & Henry 2023: 4).

In terms of the processing labor force at the Akutan Trident plant, there is considerable fluctuation over the course of a typical year. For example, the level of processing workers is highest from January until April when there are approximately 1,000 to 1,300 workers on-site. The maximum number of workers that can be accommodated in on-site housing is 1,350, excluding limited transient quarters used by visiting management, technicians, or industry visitors that stay at the plant on a short-term basis. This peak processing activity coincides with the A season pollock fishery; opilio and bairdi crab processing which typically runs from January through March; and cod processing which primarily occurs from January through late February or early March with a second pulse of processing occurring over a few days in April.

May represents a relative lull in processing as 200 to 300 personnel remain on-site. Of these employees, roughly 100 are processing personnel and the rest are administrative, management, maintenance, or project personnel. The total number fluctuates based on specific projects undertaken each year. Processing activities during this time include halibut and black cod, which is processed at the plant beginning in March with the highest volume of processing for these species occurring in the summer months.

From June through October, between 800 and 1,200 workers will be on site, which coincides with pollock B season; a pulse of cod processing that occurs in September; herring processing, with that season beginning on July 4 and lasting approximately two weeks, with season length depending on quota; and the summer halibut and black cod processing peak which may last until the end of July or early August.

After the end of pollock B season things again slow down at the plant. From October 15 through early November king crab is typically processed at the plant. Depending on remaining cod and crab processing, between the end of October and mid-November, the number of workers on site will decline to between 200 and 250, of whom, as during the May lull, perhaps 100 are processing personnel with the rest being administrative, management, maintenance, and project personnel, the number of which fluctuates based on specific projects undertaken each year.

King Cove

Peter Pan Seafoods owns and operates the shorebased processing facility in King Cove. The King Cove plant was built around the local salmon fisheries, but it also processes crab (King, tanner, opilio, and more recently Dungeness), halibut, sablefish, pollock, and other groundfish.

The annual processing round of the plant begins with Pacific cod processing (Pacific cod fixed gear opens on January 1) and crab related processing activity starts shortly after. The Western Gulf of Alaska Pacific cod and pollock trawl fisheries open near the Bering Sea pollock fishery in late January. The Peter Pan plant tends to hold off deliveries of Bering Sea pollock from AFA CVs affiliated with the plant through the cooperative until the Gulf fisheries can be serviced; this practice is facilitated by the cooperative conditions of the Bering Sea pollock fishery which allow the plant to optimize processing across multiple fisheries. Western Gulf pollock activity may only last a week or so, while Bering Sea pollock may last through the end of February.

Summer activity at the Peter Pan plant in King Cove begins in early June as the Bering Sea pollock B season and commercial salmon fishing seasons start. July is relatively slow for salmon, but August typically picks up again with the pink salmon runs. Typically, the Peter Pan plant focuses on Pacific cod and King crab through October (noting this patter has been affected by recent King crab closures in the Bering Sea). By mid-November, the plant is entering its off season.

Employment levels at the plant vary by season. Employment peaks typically occur in late January through March with most weeks at or near 400 total employees (on-site). Secondary peaks of approximately 300 employees are common from mid-June through mid-August. However, the secondary peaks can be more

variable with some weeks reaching 400 or more employees while others are considerably less than 300. The level of on-site workers drops to nearly 30 persons during the end of year maintenance work.[18]

[18] Personal communication, Peter Pan Seafoods staff.

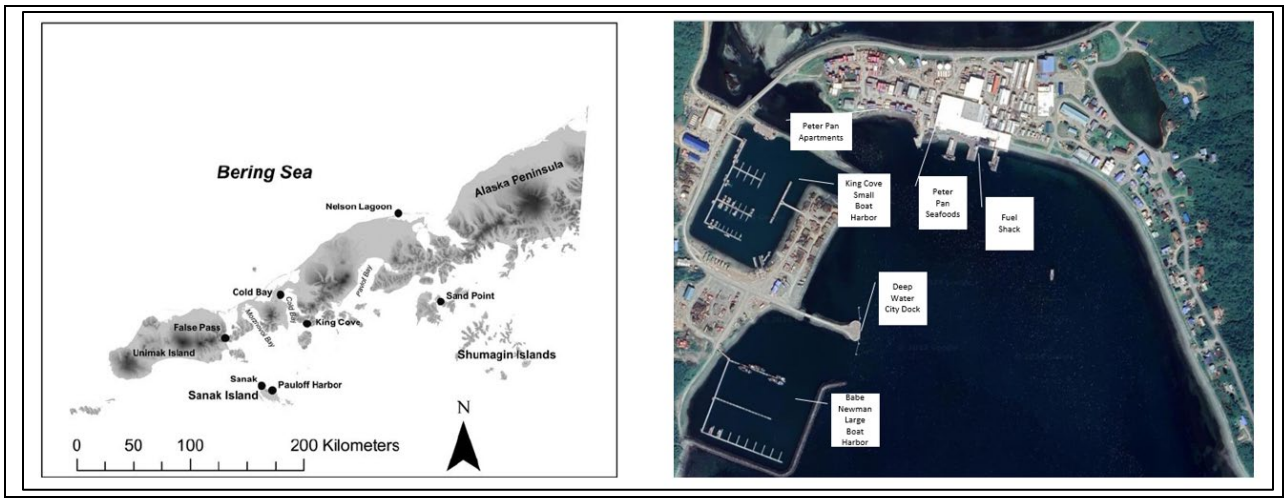


Figure 4-5 Map of Western Gulf of Alaska communities including King Cove and select fishery-related infrastructure within King Cove

4.1.5 Sketches for Communities Identified as Substantially Engaged in or Dependent on B Season Pollock

The following sections provide additional context for a subset of communities identified as being *substantially* engaged in or dependent on the Bering Sea pollock fishery through the harvesting and processing of AFA pollock. The series of tables providing quantitative information on communities' engagement (or participation) and economic dependence (or reliance) in Sections 4.1.1, 4.1.2, 4.1.3, and 4.1.4 were the starting point for this analysis.

Community-level engagement can be characterized in different ways, whether it is by being a community listed as the ownership address of a vessel, being the location of a shorebased processing facility, being the base of CP's economic activity during port calls or being the location of fishery support sector businesses. Fishery support service business can be wide range including accounting, insurance, legal and financial services, building materials, communications (wireless and cellular), fishing equipment and gear, food and groceries, shipping and transportation, fuel, refrigeration and more. Simplifying assumptions needed to be made to determine the subset of communities that would be selected for characterization, and three screening criteria were used to identify communities potentially substantially engaged in or dependent on the Bering Sea pollock fishery.

1. First, communities were included if they were the location of a shoreside processing facility that received at least one delivery of Bering Sea pollock during the B season in any year from 2011-2022. This criterion resulted in three Alaska communities being selected: Akutan, Unalaska/Dutch Harbor, and King Cove.
2. Second, the analysts considered communities where AFA CPs made port calls. Port call data are limited in their utility in that they do not provide information on the nature or magnitude of local expenditures related to port calls. However, this information can be used as a proxy to identify communities where economic activity that may accompany port calls including fuel purchase, services related to crew changes, cold storage use, longshoring and stevedore services, harbor services, among others. Over 98% of the port calls made by AFA affiliated CPs occurred in Unalaska/Dutch Harbor over the last decade (2013-2022) and all CP port calls

in more recent years (2021 and 2022).[19] Based on these data, it is anticipated that the economic benefits of AFA affiliated CP port calls are primarily realized in Unalaska/Dutch Harbor. As such, this criterion did not result in additional communities to be included for further analysis.

3. The third criterion identifies communities that had at least a minimal, ongoing level of engagement in the Bering Sea pollock fishery as measured by an annual average of more than one vessel with a local ownership address that participated in the B season from 2011 through 2022. As a result of this criterion, Kodiak, Seattle/Seattle MSA, and Newport were included for analysis.

A total of six communities were identified as being highly engaged in or economically dependent on the Bering Sea B season pollock fishery: Akutan, King Cove, Kodiak, Newport, Seattle, and Unalaska/Dutch Harbor. Overall, this approach is consistent with the portion of the National Standard 8 guidelines that state, "to address the sustained participation of fishing communities that will be affected by management measures, the analysis should first identify affected fishing communities and then assess their differing levels of dependence on and engagement in the fishery being regulated (50 CFR 600.345)."

Table 4-20 Governance indicators for select Alaska communities substantially engaged in or dependent on the Bering Sea pollock B season fishery

Community	Traditional Community Name and Translation	Borough	Municipal Government (Incorporation Status, Date)	ANCSA Regional Corporation	ANCSA Village Corporation	Federally Recognized Tribe and Tribal Government
Akutan	Achan-ingiiga (Unangan Aleut)	Aleutians East Borough	City of Akutan (2nd Class City, 1979)	Aleut Corporation	Akutan Corporation	Native Village of Akutan
King Cove	Agdaaĝuxˆ	Aleutians East Borough	City of King Cove (1st Class City, 1947)	Aleut Corporation	The King Cove Corporation	Agdaagux Tribe of King Cove, Native Village of Belkofski
Kodiak City	Sun'aq	Kodiak Island Borough	Home Rule City (2nd Class City, 1940)	Koniag, Incorporated	Natives of Kodiak	Sun'aq Tribe of Kodiak[20]
Unalaska	Lluulux (Unangan Aleut)	Unorganized Borough	City of Unalaska (1st Class City, 1942)	Aleut Corporation	Ounalashka Corporation	Qawalangin Tribe of Unalaska

Source: DCDRA open data for Alaska communities; https://dcra-cdo-dcced.opendata.arcgis.com/

4.1.5.1 Akutan

Akutan is located on Akutan Island, one of the Krenitzin Islands of the Fox Island group in the eastern Aleutians. The community is located 35 miles east of Unalaska and 766 miles southwest of Anchorage. Akutan is the traditional site of an Unangan village and has been continually inhabited by the Unangaxˆ for at least 8,000 years (Downs & Henry 2023). Subsistence activities are an important component of the

[19] Source: Observer report data on CP port calls summarized by AKFIN. Analytical staff triangulated the observer port call data with the limited product transfer report data and discussions with industry representatives for the AFA CPs and motherships.

[20] Sun'aq is the federally recognized tribe of the City of Kodiak. There are, however, several other federally recognized tribes throughout the Island/Borough including the Native Village of Afognak, the Native Village of Akhiok, Kaguyak Village, the Native Village of Karluk, the Native Village of Larsen Bay, the Alutiiq Tribe of Old Harbor, Native Village of Ouzinkie, Native Village of Port Lions, Tangirnaq Native Village. More information is available here.

local economy and lifeways for year-round residents who harvest salmon, cod, herring, and other species of fish in the waters near Akutan. In 1878, Akutan became a fur storage and trading port for the Western Fur & Trading Company, which was later bought by the Alaska Commercial Company. In 1912, the Pacific Whaling Company built a whale processing station across the bay from Akutan. Commercial fishing began in the late 1800s, and today Akutan is home to one of the largest shoreside processing plants in the world. Crab fisheries began in 1930 and accelerated in size and scope in the 1950s, when king crab fisheries developed in the Bering Sea. King crab harvests peaked in the 1970s and early 1980s. However, crab harvests and deliveries have declined dramatically in recent years.

Table 4-21 Population and demographic information for Akutan

Akutan Year: 2018 - 2022	
Population	
2018	758
2019	731
2020*	1,589
2021	700
2022	911
Select Demographics	
Male	76.3%
Female	23.7%
White	25.9%
American Indian or Alaska Native	14.8%
Black or African American	16.4%
Asian	17.1%
Native Hawaiian or Pacific Islander	0.0%
Hispanic or Latino	19.0%
Below poverty line	20.2%
High school graduate or higher	39.0%
Population under 5	1.8%
Population over 18	96.6%
Population over 65	5.6%

Source: The American Communities Survey by the U.S. Census Bureau Years: 2018 - 2022.
*Source: 2020 U.S. Census.

There are effectively two distinct community subgroups in Akutan: year-round residents are mostly Unangax̂, and seasonal processing plant employees who live in group quarters. Population estimates for Akutan are often inflated due to the fluctuation in population driven by the commercial fishing industry (Schmidt & Berman 2018). For example, in 2020, the U.S. Census population of 1,589 is roughly twice the population size of recent years' ACS estimates. An estimated 93% of Akutan's population live in group quarters, a dynamic which contributed to social division across Akutan inhabitants.

Akutan was incorporated as a second-class city in 1979 and is located within the Aleutians East Borough. When the CDQ program was implemented in 1992, Akutan like nearby Unalaska, did not meet the fourth qualifying criterion that sates "the community must not have previously developed harvesting and processing capability sufficient to support substantial groundfish fisheries participation in the BSAI…" In 1996, the Akutan Traditional Council, with the support of the Aleutian Pribilof Islands Community Development Association (APICDA), petitioned to become a CDQ community, successfully arguing that there was little opportunity to benefit from the shorebased commercial fishing facilities (Downs & Henry 2023). The Akutan Corporation is the local ANCSA chartered village corporation, the Aleut Corporation is the regional ANCSA corporation, and the Aleutian Pribilof Islands Association are the main Native

associations. Akutan is located in Federal Reporting Area 519, International Pacific Halibut Commission Regulatory Area 4B, and the Aleutian Islands Sablefish Regulatory Area.

Infrastructure and Transportation

Akutan's airport opened in 2012, is located seven miles east on Akun Island, and services the community by helicopter. Originally the airport was linked to the community via hovercraft shuttle service running between Akutan and Akun Islands. Regularly scheduled fixed wing aircraft service to and from Akutan Airport is provided out of Unalaska/Dutch Harbor (Downs & Henry 2023).

The state ferry serves Akutan bimonthly from May to October. Recently, the City of Akutan partnered with the Aleutians East Borough and the Army Corps of Engineers to develop a new harbor. The harbor project will create a 12-acre mooring basin with mooring for up to 57 large fishing vessels. The project underwent public review this past summer (2023). Trident Seafoods owns several commercial docks and processing facilities in Akutan and has recently begun efforts to build a new processing facility in Unalaska which would eventually replace the Akutan facilities.

The community uses water from a stream and dam constructed in 1927, and a community septic tank treats sewage before discharge. Electricity relies on hydropower with diesel backup. Household heating relies on fuel oil and kerosene. There is one public school in Akutan which provides K-12 education. Figure 4-6 below provides a timeseries of school enrollment in Akutan from 2008 through 2023 (a longer timeseries of information on school enrollment can be found in Table 4 of the most recent community profile in Downs & Henry 2023). Over the analyzed period, school enrollment has fluctuated between 7 and 20 students and tends to fluctuate with employment within the fisheries sector. Of continuing concern for the community is the ability to maintain enough student enrollments to qualify for state funding, which requires a minimum of 10 students. A school closure would significantly affect the social fabric of Akutan and reduce access to educational and community resources.

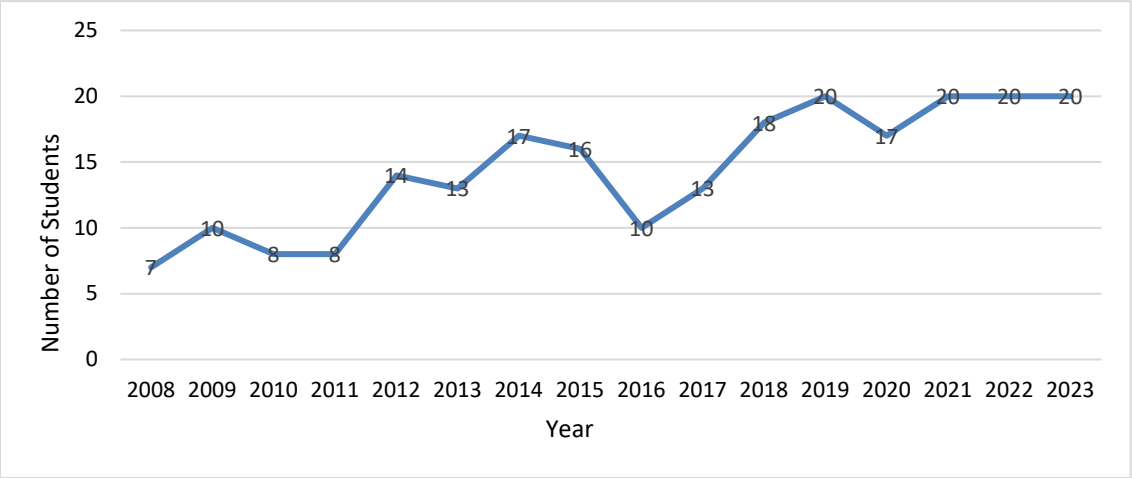


Figure 4-6 Patterns of school enrollment in Akutan, 2008-2023

Local Economy and Links to Commercial and Subsistence Fisheries

Akutan's economy is primarily based on commercial fishing and subsistence harvests. Currently, the Trident Seafoods' Akutan plant is the largest seafood production facility in North America; its processing profile is described in Section 4.1.4.1 and is not repeated here. No vessel that participated in the B season pollock fishery had a registered ownership address in Akutan, and there has been relatively few active vessels with Akutan listed as an ownership or homeport address. The total number of active vessels listed has fluctuated between six and one from 2000 through 2020, see Figure 4 in Downs & Henry (2023).

In terms of support services, Akutan differs sharply from nearby Unalaska in terms of opportunity to provide a base for commercial fisheries. Logistical challenges are presented by steep terrain around the

community. For example, there is no airport that is road accessible from the community and Akutan does not have a boat harbor accessible by road from the community (except for a small skiff moorage facility). In 2019, the only direct fishery support business active in the community in recent years was Pelkey's Dive Service, which was staffed by the two owners plus a couple of helpers on occasion. This operation catered in part to fishing vessels, including changing zincs and clearing fouled propellers, among other services (Downs & Henry 2023).

There are other businesses in Akutan that derive benefits from commercial fisheries in less direct ways. For instance, the Akutan Corporation derives economic benefits from the local processing activities through sales of goods and services to local seafood plant employees at the McGlashan Store, the community general store the corporation owns and operates in the same building that contains the Akutan Post Office and warehousing space. Over the years, Akutan Bay has also been the site of product transfers from at-sea processors to cargo vessels and this activity has resulted in shared state Fishery Resource Landing Tax revenues accruing to the City of Akutan (Downs & Henry 2023). It is staff's understanding that it is not, however, common practice for AFA CPs and motherships to conduct product transfers and offloads in Akutan Bay but rather nearby Unalaska/Dutch Harbor.[21]

Subsistence is vitally important, particularly to the year-round residents, as a source of food, social structure, and cultural identity. Subsistence permits are not required in Akutan and there are no annual harvest assessment programs in place. Subsistence practices remain highly important in Akutan. Although salmon are the most important subsistence species, other harvests include seal, salmon, herring, halibut, clams, wild cattle, and game birds. Earlier research documents a decline in subsistence harvests (see Fall et al 2013); the community ranked highest in the diversity of harvest. In 1990, the average number of species harvested by Akutan households was 20, however in 2008, the number declined to 10 (Fall et al. 2012). By 2018, the figures had fallen further to averages of 8 species harvested (Schmidt & Berman 2018). A 2018 study documented the per-capita harvest by year-round residents in Akutan as 439 pounds, 76% of which was fish (primarily salmon, but also cod and halibut) (Schmidt & Berman 2018). Wild cattle reside on the nearby island of Akun and comprise an estimated 9% of subsistence harvests. Marine mammals make up a smaller portion of harvests in Akutan (with sea lions at 4%).

Salmon harvests fluctuate from year to year depending on availability; however, research suggests that the percentage of subsistence that is salmon has increased in recent decades. Due to Akutan's geography, there are limited beaches from which to harvest salmon. Subsistence fishers tend to fish opportunistically harvesting what is available rather than targeting specific salmon species. While sockeye tend to be most common, chum are reported in small numbers in available subsistence household surveys.

In 2022, the median household income in Akutan was estimated to be $28,750 and the per capita income was $45,054. The percentage of the population living below the poverty line was estimated to be 20.2%.

[21] Personal communication, A. Estabrooks.

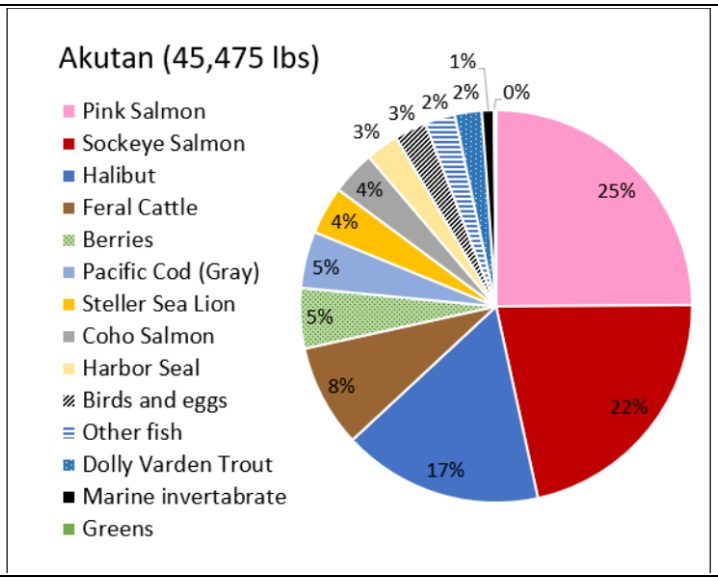


Figure 4-7 Percentages of subsistence harvests based on pounds harvested in Akutan
Source: Schmidt & Berman (2018: 6).

4.1.5.2 King Cove

King Cove is located on the south side of the Alaska Peninsula, 18 miles southeast of Cold Bay and 625 miles southwest of Anchorage. The community is located in the middle of a storm corridor, which often brings extreme fog and high winds. Historically, the Unangax̂, the original inhabitants of the island, harvested salmon, cod, herring, and other species in the area. Unangam tunuu was the language traditionally spoken, but few people speak this language today.[22] The first settlers were Scandinavian. In 1911, Pacific American Fisheries built a salmon cannery which continuously operated until a fire in 1976. The plant was rebuilt and operated by Peter Pan Seafoods. The city of King Cove was incorporated as a first-class city in 1947. Year-round residents are largely Unangan, with a large influx of seasonal workers in March and again in June and July driven by seafood processing employment. King Cove was included under ANCSA and the Regional Corporation is the Aleut Corporation; the ANCSA Village Corporation is the King Cove Corporation.

[22] Information is available from the City of King Cove's website here.

Table 4-22 Population and demographic information for King Cove

King Cove Year: 2018 - 2022	
Population	
2018	1,074
2019	1,147
2020*	757
2021	1,238
2022	1,108
Select Demographics	
Male	58.8%
Female	41.2%
White	12.6%
American Indian or Alaska Native	49.3%
Black or African American	0.3%
Asian	23.0%
Native Hawaiian or Pacific Islander	0%
Hispanic or Latino	7.9%
Below poverty line	12.8%
High school graduate or higher	28.7%
Population under 5	3.3%
Population over 18	81.4%
Population over 65	11.8%

Source: The American Communities Survey by the U.S. Census Bureau Years: 2018 - 2022.
*Source: 2020 U.S. Census.

Infrastructure and Transportation

King Cove is accessible only by air and sea. A state-owned 3,360-foot gravel runway is available for flights. The State Ferry, The M/V *Tustumena* serves the Aleutian Chain, and serves King Cove twice monthly between May and September. The Port of King Cove's small boat harbor can accommodate 50 vessels up to 60' long and has a 150-ton travel lift and grid. The large boat in the Port of King Cove can accommodate 46 vessels up to nearly 150' long. A new harbor and breakwater are under construction by the Corps of Engineers and Aleutians East Borough. Additional federal funds have been allocated to King Cove for a new boat hoist, with the stipulation of finding matching funds. Once completed, a new harbor will be operated by the city and will provide additional moorage for 60′ to 150′ vessels.

All King Cove residents are connected to a central water pipeline supplied by Ram Creek. King Cove is one of the leaders of small-scale renewable energy in rural Alaska, with two hydroelectric facilities on the Delta Creek and Waterfall Creek with a capacity of 1.25MW which is estimated to have reduced the town's consumption of diesel fuel by 72%.[23] The town's landfill is nearing capacity with plans to expand solid waste infrastructure from a USDA grant announced in 2018. There is one local health clinic and one school in King Cove. Figure 4-8 provides the school enrollment for King Cove from 2008 through 2023. As shown, there is interannual variability in the number of enrolled students with a general downward trend over time, although 2023 enrollment (84 students) is higher than 2022 enrollment (77 students). King Cove's population and enrollment has remained somewhat steady, due in part to dwindling populations and school closures in smaller communities nearby (Reedy 2019).

[23] Information is also available at the National Hydropower Association accessed here.

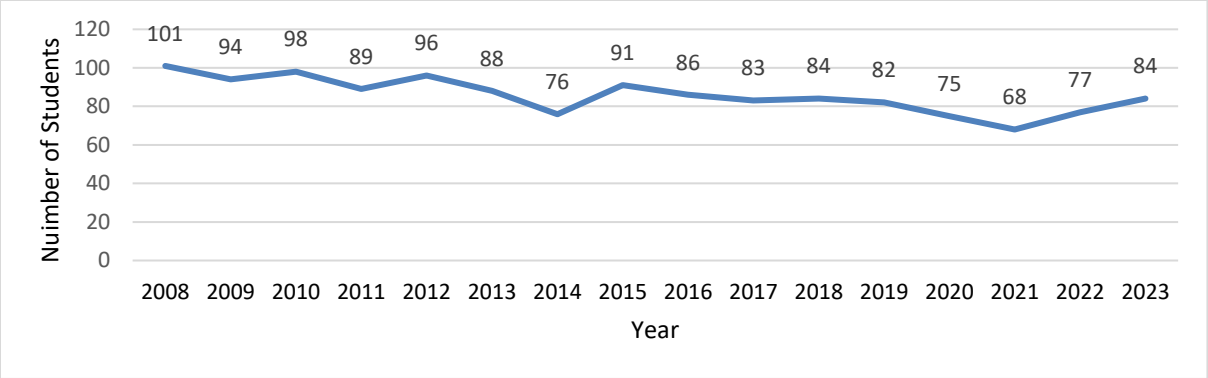


Figure 4-8 School enrollment, King Cove, 2008-2023

Local Economy and Links to Commercial and Subsistence Fisheries

King Cove has long been engaged in commercial salmon and groundfish fisheries and has one shorebased processor has historically operated in the community. Vessels with a registered ownership address in King Cove participate in a wide variety of commercial fisheries including salmon (drift, driftnet, setnet, and Seine), halibut, cod, among others. King Cove residents typically deliver to Peter Pan Seafoods which has historically processed crab, pollock, cod, all five species of salmon, halibut and sablefish from both the Bering Sea and the Gulf of Alaska. Peter Pan Seafoods is set up to serve smaller vessels but take deliveries from larger vessels like those participating in the AFA pollock fishery as well (Reedy 2015).

Similar to Trident's facility in Akutan, workers at the Peter Pan Seafoods plant patron local businesses within the community but generally live apart from the year-round resident population. King Cove has several marine support businesses in pot hauling, pot storage, moorage, boat watchers, and diving/welding. As described in Reedy's (2015) work, the community has two grocery stores, two bars, one restaurant, one hotel, and two taxi services. Peter Pan Seafoods offers fuel services for vessels and the community and maintains a company store and gear supply store. In January 2024, Peter Pan Seafoods announced the closure of the King Cove facility for the 2024 A pollock season, citing tumultuous markets, high interest rates, and financing challenges combined with the high cost of fuel.[24] During peak season, the facility employed nearly 400 people (see Section 4.1.4.1).

Commercial and subsistence fishing are entangled in the lives and livelihoods of King Cove residents and residents of other communities throughout the Aleutian East Borough (Reedy 2009). King Cove has a wide variety of sea and land resources available for subsistence, but species reliance has changed to some degree over time (Reedy 2015). Within King Cove (and other communities like nearby False Pass and Sand Point), a strong relationship between commercial fishing access and subsistence access exists in which subsistence salmon are removed from commercial catches, but numerous other species are also harvested within the context of commercial fishing. Commercial fishermen reported harvesting pinks and chums and drying on their boat to bring back home to eat. Salmon strips were valuable gifts and jarred salmon were used as a high value barter item. The ability to share subsistence harvests was vital to the community (Reedy 2019). Although salmon contributes the largest proportion of total resources used for subsistence, other species are frequently harvested such as cod, king crab, tanner crab, land animals, marine mammals, invertebrates, and plants.[25] The harvesting, processing, sharing and consumption of salmon, especially sockeye, was culturally essential for King Cove residents (Fall et al. 2018).

[24] https://www.seafoodsource.com/news/processing-equipment/peter-pan-closing-seafood-processing-facility-in-king-cove-for-alaska-pollock-a-season
[25] Community Subsistence Information System, ADF&G, King Cove available here

In 2022, the median household income in King Cove was estimated to be $79,844 and per capita income as $40,796. The percentage of the population living below the poverty line was estimated to be 12.8%.

4.1.5.3 Kodiak

Kodiak Island is the largest island in the Gulf of Alaska and is located approximately 25 miles across the Shelikof Straight from the Katmai Coast and 90 miles southwest of the Kenai Peninsula. Kodiak Island has been inhabited for the past 8,000 years by the Alutiiq, or Sugpiaq, people who have a long history harvesting fish, marine invertebrates, and marine mammals for subsistence. A majority of the Alaska Native population living in Kodiak today are Alutiiq. The Alutiiq language is one of the "Esk-Aleut" languages and is closely related to Central Yup'ik.[26]

In the late 1700s, Russians established a fur trading settlement at Chiniak Bay. In 1882 a fish cannery opened in Karluk spit, sparking further investment in commercial salmon fisheries. While the majority of the population of Kodiak Island live in Kodiak City, there are twenty communities dispersed across the island including Akhiok, Port Lions, Larsen Bay, Old Harbor, Karluk and Ouzinkie.[27] Kodiak is located in Federal Statistical and Reporting Area 630, Pacific Halibut Fishery Regulatory Area 3A, and the Central Gulf of Alaska Sablefish Regulatory Area.

[26] See Alutiiq Museum's Archeological Repository available here.
[27] See the DCRA Information Portal for Kodiak Island borough for more information, available here.

Table 4-23 Population and demographic information for Kodiak

Kodiak Island Borough Year: 2018 - 2022	
Population	
2018	13,250
2019	12,998
2020*	5,581
2021	13,218
2022	13,065
Select Demographics	
Male	53.5%
Female	46.5%
White	50.6%
American Indian or Alaska Native	11.4%
Black or African American	0.9%
Asian	22.7%
Native Hawaiian or Pacific Islander	0%
Hispanic or Latino	8.8%
Below poverty line	12.6%
High school graduate or higher	35.4%
Population under 5	6.3%
Population over 18	76.0%
Population over 65	12.3%

Source: The American Communities Survey by the U.S. Census Bureau Years: 2018 - 2022.
*Source: 2020 U.S. Census.

Infrastructure and Transportation

Kodiak Island is accessible by air and sea but accessibility varies drastically among communities and there are limited roadways only on the east side if the island. Kodiak City has two small airports that provide several daily flights. Air taxi services provide flights to five remote villages; however, weather conditions often restrict travel. City-owned seaplane bases at Trident Basin and Lilly Lake accommodate floatplane traffic. The state ferry operates three to four times a week between Kodiak and Homer, and in the summer months, includes other ports as far west as Dutch Harbor. There are two main harbors in Kodiak City: St. Paul Harbor and St. Herman Harbor, which is the larger of the two. Several AFA vessels participating in the B season pollock fishery have permanent stalls and transit dock spaces in the Borough's harbors.[28] Three deep-draft piers accommodate ferries, cruise ships, container ships, military vessels, and a variety of large commercial fishing vessels. Island communities have limited access to medical services and residents must travel to Kodiak City or Anchorage for treatment.

Stable school enrollment is a concern for Kodiak Island Borough communities, which have struggled to keep schools open with declining enrollment in recent years. For example, Larsen Bay School closed in 2018, and Karluk school closed in 2019 due to low enrollment. Total K-12 school enrollment for Kodiak Island Borough has shown a steady decline. The number of Kodiak Island Borough students decreased by 19.3% since 2008, from 2,595 in 2008 to 2,093 in 2023. Compared to the past 5-year average, 2023 enrollment fell by 2.4%. Shrinking school enrollment may suggest a population undergoing transition, and fewer schools mean fewer public services for residents as schools are community hubs that facilitate gathering, knowledge exchange and community support.

[28] Personal communication, J. Bonney.

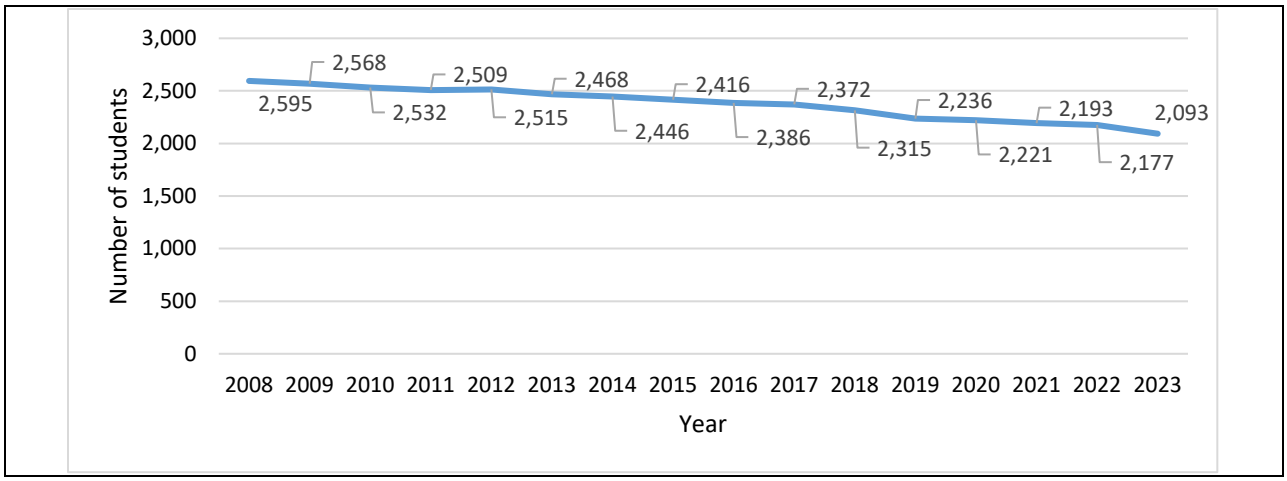


Figure 4-9 Student enrollment, Kodiak Island Borough, 2008-2023

Local Economy and Links to Commercial and Subsistence Fisheries

Commercial fishing, seafood processing, and support services are major industries contributing to the local economy across Kodiak Island Borough. Large-scale commercial fisheries have been established in and around the Kodiak Archipelago for well over a century as the first salmon cannery was built in Karluk in 1882 (Roppel 1986). A recent report by the McDowell Group (2021) notes the seafood industry is the most significant sector in terms of earnings and employment in the Borough, generating approximately 3,200 jobs and $200 million in labor income in 2019. The U.S. Coast Guard station and hospital are also significant local employers. Tourism is a growing sector of the economy which is linked to recreational (or sport) fishing among other activities.

Compared to other communities within Kodiak Island Borough, the majority of commercial vessels list Kodiak City as their registered ownership address and the majority of shorebased processing facilities are also located within Kodiak City, which is Alaska's second largest commercial fishing port (in volume) of seafood landed (Wise et al. 2023). As a fishery dependent community, Kodiak has long seen fluctuations in harvest volumes and values for commercial fisheries in the region. Total volumes of seafood landed in the borough have been subject to resource shocks in the last five years, with a precipitous drop in Pacific cod abundance since 2015, very low pink salmon returns in 2016 and then again in 2018, and challenging dynamics in the pollock market (McDowell 2021). Three major seafood processors have also recently announced plans to sell their plants or temporarily close in 2024 including Trident, Peter Pan Seafoods, and OBI citing turbulent market conditions.

In 2022 and 2023, Kodiak City did not report values for fish-related taxes (both municipal and shared), making fishery-related tax data unavailable. Data related to port/dock usage fees are also not available, but these revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and wellbeing. In 2022, the estimated median household income for the Kodiak Island Borough was $91,138 and per capita income was estimated as $39,563. The percent of the population living below the poverty level was estimated to be 8% in 2022.

Subsistence harvests of wild food plays an important role in terms of food security, wellbeing, and cultural identity for many residents across Kodiak Island. As discussed elsewhere throughout this SIA, harvesting, sharing, and consuming wild foods gathered through subsistence practices strengthens social networks and community ties. Salmon plays a critical role in the subsistence economy for Kodiak Island residents. In 2020, which is the most recent year for which complete subsistence harvest data are publicly available, Kodiak Area residents harvested 20,081 salmon. Of these salmon, ADF&G Division of Subsistence estimated 111 were Chinook salmon, 16,295 were sockeye, 2,789 were coho, 150 were chum, and 736 were pink (see Table 10-1 in Brown et al. 2023). In Kodiak, as with King Cove, commercial fishing plays an important role in supporting mixed subsistence economies where residents who fish

commercially often retain salmon, crab, herring, and other resources for subsistence or personal uses (Brown et al. 2023).[29]

4.1.5.4 Newport

Newport is a community in Lincoln County, Oregon located on both north and south sides of Yaquina Bay near the Yaquina River's entrance to the Pacific Ocean. The nearest major metropolitan area is Portland, 136 miles to the northeast. For over 3000 years, the Yaqo'n people inhabited the coastal area, relying on marine and freshwater resources and developing complex social networks across the land and waterways. Miners arrived in the 1850s to search for gold in the Yaquina River Valley. In the mid-1800s, an oyster market developed to feed minors during the San Francisco goldrush, and settlers developed a town in 1866. Economic activity grew around oysters, seafood, and timber. The abundance of salmon led to commercial canneries along the waterfront. In the early 1870s, two lighthouses were built to support the increasing shipping activity in the region. Newport was incorporated as a city in 1882. With the arrival of the railroad, tourism in the area increased. Since Newport was first settled, fishing tourism, and logging have continued to define the community.

In 2020, the U.S., Census determined Newport had a population of 10,319. Over the past five years, Newport's population increased by 16%. Of the community's potential labor force 16 years and older, 47.7% were employed (4.5% of that were in the agriculture, forestry, fishing and hunting, and mining sector), and the median household income is $57,511. The poverty rate in Newport is 15.5%, slightly higher than the 12.1% for all of Oregon. In 2020, 95.8% of the residents had high school or higher levels of education.

Table 4-24 Population and demographic information for Newport

Newport Year: 2018 - 2022	
Population	
2018	10,381
2019	10,559
2020*	10,256
2021	10,305
2022	10,319
Select Demographics	
Male	48.1%
Female	51.9%
White	79.9%
American Indian or Alaska Native	0.5%
Black or African American	0.9%
Asian	1.7%
Native Hawaiian or Pacific Islander	0%
Hispanic or Latino	16.0%
Below poverty line	15.5%
High school graduate or higher	40.3%
Population under 5	3.8%
Population over 18	83.6%
Population over 65	28.7%

Source: The American Communities Survey by the U.S. Census Bureau Years: 2018 - 2022.
*Source: 2020 U.S. Census Data.

[29] Personal use fishing is similar to subsistence fishing, except that it is fishing with efficient gear for food in nonsubsistence areas, particularly by residents of urbanized areas, or fishing for stocks without customary and traditional uses (Fall 2018).

There are 18 schools in Newport, with a total enrollment of 5,122 students in 2023. The number of students dropped substantially during the Covid-19 pandemic and have still not recovered from pre-pandemic enrollment.

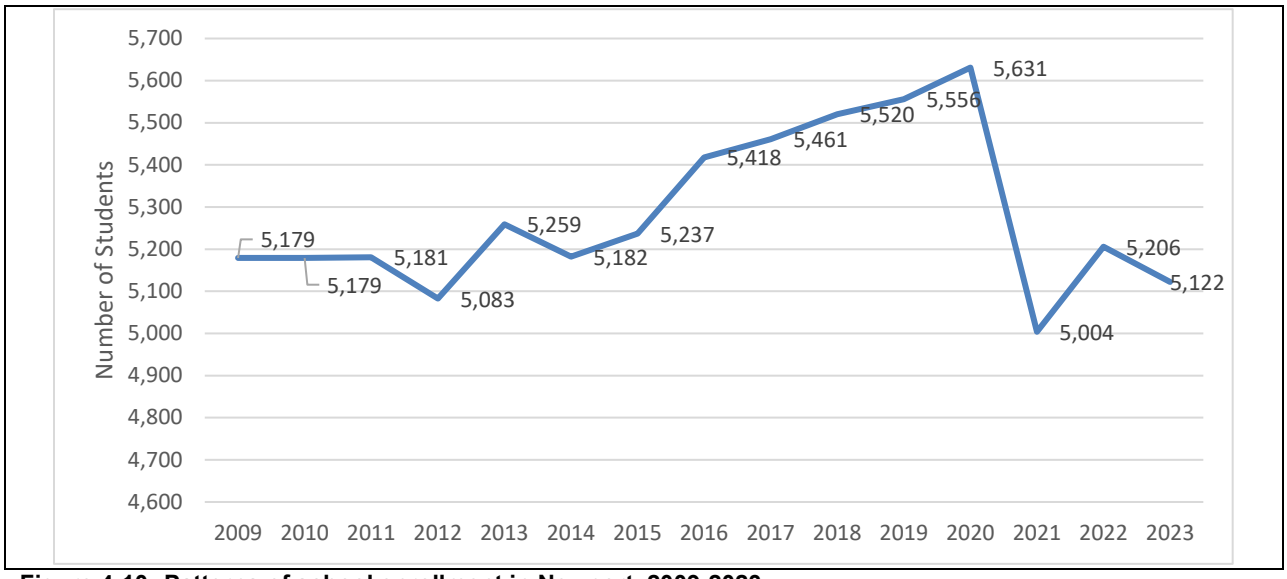


Figure 4-10 Patterns of school enrollment in Newport, 2009-2023

Infrastructure and Transportation

Prior to the construction of two jetties that would become Newport's Port in 1923, vessels would remain offshore due to the shallow and unpredictable bay entrance. With the availability of electricity, Newport's Bayfront expanded substantially to accommodate the growing seafood and lumber industries. In the early 1980s, with fishing and lumber industry flagging, town leaders developed a community revitalization plan that centered on Newport as a resort destination and marine science research center. The city expanded Oregon State University's Hatfield Marine Science Center and built the Oregon Coast Aquarium. Today the Marine Science Center is home to several federal agencies, including the National Oceanic and Atmospheric Administration, the Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and the Environmental Protection Agency (Norman et al. 2007).

The Port of Newport owns property and harbor facilities on both sides of the Bay that includes a shipping dock, 200 slip commercial vessel marina, 500 slip recreational vessel marina, four lane launch ramp, commercial fish offloading dock, and a waterborne commerce shipping dock. There are other private marinas located within the city and upriver (the Research Group, LLC 2021).

Local Economy and Links to Commercial and Subsistence Fisheries

Newport has a large commercial fleet comprised of vessels that prosecute local fisheries as well as a distant water fleet that fishes in Alaska. The Newport Area is a regional support center for a very active commercial and marine recreational fishing industry and there is a lot of harvesting, processing, supply, research, education, management, enforcement, among other activities. Newport Area specific fisheries trends have ups and downs, but the consistency in industry activity overall has allowed related businesses (repair, provisioning, gear manufacturing, etc.) to develop. Related fishery support businesses include gear manufacturing, financial services, supply services, and new boat building (the Research Group, LLC 2021). As described in Package and Conway's (2010) work developing a community profile for Newport, many fishermen make this community their destination because of the fishing support services offered.

Commercial fishing is important to the residents of Newport in terms of employment, generating economic activity, and as a source of personal, familial, and community identity. As described by interviewees from Newport in Package and Conway's work, "fishing is this community. If fishing doesn't

exist, there is no Newport." Newport's commercial fleet participates in a range of fisheries including salmon, halibut, crab, tuna, shrimp, Dungeness crab, flounder, sole, rockfish, lingcod, and pollock. Newport and Conway (2010) estimated there were 450-500 local fishermen in the community which does not including those engaged in the distant water fleet.

Seafood processing is a major source of food manufacturing in Lincoln County, but the Covid-19 pandemic affected Newport's seafood industry, particularly the processing sector and drove multiple plant closures. According to the 2007 community profile research (Norman et al. 2007), Newport had four processing plants that employed at least 217 people in 2000. An estimated 11,502,760 pounds of fish and seafood were processed at a value of $18,589,837. A top product processed was Dungeness crab with an estimated 1,546,722 pounds at a value of $5,600,209. Other important products were sablefish, shrimp, Pacific hake, rockfish, and sole. In 2022, only two seafood processors remain, and data is limited due to confidentiality concerns.

Many local community members engage in subsistence fishing. Members of the Siletz Tribe may engage in cultural fishing in Euchre Creek Falls, Dewey Creek Falls, and at a site in Rock Creek. Under the trust doctrine, the federal government is charged to protect tribal resources and by constitutional mandate to protect natural resources. The government-to-government agreements made between tribal groups and the United States through treaties guarantee fishing rights on traditional grounds. Specific information on subsistence fishing in Newport is not discussed in greater detail due to the lack of available data (Normal et al. 2007).

4.1.5.5 Seattle City

Located in Washington State in the Pacific Northwest, the City of Seattle lies between the Olympic and Cascade Mountain ranges along the Puget Sound. The city is built on the traditional territory of coastal Salish peoples, specifically the Suquamish and Duwamish Tribes. The area has been continuously inhabited for thousands of years with expansive trade networks. Settlers were attracted to the area for the rich natural resources and deep-water access. In 1851, a town site was established and quickly grew driven primarily by the lumber and coal industries. Railways and shipping routes used Seattle as a trade hub supporting Seattle's burgeoning growth. Commercial fisheries grew in the area and the harbor became the gateway to Alaska with growing commercial and shipbuilding industries.

Table 4-25 provides population and demographic information for Seattle City. In 2020, the U.S. Census determined Seattle's population was 737,015, an increase of 30% since 2010 (563,374). While not shown quantitatively in Table 4-25, the 2022 ACS estimated the working age population of Seattle City to be approximately 659,675 persons of whom 467,509 (71%) were employed.

Table 4-25 Population and demographic information for Seattle City

Seattle City Year: 2018 - 2022	
Population	
2018	744,949
2019	753,655
2020*	737,015
2021	733,904
2022	749,267
Select Demographics	
Male	50.8%
Female	49.2%
White	60.9%
American Indian or Alaska Native	0.6%
Black or African American	5.8%
Asian	18.1%
Native Hawaiian or Pacific Islander	0.2%
Hispanic or Latino	8.4%
Below poverty line	10.1%
High school graduate or higher	2.0%
Population under 5	3.7%
Population over 18	86.7%
Population over 65	13.8%

Source: The American Communities Survey by the US Census Bureau Years: 2018 - 2022.
*Source: 2020 U.S. Census Data.

Infrastructure and Transportation

Seattle is accessible by ground, sea, and air. The city is located on Interstate 5 with Interstate 90 and Washington Highway 520 connecting to the city from the east. Seattle has an Amtrak station offering national and international service. Seattle-Tacoma International Airport is 14 miles south of downtown. State Ferries offers service from Pier 50 and Pier 52 in Seattle to Bremerton, Bainbridge Island, and Vashon Island. There is international service to Victoria, British Columbia.

The Port of Seattle owns and operates three facilities that serve as core assets for the regional fishing industry: the Fishermen's Terminal, the Maritime Industrial Center, and Terminal 91. The Puget Sound Fisheries Association Committee founded Fisherman's Terminal in 1913. Fishermen's Terminal is home to a significant portion of North Pacific fishing fleet that engages in the Bering Sea pollock fishery, Alaska crab, salmon, and other groundfish fisheries. In 2017, more than 300 fishing vessels utilized the Port of Seattle facilities; of these vessels, 226 (or 75%) were identified as actively fishing in Alaska's fisheries (Port of Seattle 2019). Between the 1960s–1980s, there was a boom in Alaska fisheries as commercial harvests decreased in other locations. Many commercial fishermen from other areas ventured into Alaskan waters for a variety of reasons. Oral history research on Alaska fishermen residing in the broader Pacific Northwest identified factors that brought them to Alaska which included established relationships and social networks, expanded opportunities, sense of adventure, and economic possibilities (Package-Ward & Himes Cornell 2014).

The Port of Seattle is the fifth largest container facility in the U.S. and the 20th largest in the world; the port also ranks as the top U.S. port in container tonnage exports to Asia. Pier 90 and Pier 91 contain six berths each and provide moorage for barges and factory trawlers, in addition to the transportation of foodstuffs. Commercial moorage also is available at the Bell Street Pier, Maritime Industrial Center, Terminal 30, and Fishermen's Terminal. Fishermen's Terminal on the Lake Washington Ship Canal

includes moorage for more than 700 workboats and commercial fishing vessels, lineal moorage of 2,500 feet, and 371 stalls. As described above, Fishermen's Terminal has historically been the home to a large portion of the North Pacific commercial fishing fleet (Norman et al. 2007).

Local Economy and Links to Commercial and Subsistence Fisheries

Seattle has long experienced "boom" industries leading to rapid and fluctuating economic growth. The 2022 ACS shows the majority of the employed population 16 years or older are engaged in professional, scientific, and management positions (110,496 persons), followed by educational, health care, and social services (101,340 persons). Approximately 1,600 persons (or .03%) of the employed population are in natural resource jobs including agriculture, forestry, fishing, and hunting employed a small percentage of the population, but this percentage may be artificially low given that many fishermen are self-employed and are underrepresented in these data.

According to a survey conducted by the Port of Seattle in 2017, the Seattle commercial fishing industry generated more than $455 million in gross first wholesale revenues from Alaska's fisheries and an additional $26.6 million in revenues were earned in fisheries outside of Alaska (i.e., Puget Sound and Washington's West Coast) (Port of Seattle 2019). Additionally, based on this 2017 survey, an estimated 7,200 jobs across all fisheries and sectors were associated with commercial fishing at the Port of Seattle which included 5,100 jobs on fishing vessels, the majority of which (4,900 jobs) operated in Alaska fisheries (Port of Seattle 2019).

Tribal and nontribal community members may be engaged in subsistence fishing in the Seattle area, however little information is available. The Muckleshoot Tribe, located southeast of Seattle, in partnership with the Washington Department of Fish and Wildlife is involved with a sockeye salmon counting program on Lake Washington (Norman et al. 2007).

4.1.5.6 Unalaska/Dutch Harbor

Unalaska overlooks Iliuliuk Bay and Dutch Harbor on Unalaska Island in the Aleutian Chain. The area has been inhabited for thousands of years by the Unangax̂ (APIA 2019). When commerce with Russian fur traders began in 1759, more than 3,000 Unangax̂ lived in 24 settlements on Unalaska and Amaknak Islands. In 1787, the Russian American Company enslaved and relocated many Unangan families to the Pribilof Islands to work the fur seal harvest for the fur trade. By the late 1800s, the fur trade diminished, and Russian fur traders abandoned the area.

Dutch Harbor grew as a coaling station, fueling ships to service the fishing, fur trade, and gold mining. The City of Unalaska was incorporated as a 1st class city in March 1942. In the early 20th century, seafood processing of salmon, herring, and cod was established. By the 1940s, the military presence in the region overshadowed commercial fishing, and Dutch Harbor was mostly repurposed as a naval port. After World War II, halibut, salmon, and king crab fisheries began in the 1960s, bringing an economic boom in the 1970s. When king crab stocks collapsed in the early 1980s, Unalaska began to transition to groundfish fisheries. Today, Unalaska's International Port of Dutch Harbor is the one of the busiest commercial fishing ports in the nation.

Unalaska is a demographically complex with two distinct community subgroups: those who live year-round in the village of Unalaska, and seasonal employees who primarily live in group quarters mainly servicing the seafood processing sector (Downs & Henry 2023). Unalaska's population reaches its annual peak between January and April each year (during the pollock A season). According to the 2020 Census, 2,577 people (60.6% of the total population) lived in group housing (primarily associated with the seafood processing sector. Unalaska was included under ANCSA. The active Native Corporations are the Ounalashka Corporation and Aleut Corporation. The Qawalangin Tribe of Unalaska is the federally recognized tribal government in the community. The area is included in Federal Statistical and Reporting Area 610, Pacific Halibut Fishery Regulatory Area 4A, and the Western Gulf of Alaska Sablefish Regulatory Area. Unalaska is in House District 37, Senate District S.

Table 4-26 Population and demographic information for Unalaska

Unalaska Year: 2018 - 2022	
Population	
2018	4,781
2019	4,724
2020*	4,254
2021	4,339
2022	4,342
Select Demographics	
Male	65.4%
Female	34.6%
White	24.9%
American Indian or Alaska Native	2.4%
Black or African American	3.7%
Asian	47.4%
Native Hawaiian or Pacific Islander	4.2%
Hispanic or Latino	12.6%
Below poverty line	8.0%
High school graduate or higher	40.0%
Population under 5	4.4%
Population over 18	82.9%
Population over 65	5.7%

Source: The American Communities Survey by the U.S. Census Bureau Years: 2018 - 2022.
*Source: 2020 U.S. Census Data

Infrastructure and Transportation

Unalaska is serviced by daily scheduled flights from Anchorage. The Alaska Marine Ferry, *M.V. Tustumena*, stops once a month in Unalaska between early June and early September. There are six marine facilities in Unalaska, which include 10 docks, three of which are operated by the city. Dutch Harbor has 5,200 ft. of moorage and 1,232 ft. of floating dock, accommodating vessels up to 200 feet, and 238 moorage slips. The Unalaska Marine Center and U.S. Coast Guard Dock offer cargo, passenger, and other port services. All homes and onshore fish processors are served by the city's piped water system and shorebased processors generate their own electrical power.

Unalaska is home to the westernmost container terminal in the United States, acting as an international hub for cargo transshipment. Two rail cranes are located in Unalaska, one at the marine center and one at a privately owned commercial dock. Unalaska's business community provides a range of support services including accounting and bookkeeping, banking, cold storage, construction and engineering, diesel sales and service, electrical service and marine electronics, equipment and gear, hydraulic services, logistical support, marine pilots and tugs, trucking, vehicle rental, vessel repair, warehousing, among others (Downs & Henry 2023).

There is one elementary school and one high school in Unalaska with a total enrollment of 354 students in 2023, up from 342 in 2022. However, the 2023 enrollment is 7% less than the previous 5-year average (inclusive of those years most affected by the Covid-19 pandemic).

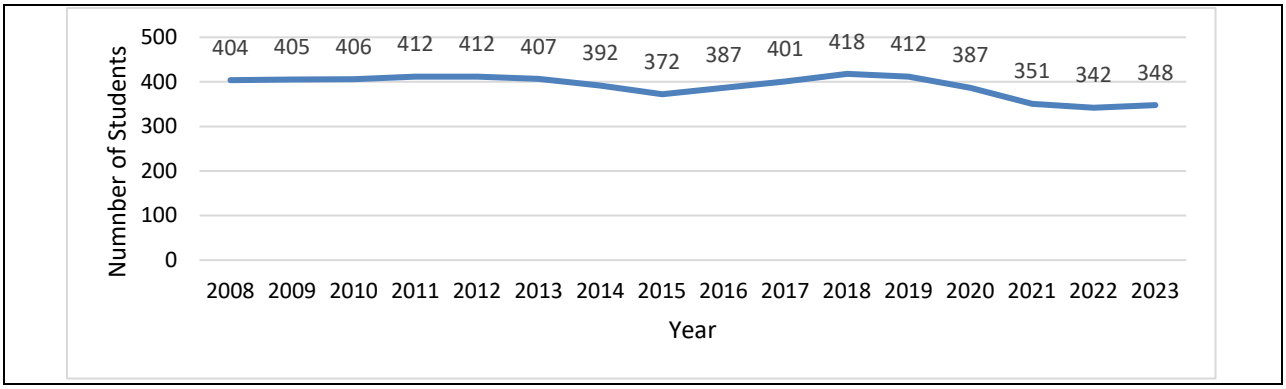


Figure 4-11 School enrollment for Unalaska, 2008-2023

Local Economy and Links to Commercial and Subsistence Fisheries

Unalaska's primary economy is based on commercial fishing, seafood processing, and fleet services. Unalaska has been highly engaged in commercial fisheries for decades beginning with the king crab boom in the late 1970s. Processors grew as increasing numbers of commercial vessels landed crab in Unalaska. As crab fisheries declined in later years, Unalaska expanded into other fisheries including Bering Sea pollock. Of the vessels harvesting or processing B season pollock, Dutch Harbor is listed as the registered ownership address of two motherships during the analyzed period from 2011 through 2022. No CVs that participated in the B season fishery from 2011 through 2022 listed Unalaska/Dutch Harbor as their registered ownership address.

The residential fleet is comparatively smaller than other fishing communities and are engaged to varying degrees in the fixed gear groundfish, IFQ halibut, IFQ sablefish, salmon, and local crab fisheries on a relatively small scale. Pacific cod has been a major driver of local groundfish efforts for local Unalaska vessels.[30] A frequently noted problem in developing markets and long-term relationships with the larger processing entities in the community, however, is that the locally based fleet consists of vessels that are small by Bering Sea standards. In practical terms this means that they are more weather dependent than larger vessels and have a smaller delivery capacity per trip. These factors make it more challenging for larger plants to accommodate what are, by necessity, relatively small and (in most cases) sporadic deliveries (Downs & Henry 2023).

Within the community, the shorebased processing component is a primary economic driver, although most of the fish landed in Unalaska is delivered by vessels outside of the community. In the past, the City of Unalaska would report the top ten employers in the community, but changes in federal law subsequently precluded that practice. In 2009, the last year for which data are available on the top ten employers in the community, UniSea, Westward, and Alyeska seafood processors were the top three employers in Unalaska; the City of Unalaska and the Unalaska City School District were ranked as the fourth and seventh largest employers, respectively; and two stevedoring companies (Pacific Stevedoring and Dutch Harbor Services), a shipping company (American President Lines), and a fuel provider (North Pacific Fuel), all of which are largely if not nearly exclusively reliant on fisheries related customers for their Unalaska operations, were ranked fifth, ninth, sixth, and tenth respectively. The remaining top ten

[30] The local small vessel fleet, among them vessels ranging from 18 to 68 feet in length, is represented by the Unalaska Native Fisherman's Association (UNFA). While UNFA, according to tribal leadership, has a close working relationship with the Qawalangin Tribe of Unalaska, membership in UNFA is not limited to those residents of Alaska Native descent. There is, however, a requirement that members must live in the community eight months per year and the association does maintain a majority of Alaska Native board members to retain access to existing funding sources. Active membership in UNFA varies widely from year to year based on current fishery issues. With the financial support of APICDA that includes underwriting travel expenses, UNFA represents the interests of Unalaska small boat fishermen before the North Pacific Fishery Management Council by sending local representatives to attend relevant meetings (Downs & Henry 2023).

employer, a general store (Safeway/Eagle Quality Center) has a more diversified customer base than the shipping and fuel supply related firms in the top ten, but nonetheless derives a substantial amount of their revenue from fishing related customers, according to interviews with senior store management (Downs & Henry 2023).

Beyond employment, fishing and fishing support define a substantial portion of the identity of the community, and fishing-related issues extend into many other areas of community life. An example of the engagement of the community with the direct and fisheries support sectors and vice versa may be seen in the individuals who have filled city council and mayoral positions in recent years, several of whom have been current or former fishermen or current or former employees of processing firms or support service businesses heavily reliant on the fishing industry (Downs & Henry 2023).

Subsistence has long been, and continues to be, highly important to most of Unalaska's permanent residents. Historically, local Unangan families relied heavily on marine mammals, especially Stellar sea lion and seals, with sea lion being a very important traditional food that is still widely shared (Unger 2014). Seal oil is also an important traditional food. Salmon have been an important resource for Unalaskans for thousands of years and are the most important shared resources among households. The primary salmon species used locally for subsistence is sockeye salmon. The Unangan traditionally used weirs and traps to harvest salmon as they arrived in the Makushin, Nateekin, Wislow, and Kashega rivers. Pink salmon are the most abundant salmon run on the island but are less sought after for subsistence uses. Coho salmon run from August through October, and a small number of chum salmon come in with coho. Chinook salmon do not return to any local streams but are available in marine waters during the winter (Keating et al., 2022). Pacific halibut and cod are the primary nonsalmon fish used for subsistence by Unalaskans. Reedy and Maschner (2014: 376) reported that "wild cod is perhaps the most traditionally used fish in the 10,000-year history of the Aleut [Unangan], and a fish that is critical to all modern communities."

Unalaskans obtain many subsistence foods not just by harvesting on their own but also through sharing, customary trading, and bartering within extensive local and regional social networks (Reedy 2016). Unalaskans who participate in commercial fishing also retain portions of their commercial catches for home use (referred to as "home pack"). In the past it was common for some households to obtain significant amounts of crab for household use through home pack, "Cementing crab as a critical subsistence resource and part of the social economy [and] also the status and social capital of the providers" (Reedy and Maschner 2014: 375). While residents continue to harvest crab under subsistence regulations, recent closures have likely significantly reduced opportunities for locals to participate in the industry as crew and reduced home pack crab resources (Keating et al. 2022).

4.1.6 Estimating Fishery Tax Revenue from Bering Sea Pollock

A relatively straightforward economic benefit to the State of Alaska and communities engaged in the the Bering Sea pollock fishery are the revenues derived from taxes levied on this fishery. The following section provides estimates of the fishery-related tax revenues associated with the B season pollock fishery within the bounds of confidentiality restrictions.[31]

The State of Alaska levies two fishery resource taxes and shares a portion of these tax revenues with qualified local governments in Alaska. The State's **Fisheries Business Tax (FBT)** is typically paid by the first processor of fish, or the exporter of unprocessed fish, on the raw fish landed in the state. The current tax rates are 3% for fishery resources processed at shoreside plants and 5% for those processed at floating

[31] The Alaska community of Kodiak was excluded from this portion of the analysis because a) there is no AFA qualified processing plant in the community of Kodiak, and b) it is not a common practice for CPs to offload or transfer Bering Sea pollock products processed at-sea in Kodiak (personal communication, J. Bonney). As such, it is not anticipated the City of Kodiak, or the Kodiak Island Borough, would generate a significant amount of fishery-related tax revenue from the Bering Sea pollock fishery.

processors. The State's **Fishery Resource Landing Tax (FRLT)** is levied at a 3% rate on fishery resources that are processed outside the 3-mile limit but, within the U.S. EEZ, and first landed in Alaska.[32] This tax is levied whether the product is destined for local consumption or shipment abroad. Under Alaska Statute (AS) 43.77, CPs and motherships are required to pay this tax at a rate that is equivalent to rates paid by catcher vessels and shore-based processors under the FBT (AS 43.75).

To understand the relative proportion of shared fishery tax revenues the potentially affected Alaska communities earned directly from fisheries, staff collected the Shared Taxes and Fees Annual Reports from the Alaska Department of Revenue (DOR) for fiscal years (FY) 2011 through 2022. These reports provide an overview of the shared tax and fee programs administered by the DOR, and they provide the current and historical amounts shared to the municipalities in Alaska.[33] Table 4-27 provides the annual average amount ($) and percentage contribution of shared FBT revenue and shared FRLT revenue in select Alaska communities that participated in the B season pollock fishery compared to all other Alaska communities. It also conveys the relative magnitude of earnings from the two shared fishery taxes which are levied on different operating entities (i.e., those tax revenues associated with shorebased processing and those associated with CP product transfers). However, it is important to note that this data from the DOR does NOT provide fishery-specific tax revenue information. Thus, the revenues reported from the FBT and FRLT are based on all fish processing activities occurring in the community or all product transfers occurring in the community.

[32] Additionally, section 210(f) of the AFA requires a fishery cooperative to execute a contract with each cooperative member that obligates the member to make a payment to the state for pollock harvested in the Alaska pollock fishery that is not landed in Alaska. The required payment is equal to the amount that would have been due under the state landing tax had the product been landed in Alaska. AS 4377.015 requires that these payments be treated as if they are landing taxes, thereby imposing a filing and payment requirement and otherwise provides that the shared tax provisions apply to the payments.

[33] Other shared taxes and fees include Aviation Motor Fuel, Commercial Passenger Vessel, Electric Cooperative, Telephone Cooperative, and Liquor License.

Table 4-27 Alaska Department of Revenue shared fishery tax revenue amounts by Borough and City for Alaska communities substantially engaged in or dependent on Bering Sea Pollock, FY 2011 through 2022

Borough or City	Annual Average Shared Revenue from FBT and FRLT Combined	Fisheries Business Tax (FBT) Shared Revenue		Fishery Resource Landing Tax (FRLT) Shared Revenue	
		Annual Average Shared FBT revenue	FBT as Percent of FBT + FRLT (Annual Average)	Annual Average Shared FRLT Revenue	FRLT Revenue as Percent of FBT + FRLT (Annual Average)
Aleutians East Borough	$1,928,175	$1,906,524	98.9%	$21,651	1.1%
City of Akutan	$982,092	$973,749	99.2%	$8,343	0.8%
City of King Cove	$468,133	$468,133	100.0%	$ -	0.0%
City of Unalaska	$8,514,404	$3,765,948	44.2%	$4,748,455	55.8%
Subtotal	**$11,892,804**	**$7,114,354**	**59.8%**	**$4,778,449**	**40.2%**
All other AK Communities	$15,777,730	$15,497,048	98.2%	$281,960	1.8%
Grand Total	**$27,670,534**	**$22,611,402**	**81.7%**	**$5,059,132**	**18.3%**

Source: Alaska Department of Revenue, FY 2011-2022 Shared Taxes and Fees Annual Reports. https://tax.alaska.gov/programs/sourcebook/index.aspx. Accessed 11/28/2023; TF Shared Taxes DOR.

As shown in Table 4-27, the majority of shared tax revenues for the Cities of Akutan and King Cove, as well as the Aleutians East Borough, are derived from the FBT (associated with shorebased processing); no FRLT revenues are reported during the analyzed period for the City of King Cove. Unalaska is unique in scale among all Alaska communities when comparing the proportion of revenues earned from the FBT to the FRLT because the city derives substantial public revenue benefits from both taxes. On average, the community earned $4.7 million in revenues from the FRLT, accounting for 55.8% of the community's combined shared fishery tax revenues. CPs deliver products processed at-sea for immediate shipping or placement into cold storage and subsequent shipping in Unalaska.

Because the FBT and FRLT information provided by the State are not fishery-specific, staff have prepared estimates of the FBT and FRLT levied on Bering Sea pollock within the bounds of confidentiality restrictions. The first step was to derive the "estimated taxable value" of the fishery. These values were provided by AKFIN and are based on the value of unprocessed landings (the ex-vessel price for inshore deliveries). The State determines the unprocessed value for CP production by multiplying a statewide average price per pound of unprocessed fish (derived from ADF&G data) by the unprocessed weight. Next, a 3% tax rate representing the FBT was applied to the estimated taxable value of Bering Sea pollock from inshore cooperatives and the inshore open access fishery in applicable years. A 3% tax rate representing the FRLT was applied to the estimated taxable value of Bering Sea pollock for the CDQ, CP, and mothership sectors. As described previously, CDQ pollock has historically been harvested by AFA affiliated CPs except for 2016 when one mothership CV harvested a relatively small amount of CDQ pollock.

Estimates of the FBT and FRLT levied on Bering Sea pollock (A and B seasons) from 2011-2022 are provided in Figure 4-12. The total FBT liability ranged between $6.24 million (2017) and $7.18 million (2012), and total FRLT liability ranged between $7.94 million (2016) and $9.37 million (2012). Combined, total state tax liability ranged between $13.99 million (2017) and $16.87 million (2012).

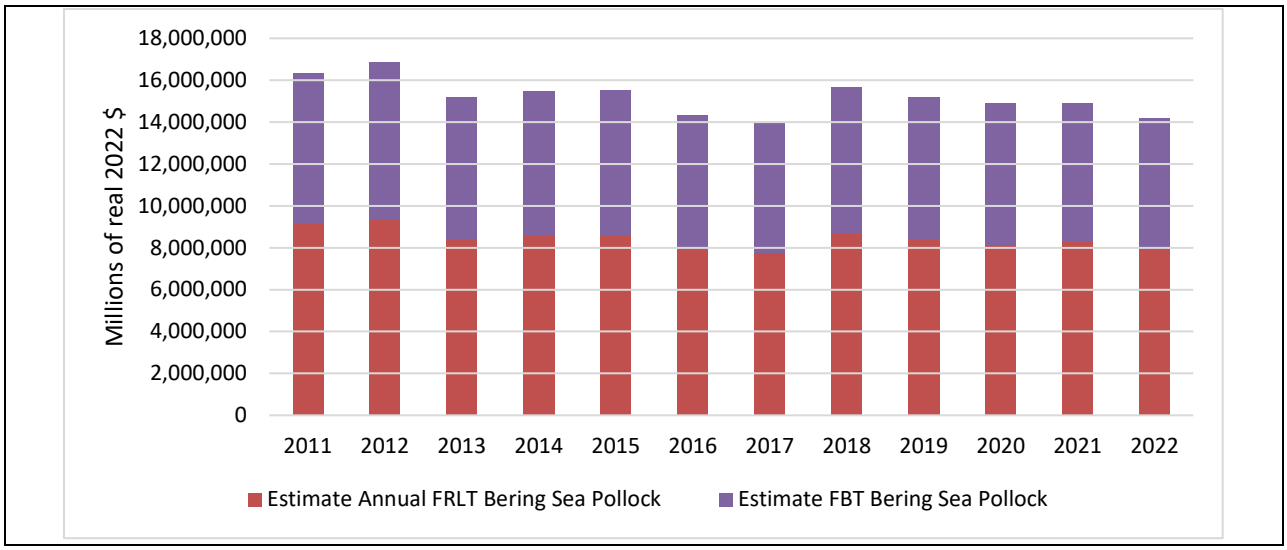


Figure 4-12 Estimate of Fishery Resource Landing Tax and Fisheries Business Tax for A and B season harvests and deliveries of AFA and CDQ pollock, 2011 through 2022

Source: AKFIN.

The same procedure was used to determine the FBT and FRLT levied on B season pollock (2011-2022). Estimates of the State's FBT and FRLT resulting from Bering Sea pollock during the B season fishery only from 2011 through 2022 are provided Figure 4-13. Total FBT liability ranged between $3.53 million (2022) to $4.47 million (2012). Total FRLT liability ranged between $4.25 million (2020) to $5.50 million (2012).

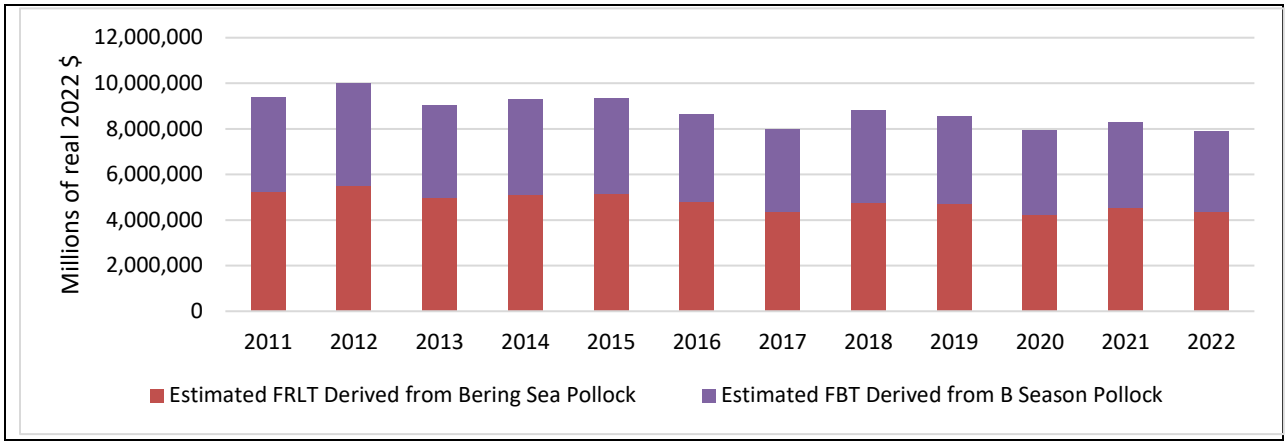


Figure 4-13 Estimate of Fishery Resource Landing Tax and Fisheries Business Tax for B season harvests of AFA and CDQ pollock, 2011 through 2022

Source: AKFIN.

Incorporated cities and organized boroughs may also levy their own local taxes on the unprocessed value of fishery resource landings made in the relevant jurisdiction. The municipalities in which an AFA inshore processor is located and accepted B season deliveries during the analyzed period include the Cities of Unalaska/Dutch Harbor (2%), King Cove (2%), and Akutan (1.0% in 2011-2012 and 1.5% from 2013-2022). The Aleutians East Borough, in which Akutan and King Cove are located, also levies a local fish tax of 2%.

Figure 4-14 shows the estimated revenues generated from State *and* local taxes levied on B season pollock (2011-2022). As shown, the total estimated State and local taxes levied on B season pollock from 2011 through 2022 are estimated between $10.76 million (2017) and $13.20 million (2012).

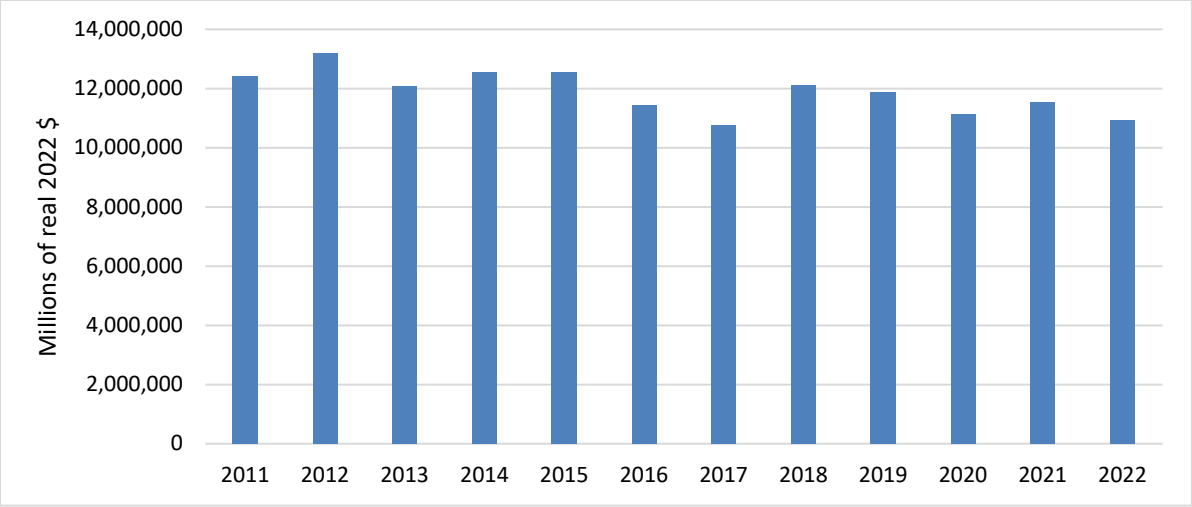


Figure 4-14 Total estimated State and local tax revenues (FBT, FRLT, and City Raw Seafood) for B Season Bering Sea pollock, 2011 through 2022 (millions of 2022 real $)

Source: AKFIN.

The Alaska DOR deposits all revenue from the FBT and the FRLT into the State's General Fund, and 50% of those shared revenues are subject to revenue sharing with local governments in the following way:

1. If the landings occur in an incorporated city within an organized borough, the 50% shareable amount is divided between the city and the borough.
2. If the landings occur outside of an incorporated city but still within an organized borough, the entire 50% shareable amount accrues to the borough.
3. If the landings occur in an incorporated city within an unorganized borough, the 50% shareable amount accrues to the city.
4. If the landings occur in neither an incorporated city nor an organized borough, the 50% shareable amount is distributed through an allocation program administered by the Alaska Department of Commerce, Community, and Economic Development (DCCED).[34]

The following procedure was applied to calculate estimates for the total State and local taxes levied on the B season pollock fishery by community for those shorebased processors that partner with an AFA inshore cooperative as well as for the CDQ, CP, and mothership sectors:

- For those inshore cooperatives partnered with shorebased processors in **Unalaska/Dutch Harbor**, a 5% tax rate was applied to the estimated taxable value of B season pollock. The 5% tax rate is the sum of the State's 3% FBT and the City's 2% Raw Seafood Tax. Unalaska is an incorporated city in an unorganized borough. Of this amount, 3.5% is accrued to the City of Unalaska and 1.5% to the State.[35]

[34] DCCED first allocates the revenues raised statewide in proportion to the share of statewide pounds of fish and shellfish processed in each of the 19 fisheries management areas (FMA) during the preceding calendar year, and then within an FMA by a formula that may vary by FMA (NMFS 2014).

[35] The *Northern Victor* is a floating processor that operated in Beaver Inlet in FMA 2 for a portion of the analyzed period (2011-2017) and as a stationary floating processor in Unalaska/Dutch Harbor (2018-2022). There is uncertainty in the formula the State used while the *Northern Victor* operated as a floating processor in Beaver Inlet. As such, the analysis attributes all taxable revenue to the State (2011-2017) in line with prior approaches used for the 2017 AFA Program Review (NPFMC 2017). Taxable revenues for the *Northern Victor* are split between the City of Unalaska and the State from 2018-2022.

- For the inshore cooperative partnered with Trident Seafoods in **Akutan**, a 6.5% tax rate was applied to the estimated taxable value of B season pollock.[36] The 6.5% tax rate is the sum of the State's 3% FBT, the City's 1.5% Raw Seafood Tax, and the Aleutians East Borough's 2% Raw Seafood Tax. Akutan is an incorporated city in an organized borough. Of this amount, 3% is accrued to the City of Akutan, 2% to the Aleutians East Borough, and 1.5% to the State.
- For the inshore cooperative partnered with Peter Pan Seafoods in **King Cove**, a 7% tax rate was applied to the estimated taxable value of B season pollock. The 7% tax rate is the sum of the state's 3% Fisheries Business Tax, the City's 2% Raw Seafood Tax, and the AEB's 2% Raw Seafood Tax. King Cove is an incorporated city in an organized borough. Of this amount, 3.5% is accrued to the City of King Cove, 2% to the Aleutians East Borough, and 1.5% to the State.
- It was assumed that all product transfers for the CP and mothership cooperatives occurred in **Unalaska/Dutch Harbor**. A 3% tax rate was applied to the estimated taxable value of B season pollock for the CP, CDQ, and mothership sectors. Unalaska is an incorporated city in an unorganized borough. Of this amount, 1.5% is accrued to the City of Unalaska and 1.5% to the State.[37]

Figure 4-15 shows the estimated amount of State and local taxes levied on B season pollock (using the procedure described above) that have accrued to the City of Unalaska, the City of Akutan, King Cove, and Aleutians East Borough as a group, and the State of Alaska. This information is provided within the bounds of confidentiality restrictions. While the volume of landings made by each cooperative is available in the annual cooperative reports, the value of these landings is not. As such, the analysis treats these data as confidential for communities with a single processing entity.

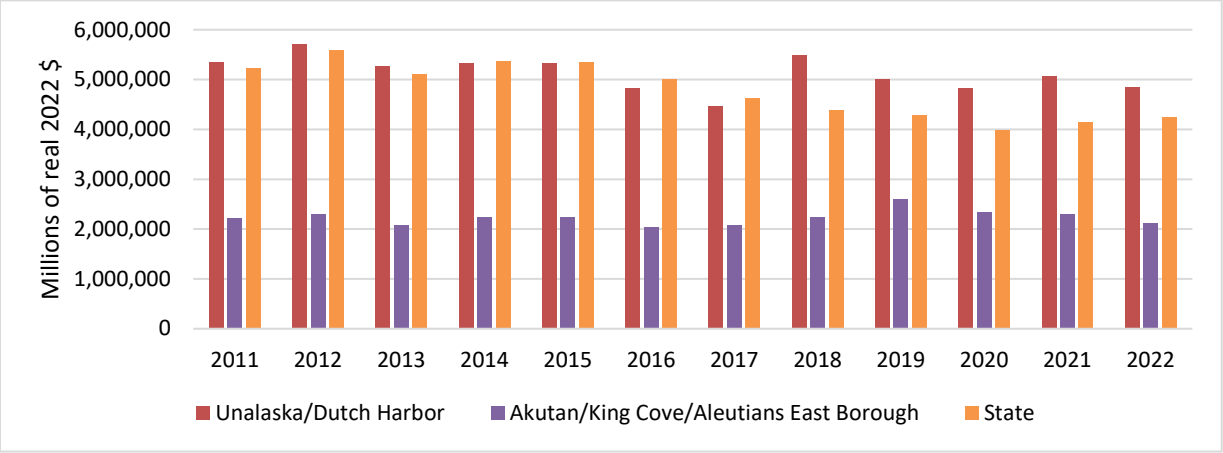


Figure 4-15 Total estimated State and local tax revenues (FBT, FRLT, and City Raw Seafood) generated from the B season pollock fishery by locale, 2011 through 2022 (millions of 2022 real $)
Source: AKFIN.

The community grouping of Akutan, King Cove, and the Aleutians East Borough derived significant public revenues from direct fishery-related taxes levied on deliveries of B season pollock. The estimated revenue generated from this fishery ranged between $2.03 million (2016) and $2.60 million (2019). Unalaska/Dutch Harbor also derived substantial public revenues from fishery-related taxes levied on B season pollock; these revenues ranged between $5.70 million (2012) and $4.46 million (2017).

[36] This rate was adjusted for 2011 and 2012 to 6% because the City of Akutan levied a 1% City Raw Seafood Tax in those years.
[37] CPs and motherships do not pay a local raw seafood tax to the City of Unalaska. This is because the products are frozen and processed. These vessels pay the FRLT as well as any other applicable State shared tax (e.g., sales, fuel, etc.).

4.2 Community Development Quota Program

The following sections of the analysis provide regional- and community-level information for the 65 coastal Western Alaska communities eligible to participate in the CDQ program. The CDQ program was implemented in 1992 to provide 65 coastal Western Alaska communities the opportunity to **a)** participate and invest in federally managed BSAI fisheries; **b)** to support economic development in these communities; **c)** and alleviate poverty as well as provide economic and social benefits. To meet this purpose, the CDQ program is allocated a portion of federally managed species throughout the BSAI region (including pollock, cod, Atka mackerel, flatfish, and rockfish as well as prohibited species catch allowances for salmon, halibut, and crab). The CDQ program receives 10% of the Bering Sea pollock TAC.

The annual CDQ allocations of federally managed fisheries in the BSAI region provide revenue streams to CDQ entities commonly known as CDQ groups. The CDQ groups are non-profit organizations that receive programmatic allocations of federally managed fisheries in the BSAI management region. In this way, it is through the CDQ groups that these 65 communities are considered here as indirect participants in the Bering Sea pollock fishery. The CDQ groups independently determine strategies for harvesting their programmatic allocations, the types of investment strategies to make, and the range of social and economic benefits that would benefit their constituent communities (see Figure 4-16). The CDQ groups have used their revenues to support local mixed economies, participation in commercial and subsistence fisheries, infrastructure development, employment, training programs, and other benefits for their regions and communities.

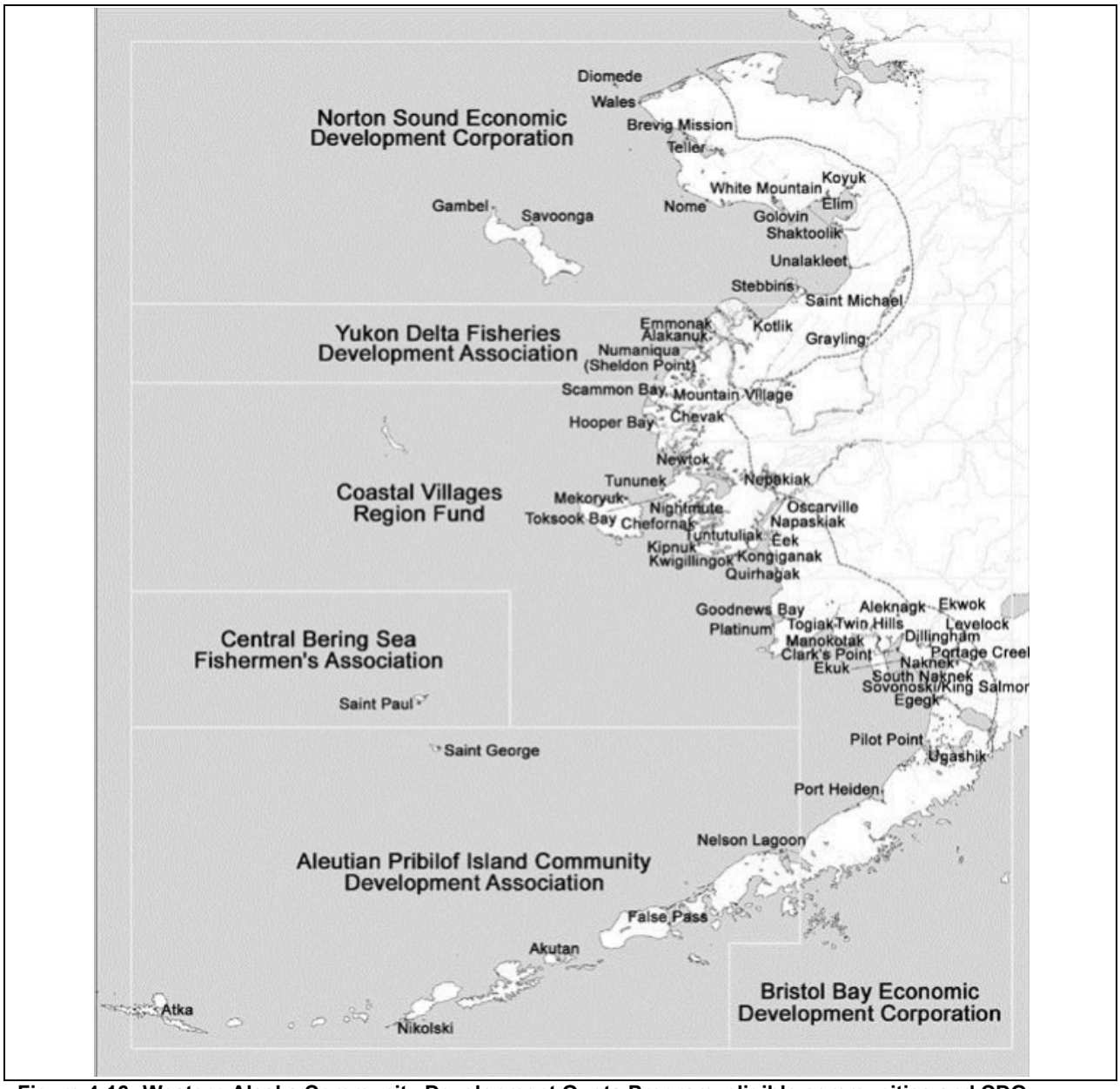


Figure 4-16 Western Alaska Community Development Quota Program, eligible communities and CDQ groups

Source: NOAA Fisheries, available at: https://media.fisheries.noaa.gov/dam-migration/cdq-program-summary-1018.pdf

Section 6.1.10.2 of the preliminary DEIS provides information on CDQ group ownership in the Bering Sea pollock fishery as well as the CDQ groups' relative economic dependence on Bering Sea pollock. That information is not repeated here. Rather, the following subsections provide a high-level overview of the CDQ regional economies as well as socioeconomic and governance indicators for the 65 CDQ communities. An important nuance to note is that, while all CDQ communities have some degree of engagement in the Bering Sea pollock fishery through their CDQ groups (noting the degree of magnitude for this relationship varies), many CDQ communities are also engaged in subsistence harvests of chum salmon including communities throughout the Norton Sound and Yukon-Kuskokwim Delta regions represented by NSEDC, YDFDA, and CVRF. Information relevant to CDQ regions and communities' subsistence harvests of chum salmon can be found throughout Section 4.3.

General Approach

Information on the total population and demographic composition of CDQ communities was sourced from the 2020 U.S. Decennial Census. Information on socioeconomic indicators for all CDQ communities was sourced from the 2022 ACS 5-year estimates (2018-2022). The 2020 U.S. Census is the most recent information available for an official count of the U.S. population. The ACS is conducted on a monthly basis (by the U.S. Census Bureau), and its strength is in its ability to estimate characteristic distributions across a population.[38] The 2022 ACS 5-year estimates (2018-2022) are the most recent information available; additionally, it would not be appropriate to use one-year ACS estimates for this analysis because one-year ACS estimates are available for areas with populations of 65,000 residents or more. The majority of Alaska communities, and all CDQ communities, do not meet this population threshold.

Some additional points to note are that the U.S. Census Bureau defines a "minority" as anyone that self-identifies as not single-race white and not Hispanic. Information on race and ethnicity is sourced from the U.S. Census, Demographic and Housing Characteristics. To calculate the percent of a total population that self-identifies as minority, the following formula was used:

$$\%\text{Minority} = \frac{\text{Total Population: All races, ethnicities} \; - \; \text{Population identified as not Hispanic, White Alone}}{\text{Total Population: All races, ethnicities}}$$

Additionally, and in general, median household income is a more accurate measure of household income for a particular geography because the value is not affected by a small number of extremely high or low outliers. This analysis provides both the median household income and average household income for CDQ communities when either or both are available because of the number of communities for which ACS estimates of median household income were not available.

Table 4-28 provides select socioeconomic indicators for each CDQ group and compares them to the State of Alaska. As shown, the number of communities and the total population of residents represented by each CDQ group varies across the six regions. For example, CBSFA represents 1 community (the community of St. Paul Island) with a total population of 413 persons compared to CVRF which represents 20 communities and a total population over 9,600 persons (based on the U.S. 2020 Census). In general, the income levels of the CDQ regions as a whole are lower than those reported for the State of Alaska. The CDQ regions have a higher level of Alaska Native/American Indian and minority populations than the State of Alaska.

[38] All ACS data are estimates because the survey collects data from a sample of the population in the U.S. and Puerto Rico. Sampled information is the extrapolated across the general population. The ACS's periodic estimates are based on data collected throughout a calendar year, which are then consolidated and averaged for the selected period. The ACS is administered to approximately 1 in 12 households which can result in substantial margins of error for the estimates produced, particularly in smaller communities.

Table 4-28 Select socioeconomic indicators for CDQ communities organized by CDQ group compared to all communities in the State of Alaska

		2020 U.S. Decennial Census			2022 ACS 5-year estimates (2018-2022)				
CDQ Group	Number of Communities	Total Pop.	Alaska Native/ American Indian Residents (% of Total Pop.)	Minority Residents (% of Total Pop.) *	Number of Households	Median Household Income (Average)	Average Household Income	Per Capita Income (Average)	Residents Below Poverty Threshold (Average, % of Total Pop.)
APICDA	6	2,186	11.8%	76.1%	143	$53,740	$73,539	$25,996	10.8%
BBEDC	17	5,178	63.4%	70.7%	1,545	$51,717	$75,634	$32,688	18.8%
CBSFA	1	413	86.7%	88.9%	78	$60,000	$89,199	$31,903	28.6%
CVRF	20	9,691	95.0%	97.2%	2,044	$40,867	$56,27	$18,000	34.5%
NSEDC	15	9,207	74.5%	92.1%	2,553	$49,671	$63,289	$19,695	28.4%
YDFDA	6	3,284	94.5%	97.8%	1,118	$37,901	$51,203	$13,103	41.7%
All CDQ Groups	**65**	**29,959**	**77.6%**	**93.5%**	**7,486**	**$46,810****	**$64,973**	**$22,633**	**27.5%**
State of Alaska	**-**	**733,391**	**15.2%**	**42.6%**	**264,376**	**$88,121**	**$110,602**	**$42,828**	**11.0%**

Source: 2020 U.S. Census and 2022 American Community Survey (5-year estimates, 2018-2022).
*Defined as all persons that did not self-identify as “Not Hispanic, White alone” in the Census categories.
**Defined as the percentage of people in a particular geography/place whose income in the past 12 months is below the poverty level. The U.S. Census Bureau calculates several different poverty thresholds. As a point of reference, a family of four (two adults and two children) had a poverty threshold of $29,678 in 2022).
Other notes: Calculations for average median household income, average household income, average per capita income, and average percent of residents below the poverty threshold do not include non-estimable values (identified in the ACS as ‘-‘, ‘X’, or ‘N’). Calculations do include zero values when present (e.g., 0.0% of residents below poverty threshold).

4.2.1 Aleutian Pribilof Island Community Development Association (APICDA)

APICDA is a CDQ group that represents six communities – Akutan, Atka, False Pass, Nelson Lagoon, Nikolski, and St. George—which are located across the western portion of the Aleutian Peninsula and Pribilof Islands. The Aleutian Island chain stretches approximately 1,200 miles southwest from the end of the Alaska Peninsula at False Pass toward the Kamchatka Peninsula in Russia. While Unalaska is located within the APICDA region, the community did not qualify for the CDQ program when it was established because the community had substantial, existing fishery-related infrastructure in 1992. Today, however, Unalaska is an ex-officio member of APICDA, and the community's residents participate in several of the group's programs.

In 2020, the U.S. Census determined APICDA communities to have a total population of 6,440 residents; this figure includes the population of Unalaska. When Unalaska's population is removed, the total population of APICDA communities is 2,186 residents (see Table 4-29). On average, 51.4% of the residents in APICDA communities identified as being Alaska Native or American Indian, 91.2% of residents in APICDA communities self-identified as a minority population (both estimates include Unalaska).

The number of residents that self-identified as Alaska Native or American Indian in Unalaska, Akutan, and False Pass are substantially lower from other APICDA communities. This information should be interpreted with some caution because of the demographic composition of these communities. Akutan, Unalaska, and False Pass are home to shorebased processing facilities that affect the reported population and community demographic information. The U.S. Census captures people based on their "usual residence" which includes processing workers from outside these communities that reside in company housing at plant sites. Many of these transient residents live in group housing or company housing provided by processing facilities. The demographics of the processing workforce can overshadow the small, predominately Alaska Native populations residing within the traditional community footprints. Year-round residents make up a smaller portion of the overall population and many residents are Alaska Native (see also Downs & Henry 2023).

APICDA communities are located in the traditional territory of the Unangax̂ in southwest Alaska. There is evidence of human occupation of the Aleutian Islands dating back 10,000 years (Reedy Maschner 2014). Historically, villages were located at the mouth of streams to take advantage of abundant salmon runs. Fisheries that have historically been used for subsistence in the region include salmon, cod, herring halibut, Pacific cod, rockfish, sculpin, greenling, flatfish, king and Tanner crab, razor clams, butter clams, chitons, limpets, mussels, octopus, and other abundance local species. Subsistence fishing and hunting continues to be a major part of the mixed economies for APICDA member communities (Himes-Cornell et al. 2013; Wise et al. 2023).

Some APICDA member communities are located within the Aleutians East Borough (Akutan, False Pass, and Nelson Lagoon) while other communities (Atka, Nikolski, St. George, and Unalaska) are not part of an organized Borough but are located in the Aleutians West Census Area.[39] All APICDA member communities are home to a federally recognized tribal government. The Aleut Corporation is the regional ANCSCA Regional Corporation for all APICDA communities (see Table 4-30).

Figure 4-17 shows the distribution of shorebased processing facilities that registered in 2023 and the port they intended to operate in (although this does not guarantee that these processors actually operated) across the State's westward region that encompasses APICDA communities. The economic importance of commercial fishing for many APICDA communities cannot be overstated, particularly Unalaska/Dutch Harbor which has ranked as the number one U.S. port in volume of landings since 1992 and has ranked

[39] A general note for the reader is that Boroughs, cities, and municipalities are legal entities with different governing powers. Census areas are statistical entities established in cooperation with the State of Alaska for reporting data in the portion of the state that falls outside of any Borough.

second in value of landings (behind New Bedford, Massachusetts) since 2000. In recent years, employment statistics for Unalaska/Dutch Harbor have shown that the top three employers in the community were seafood processing companies, and that their employees accounted for over half of all employment in the city. Select economic indicators for APICDA communities estimated the average median household income was $72,223 and ranged from $104,706 (Unalaska) to $28,750 (Akutan). The average percent of residents below the poverty line varies by community but was highest in St. George at 35.0%.

Table 4-29 Select socioeconomic indicators for APICDA region communities

Community	2020 US Census					2022 ACS 5-year estimates (2018-2022)				
	Total Pop.	Alaska Native/ American Indian Residents		Minority residents		Households (Number)	Median Household Income (Average)	Average Household Income	Per Capita Income (Average)	Residents Below Poverty Threshold (Average, % of Total Pop.)
		Number	% of Total	Number	% of Total					
Akutan	1,589	57	3.6%	1,443	90.8%	58	$28,750	$48,717	$45,054	20.2%
Atka	53	50	94.3%	53	100.0%	6	$86,550	$86,550	$18,586	10.7%
False Pass	397	25	6.3%	395	99.6%	33	$62,083	$82,848	$34,500	0.0%
Nelson Lagoon	41	38	92.7%	40	97.6%	34	$58,750	$68,332	$29,718	10.6%
Nikolski	39	27	69.2%	33	84.6%	2	NA	NA	$9,575	0.0%
St. George	67	60	89.6%	65	97.0%	10	$92,500	$81,250	$18,540	35.1%
Unalaska	4,254	195	4.6%	2,928	68.8%	796	$104,706	$121,897	$46,296	8.0%

Source: 2020 U.S. Census and 2022 American Community Survey (5-year average, 2018-2022); Tables and Figures_CDQGroup_SocioeconomicIndicators.

Table 4-30 Community institutional and governance summary for APICDA communities

Community	Alaska Native community name (language)	Federally recognized Tribal Government	Borough	Municipal Government	Incorporation Type (date)	ANCSCA Regional Corporation	ANCSA Village Corporation
Akutan	Achan-ingiiaga (Unangan Aleut)	Native Village of Akutan	Aleutians East Borough	City of Akutan	2nd Class City (1979)	Aleut Corporation	Akutan Corporation
Atka	Atx̂aŝ (Unangan Aleut)	Native Village of Atka	Unorganized Borough	City of Atka	2nd Class City (1988)	Aleut Corporation	Atxam Corporation
False Pass	IsanaX (Unangan Aleut)	Native Village of False Pass	Aleutians East Borough	City of False Pass	2nd Class City (1990)	Aleut Corporation	Isanotski Corporation
Nelson Lagoon	Niilsanam Alĝuudaa (Unangan Aleut)	Native Village of Nelson Lagoon	Aleutians East Borough	NA	Unincorporated CDP	Aleut Corporation	Nelson Lagoon Corporation
Nikolski	Chalukaŝ (Unangan Aleut)	Native Village of Nikolski	Unorganized Borough	NA	Unincorporated CDP	Aleut Corporation	Chaluka Corporation
St. George	NA	Saint George Island	Unorganized Borough	City of St. George	2nd Class City (1983)	Aleut Corporation	St. George Tanaq Corporation
Unalaska	Iluuluŝ (Unangan Aleut)	Qawalangin Tribe of Unalaska	Unorganized Borough	City of Unalaska	1st Class City (1942)	Aleut Corporation	Ounalashka Corporation

Source: DCRA community database, https://dcra-cdo-dcced.opendata.arcgis.com/

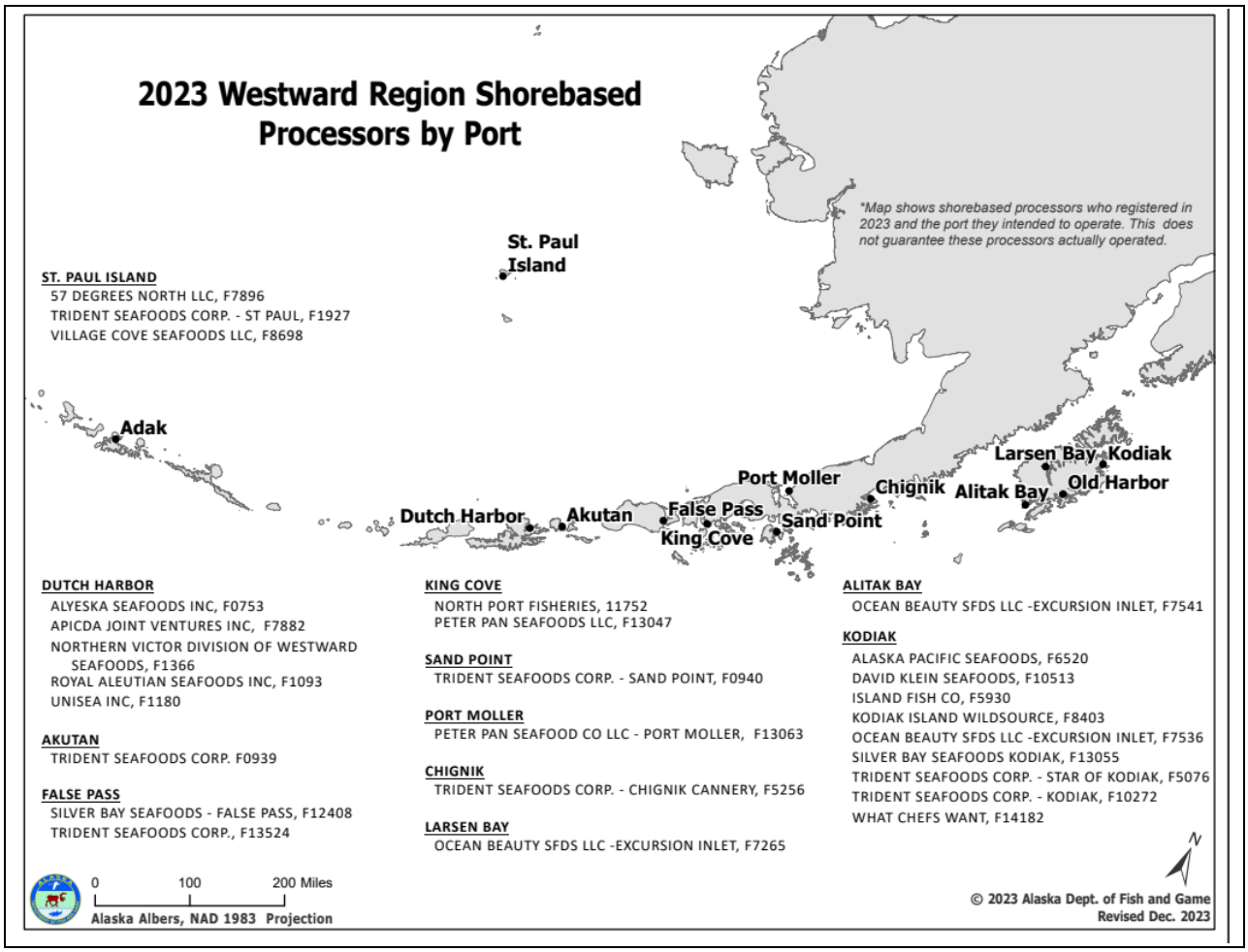


Figure 4-17 2023 Westward region shorebased processors by port
Source: https://www.adfg.alaska.gov/static/fishing/pdfs/commercial/maps/westward_shorebased_processors.pdf

4.2.2 Bristol Bay Economic Development Corporation (BBEDC)

BBEDC represents seventeen communities located across Bristol Bay and the eastern portion of the Alaska Peninsula. Bristol Bay is approximately 250 miles long by 180 miles wide at its mouth. BBEDC communities include Aleknagik, Clarks Point, Dillingham, Egegik, Ekuk, Ekowk, King Salmon, Levelock, Manoktak, Naknek, Pilot Point, Port Heiden, Portage Creek, South Naknek, Togiak, Twin Hills, and Ugashik.

In 2020, the U.S. Census determined BBEDC communities to have a total population of 5,178 residents. Dillingham is the region's largest community (2,249 residents), of which 54.9% self-identified as Alaska Native or American Indian and 74.7% identified as a minority population. Dillingham is a hub community for the region, functioning as an administrative center for the Bristol Bay and Alaska Peninsula Regions. Ugashik is the smallest BBEDC community with a recorded population of four residents, of which 75% self-identified as Alaska Native or American Indian. King Salmon is demographically unique among BBEDC communities with a total population of 307 residents, of which 15.3% self-identified as Alaska Native/American Indian. This demographic difference may partially be explained by King Salmon's economic base. This community has grown over time as a government, transportation, and service center for the commercial sockeye fishery (Table 4-31).

BBEDC communities are located across the traditional territory of the Central Yup'ik and Sugpiaq peoples. Many of the villages within the region were ancient sites used as seasonal camps for subsistence resources. Historically, Yup'ik people were nomadic, organizing their lives and subsistence activities with the migration of game, fish, and plants. The ancient settlements and seasonal camps contained small populations, with numerous settlements throughout the region consisting of extended families or small groups of families (Himes Cornell et al. 2013).

The Bristol Bay regional economy is oriented around commercial and subsistence fisheries tied to Bristol Bay as well as other seasonal employment opportunities. As one measure of regional commercial fishery engagement, Figure 4-18 shows the shorebased processing facilities in the Bristol Bay region that registered in 2023 and the port they intended to operate in (although this does not guarantee the processors actually operated). Permanent wage employment in smaller villages is scarce and often limited to jobs within local school districts or various tribal-related entities including tribal councils, non-profits, and ANCSA chartered village corporations. Select economic indicators for BBEDC communities estimated the average median household income was $65,768 and ranged between $23,333 (Clark's Point) and $115,625 (King Salmon). The average percent of residents below the poverty line varies by community but was estimated to be highest in Clark's Point and Twin Hills at 72.4% and 47.2%, respectively.

Subsistence harvests by Bristol Bay residents continue to provide important nutritional, economic, and sociocultural benefits to most Bristol Bay households. The five species of salmon found in Alaska are utilized for subsistence purposes in Bristol Bay, but the most heavily harvested are Chinook salmon, sockeye, and coho salmon. In 2020, the estimated subsistence salmon harvest in the Bristol Bay Area was 96,561 fish; of these 78,679 were sockeye (81%), 9,369 were Chinook (10%), 5,493 were coho (6%), and 2,425 were chum (3%) (see Table 6-1 in Brown et al. 2023: 118). Many residents continue to preserve large quantities of fish through traditional methods, such as dried and smoked, and frozen, canned, salted, pickled, fermented, and eaten fresh (Brown et al. 2023).

The vast majority of households in the Bristol Bay Area also use fish other than salmon for subsistence purposes. The harvest and use of nonsalmon fish for home use occurs throughout the entire year. Spring fishing begins when river and lake ice break up. Spring is important for harvesting Pacific herring and herring spawn on kelp. Also, as early summer approaches, Pacific halibut are targeted in marine waters. In June, preparations begin for commercial and subsistence salmon fishing, and these activities dominate until August or September. The overall effort to harvest nonsalmon fish is generally lower in the summer compared to the rest of the year since residents tend to focus on salmon fishing activities instead (Brown et al. 2023).

Table 4-31 Select socioeconomic indicators of BBEDC communities

Community	2020 US Census					2022 ACS 5-year estimates (2018-2022)				
	Total Pop.	Alaska Native/ American Indian Residents		Minority residents		Households (Number)	Median Household Income (Average)	Average Household Income	Per Capita Income (Average)	Residents Below Poverty Threshold (Average, % of Total Pop.)
		Number	% of Total	Number	% of Total					
Aleknagik	211	131	62.1%	173	82.0%	42	$85,000	$84,369	$27,741	19.8%
Clark's Point	67	62	92.5%	63	94.0%	10	$23,333	$31,660	$11,397	72.4%
Dillingham	2,249	1,234	54.9%	1,681	74.7%	713	$92,578	$104,635	$40,299	11.2%
Egegik	39	23	59.0%	25	64.1%	10	NA	$100,010	$84,070	0.0%
Ekuk	2	0	0.0%	0	0.0%	0	NA	NA	NA	NA
Ekwok	111	89	80.2%	102	91.9%	19	$39,063	$50,747	$18,020	11.8%
King Salmon	307	47	15.3%	129	42.0%	126	$115,625	$134,910	$49,567	1.1%
Levelock	69	65	94.2%	68	98.6%	16	NA	$58,244	$33,282	39.3%
Manokotak	488	443	90.8%	472	96.7%	141	$51,875	$61,586	$20,928	23.1%
Naknek	470	216	46.0%	307	65.3%	132	$88,333	$110,706	$43,602	14.2%
Pilot Point	70	50	71.4%	60	85.7%	27	$59,375	$87,307	$29,958	30.6%
Portage Creek	4	1	25.0%	2	50.0%	2	NA	NA	NA	NA
Port Heiden	100	79	79.0%	86	86.0%	28	NA	$48,239	$19,516	46.0%
South Naknek	67	33	49.3%	51	76.1%	26	$46,667	$56,558	$31,058	5.7%
Togiak	817	732	89.6%	776	95.0%	238	$55,833	$64,343	$29,901	16.0%
Twin Hills	103	74	71.8%	99	96.1%	15	NA	$65,567	$18,294	47.2%
Ugashik	4	3	75.0%	3	75.0%	0	NA	NA	NA	NA

Source: 2020 U.S. Census and 2022 American Community Survey (5-year average, 2018-2022); Tables and Figures_CDQGroup_SocioeconomicIndicators.

Table 4-32 Community institutional governance summary for BBEDC communities

Community	Alaska Native community name (language)	Federally recognized Tribal Govt.	Borough	Municipal Govt.	Incorporation Type (date)	ANCSCA Community	ANCSCA Regional Corp.	ANCSA Village Corp.
Aleknagik	Alaqnaqiq (Central Yup'ik)	Native Village of Aleknagik	Unorg. Borough	City of Aleknagik	2nd Class City (1973)	Yes	Bristol Bay Native Corp.	Aleknagik Natives
Clark's Point	Saguyaq (Central Yup'ik)	Village of Clark's Point	Unorg. Borough	City of Clark's Point	2nd Class City (1971)	Yes	Bristol Bay Native Corp.	Saguyak Incorp.
Dillingham	Curyung (Central Yup'ik)	Curyung Tribal Council	Unorg. Borough	City of Dillingham	1st Class City (1963)	Yes	Bristol Bay Native Corp.	Choggiung Limited
Egegik	Igyagiiq (Central Yup'ik-Sugt'stun transition)	Egegik Village	Lake and Land Peninsula Borough	City of Egegik	2nd Class City (1985)	Yes	Bristol Bay Native Corp.	Becharof Corporation
Ekuk	NA	Native Village of Ekuk	Unorg. Borough	NA	Unincorp. CDP	Yes	Bristol Bay Native Corp.	Choggiung Limited
Ekwok	Iquaq (Central Yup'ik)	Native Village of Ewok	Unorg. Borough	City of Ewok	2nd Class City (1974)	Yes	Bristol Bay Native Corp.	Ewok Natives Limited
King Salmon	NA	King Salmon Tribe	Bristol Bay Borough	NA	Unincorp. CDP	No*	Bristol Bay Native Corp.	-
Levelock	Liivlek ~ Elivelek (Central Yup'ik)	Levelock Village	Lake and Land Peninsula Borough	NA	Unincorp. CDP	Yes	Bristol Bay Native Corp.	Levelock Natives Limited
Manokotak	Manuquutaq (Central Yup'ik)	Manokotak Village	Unorg. Borough	City of Manokotak	2nd Class City (1970)	Yes	Bristol Bay Native Corp.	Manokotak Natives Limited
Naknek	Nakniq (Central Yup'ik)	Naknek Native Village	Bristol Bay Borough	NA	Unincorp. CDP	Yes	Bristol Bay Native Corp.	Paug-Vik Incorp., Limited
Pilot Point	Agisaq (Sugt'stun)	Native Village of Pilot Point	Lake and Land Peninsula Borough	City of Pilot Point	2nd Class City (1992)	Yes	Bristol Bay Native Corp.	Pilot Point Native Corporation
Port Heiden	Masrriq (Sugt'stun)	Native Village of Port Heiden	Lake and Land Peninsula Borough	City of Port Heiden	2nd Class City (1972)	Yes	Bristol Bay Native Corp.	Alaska Peninsula Corporation
Portage Creek	NA	Portage Creek Village	Unorg. Borough	NA	Unincorp. CDP	Yes	Bristol Bay Native Corp.	Choggiung Limited
South Naknek	Qinuyang (Central Yup'ik)	South Naknek Village	Bristol Bay Borough	NA	Unincorp. CDP	Yes	Bristol Bay Native Corp.	Alaska Peninsula Corporation
Togiak	Tuyuryaq (Central Yup'ik)	Traditional Village of Togiak	Unorg. Borough	City of Togiak	2nd Class City (1969)	Yes	Bristol Bay Native Corp.	Togiak Natives Limited
Twin Hills	Ingricuar (Central Yup'ik)	Twin Hills Village	Unorg. Borough	NA	Unincorp. CDP	Yes	Bristol Bay Native Corp.	Twin Hills Native Corporation
Ugashik	Ugaasaq (Sugt'stun)	Ugashik Village	Unorg. Borough	NA	Unincorp. CDP	Yes	Bristol Bay Native Corp.	Alaska Peninsula Corporation

Source: DCRA community database, https://dcra-cdo-dcced.opendata.arcgis.com/

*Although King Salmon was not included in the 1972 Alaska Native Claims Settlement Act (ANCSA), the King Salmon Tribe became a federally recognized entity as of December 29, 2000.

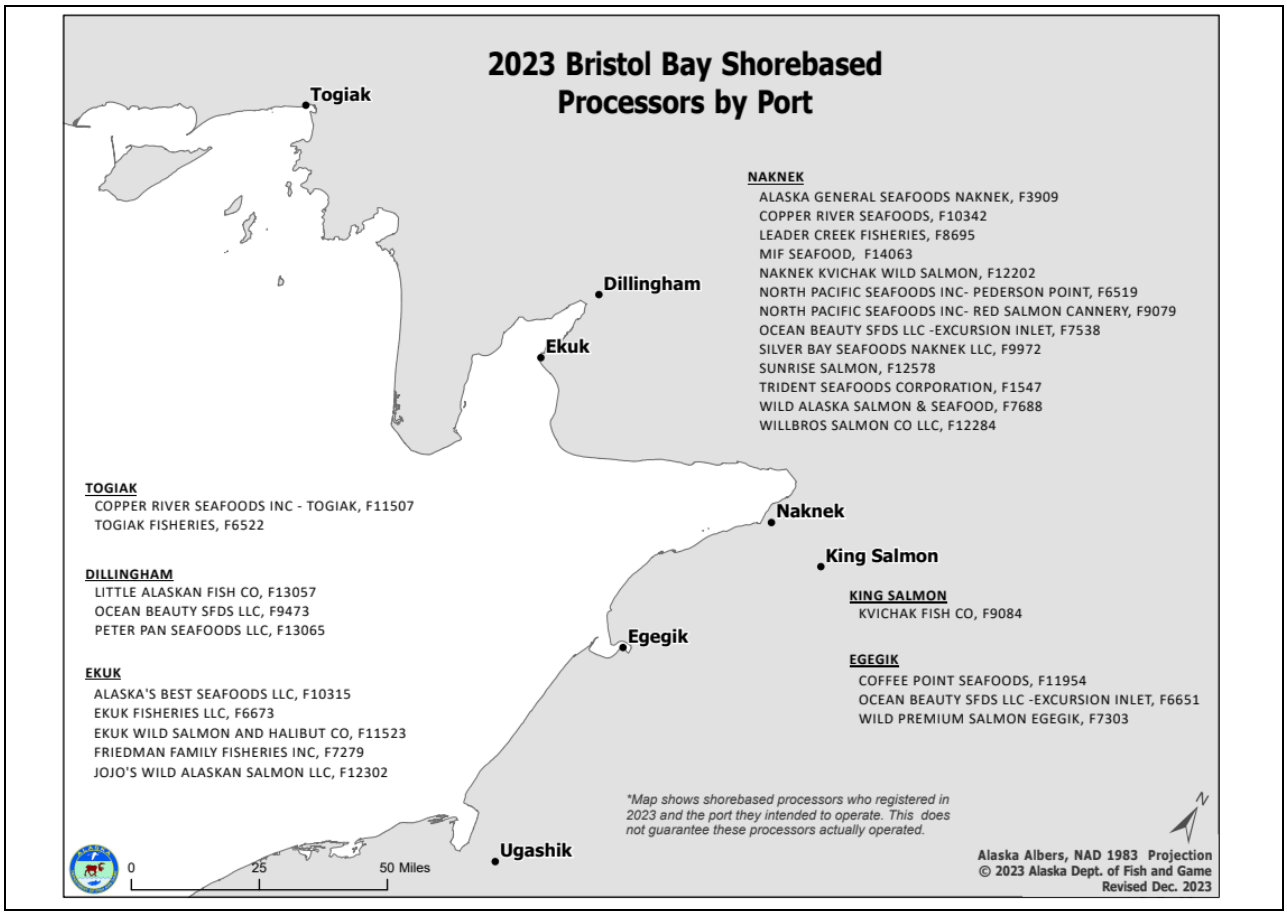


Figure 4-18 2023 Bristol Bay shorebased processors by port
Source: ADFG https://www.adfg.alaska.gov/static/fishing/pdfs/commercial/maps/bristolbay_shorebased_processors.pdf

4.2.3 Central Bering Sea Fishermen's Association (CBSFA)

CBSFA represents the community of St. Paul. Among the CDQ groups, this dynamic is unique to CBSFA as all other groups have more than one constituent community. The community of St. Paul is located on a narrow peninsula on the southern tip of St. Paul Island, which is 47 miles north of Saint George Island, 240 miles north of the Aleutian Islands, 300 miles west of the Alaska mainland, and 750 air miles west of Anchorage. St. Paul is located in the Aleutian Islands Recording District.

In 2020, the U.S. Census determined there were 413 residents in St. Paul and a majority identified themselves as Alaska Native or American Indian (86.7%) (see Table 4-33). St. Paul was likely unpopulated until the arrival of the Russians, although Unangax̂ oral history acknowledges the island was used as a seasonal hunting ground on this island grouping prior to Russian contact. In 1786, Russian fur traders "discovered" St. Paul and relocated Unangax̂ from Siberia, Atka, and Unalaska to hunt fur seals; their descendants live on St. Paul today (Wise et al. 2023). In 1983, Congress passed the Fur Seal Act Amendments, which ended the government control of the seal harvest, as well as Federal presence on St. Paul. St. Paul transitioned to focus on commercial seafood processing and support services for the commercial fishing fleet (Himes-Cornell et al. 2013).[40]

[40]In several ways, St. Paul may be seen as a community that is still under transition from a community that was based on federal institutions to a more typical "civilian" community and economy. In 1983, Congress passed the Fur Seal Act Amendments, which ended the federal government's control of the commercial seal harvest (this had effectively been the only local economic driver for over 100 years) and the federal government's control of daily life on the island. Some transition funding was provided to promote the local development of a self-sufficient, enduring, and diversified economy that was not dependent on commercial sealing; most of the

Community services are provided by the local government – St. Paul is incorporated as a 2nd Class City governed by a mayor and a city council. St. Paul is not located within an organized borough and is home to a federally recognized tribe, the Aleut Community of St. Paul Island. The Native village corporation is the Tanadgusix Corporation, which manages land and owns several subsidiary companies that provide services to commercial, industrial, and public sectors (see Table 4-34).

According to a survey conducted by the AFSC in 2011, St. Paul community leaders reported that fisheries are the primary economic driver in St. Paul and emphasized the importance of fish and crab processing to the local economy. A number of local residents were identified in that survey as being involved in commercial fisheries as vessel owners, IFQ holders, and crew license holders (Himes-Cornell et al. 2013). However, St. Paul is also a commercial fishing hub that provides support services to a variety of vessels and operation types, and the community is home to one large shorebased processing facility (owned by Trident Seafoods) which was a major crab processing plant prior to rationalization and has remained so post rationalization.[41] Trident Seafoods has been one of the top local employers.[42]

The local fleet operating out of St. Paul focuses almost exclusively on BSAI halibut fisheries. According to CBSFA's website, the local halibut fishery is a major source of employment, income, and subsistence for the community. Compared to CBSFA's other CDQ groundfish allocations, halibut can be harvested with small boats and provides an opportunity for income to be earned directly by CBSFA members. In addition to providing harvesting opportunities for the local fleet through its CDQ halibut allocation, CBSFA also provides support services for the fishermen through its Local Fleet Support Program and has worked closely with Trident Seafoods to provide halibut processing services. Without heavy participation in the shorebased processing of crab fisheries, which has declined in recent years, there is a concern that the underpinning of processing for the local halibut fishery would be removed.

Traditionally used subsistence species include seals, halibut, crab, and some groundfish. Crab species traditionally harvested for subsistence include tanner crab, hair crab, as well as red and blue king crab. Groundfish species include Pacific cod, flounder, greenling, rockfish, sablefish, and sculpins. It is fairly common practice for St. Paul residents harvesting seal and halibut to exchange those resources for salmon with other communities. The most recent subsistence data publicly available is from 2017 and is comprise of Stellar sea lions and harbor seals (Wise et al. 2023).

funding was used to upgrade inadequate community infrastructure including major investments in the harbor. This funding proved to be inadequate over the longer term (EDAW/AECOM and Northern Economics 2008). It was during this time that the local commercial halibut fishery, which got its start in 1981, became a central focus of local fishery-based economic development efforts (which were later substantially bolstered by the CDQ program), a position it retains to date (along with local seafood processing capacity that is self-sustaining over the long term).

[41] The Trident plant has historically relied primarily on crab, including opilio and king crab, with some bairdi processed as well, including during times when it may fill in what would otherwise be gaps in processing activity. Trident has previously reported that cod was also processed, typically during opilio season, although the volume of cod processed per season varied from one year to another. More recently cod processing has not been common, reportedly for a combination of reasons including market conditions, the expense of shipping product from St. Paul, and seasonal processing plant outfall constraints (NPFMC 2022).

[42] St.Paul Island had also historically been the site of a number of mobile processing operations over the years either inside the harbor (with larger operations including UniSea and Icicle) or in the area but outside the harbor (including Norquest and a number of others) as the nature of the fishery and its economic incentives dictated, and by limitations imposed by weather. While the floating processors did not typically employ any St. Paul Island residents, a handful of long-term residents were employed at the Trident Seafoods shore plant, mostly as dock workers or crane operators. These employees typically worked the entire year, which includes the BSAI crab season in the fall and winter months, and the halibut season in the spring and summer months (NPFMC 2022).

Table 4-33 Select socioeconomic indicators for Saint Paul (CBSFA)

Community	2020 US Census					2022 ACS 5-year estimates (2018-2022)				
	Total Pop.	Alaska Native/ American Indian Residents		Minority residents		Households (Number)	Median Household Income (Average)	Average Household Income	Per Capita Income (Average)	Residents Below Poverty Threshold (Average, % of Total Pop.)
		Number	% of Total	Number	% of Total					
St. Paul	413	358	86.7%	389	94.2%	78	$83,214	$89,199	$31,903	27.8%

Source: 2020 U.S. Census and 2022 American Community Survey (5-year average, 2018-2022); Tables and Figures_CDQGroup_SocioeconomicIndicators.

Table 4-34 Institutional governance summary for Saint Paul (CBSFA)

Community	Alaska Native community name (language)	Federally recognized tribal govt.	Borough	Municipal Govt.	Incorporation Type (date)	ANCSA Community	ANCSA Regional Corp.	ANCSA Village Corp.
St. Paul	Tanaxˆ Amixˆ (Unangan Aleut)	Saint Paul Island	Unorganized Borough	City of St. Paul	2nd Class City (1971)	Yes	Aleut Corporation	Tanadgusix

Source: DCRA community database, https://dcra-cdo-dcced.opendata.arcgis.com/

4.2.4 Coastal Villages Region Fund (CVRF)

CVRF represents 20 communities dispersed across the lower portion of the Yukon-Kuskokwim Delta and Nunivak Island. CVRF communities include: Chefornak, Chevak, Eek, Goodnews Bay, Hooper Bay, Kipnuk, Kongiganak, Kwigillingok, Mekoryuk, Nakaiak, Napaskiak, Newtok, Nightmute, Oscarville, Platinum, Quinhagak, Scammon Bay, Toksook Bay, Tuntutuliak, and Tununak. In 2020, the U.S. Census determined the total population of CVRF communities was 9,691 residents. Hooper Bay is the largest community (1,375 residents) and Platinum is the smallest (55 residents). On average, 95.0% of the residents in CVRF communities self-identified as Alaska Native or American Indian (see Table 4-35).

The geographic features of the Yukon-Kuskokwim Delta include meandering lowland rivers and shallow lakes interspersed with tundra, coastal bluffs, small mountain ranges, and ancient volcanoes. The delta is disconnected from the state's road system, so freight is delivered to communities by barge and occasionally by air. Daily flights from Bethel (a regional hub but not a CVRF community) are a primary means of in-region transportation. The Central Yup'ik have continuously occupied the Yukon-Kuskokwim Delta for thousands of years (Shaw 1998). Villages were located near coastal areas which provided access to sea mammals and fish as well as seasonal access upriver to inland resources such as caribou. Most residents speak the Yugcetun language (or Central Yup'ik) to some degree, although most Elders and adults are fluent speakers. Yup'ik traditions vary by community, but most Yup'ik communities gather regularly to practice traditional dancing, singing, and drumming. Yup'ik people express and live their cultural values through relationships with the land, water, lants, and animals that provide for the people (Coleman et al. 2023).

CVRF communities are not incorporated into an organized borough, but the majority are located within the Bethel Census Area. As a result, the communities themselves are responsible for basic services and tax administration. CVRF communities are all member villages of the Calista Corporation and are also members of the Association of Village Council Presidents (AVCP), a tribal non-profit organization headquartered in Bethel that serves communities in the Yukon-Kuskokwim Delta.

CVRF communities are engaged in subsistence fishing and have historically been engaged in commercial fishing, although the nature of regional engagement in those fisheries has changed over time. Some tourism and sportfishing occurs in the region, with most services and amenities offered in the Bethel area. The use of natural resources for subsistence use is relatively high in this region compared to other areas, with over 2,000 households in the area annually harvesting salmon for subsistence use (Himes-Cornell et al. 2013). Select economic indicators for CVRF communities estimated the average median household income was $42,164 and ranged between $60,938 (Kongiginak) and $23,889 (Napakiak). On average, 36.3% of the population were estimated to be below the poverty threshold.

Table 4-35 Select socioeconomic indicators for CVRF communities

Community	2020 US Census					2022 ACS 5-year estimates (2018-2022)				
	Total Pop.	Alaska Native/ American Indian Residents		Minority residents		Households (Number)	Median Household Income (Average)	Average Household Income	Per Capita Income (Average)	Residents Below Poverty Threshold (Average, % of Total Pop.)
		Number	% of Total	Number	% of Total					
Chefornak	506	458	90.5%	489	96.6%	90	$47,500	$67,424	$12,776	21.2%
Chevak	951	892	93.8%	933	98.1%	60	NA	$78,278	$75,144	28.4%
Eek	404	366	90.6%	398	98.5%	108	$48,750	$75,144	$17,033	29.1%
Goodnews Bay	258	233	90.3%	245	95.0%	37	$27,708	$37,495	$11,503	61.0%
Hooper Bay	1,375	1,330	96.7%	1,352	98.3%	169	$35,179	$40,096	$15,903	37.2%
Kipnuk	704	680	96.6%	689	97.9%	138	$43,750	$50,184	$11,924	33.2%
Kongiganak	486	465	95.7%	481	99.0%	65	$60,938	$54,552	$10,137	13.3%
Kwigillingok	380	369	97.1%	377	99.2%	126	$61,500	$68,010	$15,060	15.4%
Mekoryuk	206	193	93.7%	197	95.6%	124	$30,417	$50,415	$18,889	18.4%
Napakiak	358	325	90.8%	344	96.1%	178	$23,889	$39,087	$9,481	59.1%
Napaskiak	509	486	95.5%	497	97.6%	122	$34,569	$53,136	$11,874	47.4%
Newtok	209	198	94.7%	205	98.1%	27	$34,583	$42,922	$12,669	17.7%
Nightmute	306	298	97.4%	298	97.4%	16	$58,750	$55,956	$14,097	7.1%
Oscarville	70	67	95.7%	69	98.6%	20	NA	$74,415	$16,528	22.7%
Platinum	55	46	83.6%	54	98.2%	6	NA	NA	$35,878	0.0%
Quinhagak	776	730	94.1%	763	98.3%	237	$42,083	$58,675	$13,783	34.3%
Scammon Bay	600	593	98.8%	596	99.3%	126	$36,250	$40,523	$10,118	48.4%
Toksook Bay	658	635	96.5%	640	97.3%	184	$49,167	$68,739	$15,550	27,5%
Tuntutuliak	469	457	97.4%	461	98.3%	130	$43,000	$53,480	$20,965	36.6%
Tununak	411	389	94.6%	400	97.3%	81	$38,750	$60,612	$10,687	34.7%

Source: 2020 U.S. Census and 2022 American Community Survey (5-year average, 2018-2022); Tables and Figures_CDQGroup_SocioeconomicIndicators.

Table 4-36 Institutional governance summaries for CVRF communities

Community	Alaska Native community name (language)	Federally recognized tribal govt.	Borough	Municipal Govt.	Incorporation Type (date)	ANCSA Community	ANCSA Regional Corp.	ANCSA Village Corp.
Chefornak	Cevv'arneq (Central Yup'ik)	Village of Chefornak	Unorganized Borough	City of Chefornak	2nd Class City (1974)	Yes	Calista Corporation	Chefarnrmute, Incorporated
Chevak	Cev'aq (Central Yup'ik)	Chevak Native Village	Unorganized Borough	City of Chevak	2nd Class City (1967)	Yes	Calista Corporation	Chevak Company
Eek	Ekvicuaq (Central Yup'ik)	Native Village of Eek	Unorganized Borough	City of Eek	2nd Class City (1970)	Yes	Calista Corporation	Iqfijouaq Company
Goodnews Bay	Mamterat (Central Yup'ik)	Native Village of Goodnews Bay	Unorganized Borough	City of Goodnews Bay	2nd Class City (1970)	Yes	Calista Corporation	Kuitsarak, Incorporated
Hooper Bay	Naparyaarmiut (Central Yup'ik)	Native Village of Hooper Bay	Unorganized Borough	City of Hooper Bay	2nd Class City (1965)	Yes	Calista Corporation	Sea Lion Corporation
Kipnuk	Qipneq (Central Yup'ik)	Native Village of Kipnuk	Unorganized Borough	NA	Unincorporated CDP	Yes	Calista Corporation	Kugkaktlik, Limited
Kongiganak	Kangirnaq (Central Yup'ik)	Native Village of Kongiganak	Unorganized Borough	NA	Unincorporated CDP	Yes	Calista Corporation	Qemirtalek Coast Corporation
Kwigillingok	Kuigilnguq (Central Yup'ik)	Native Village of Kwillingok	Unorganized Borough	NA	Unincorporated CDP	Yes	Calista Corporation	Kwik Incorporated
Mekoryuk	Mikuryar (Cup'ig)	Native Village of Mekoryuk	Unorganized Borough	City of Mekoryuk	2nd Class City (1969)	Yes	Calista Corporation	Nima Corporation
Napakiak	Naparyarraq (Central Yup'ik)	Native Village of Napakiak	Unorganized Borough	City of Napakiak	2nd Class City (1970)	Yes	Calista Corporation	Napakiak Corporation
Napaskiak	Napaskiaq (Central Yup'ik)	Native Village of Napaskiak	Unorganized Borough	City of Napaskiak	2nd Class City (1971)	Yes	Calista Corporation	Napaskiak, Incorporated
Newtok	Niugtaq (Central Yup'ik)	Newtok Native Village	Unorganized Borough	NA	Unincorporated CDP	Yes	Calista Corporation	Newtok Native Corporation
Nightmute	NegteMiut (Central Yup'ik)	Native Village of Nightmute	Unorganized Borough	City of Nightmute	2nd Class City (1974)	Yes	Calista Corporation	Chinuruk Incorporated
Oscarville	Kuiggayagaq (Central Yup'ik)	Oscarville Traditional Village	Unorganized Borough	NA	Unincorporated CDP	Yes	Calista Corporation	Oscarville Native Corporation
Platinum	Arviiq (Central Yup'ik)	Platinum Traditional Village	Unorganized Borough	City of Platinum	2nd Class City (1975)	Yes	Calista Corporation	Arviq Incorporated
Quinhagak	Kuinerraq (Central Yup'ik)	Native Village of Kwinhagak	Unorganized Borough	City of Quinhagak	2nd Class City (1969)	Yes	Calista Corporation	Qanirtuuq, Incorporated
Scammon Bay	Marayaarmiut (Central Yup'ik)	Native Village of Scammon Bay	Unorganized Borough	City of Scammon Bay	2nd Class City (1967)	Yes	Calista Corporation	Askinuk Corporation
Toksook Bay	Nunakauyaq (Central Yup'ik)	Nunakauyrmuit Tribe	Unorganized Borough	City of Tooksook Bay	2nd Class City (1972)	Yes	Calista Corporation	Nunakauiak Yupik Corporation
Tuntutuliak	Tuntutuliaq (Central Yup'ik)	Native Village of Tuntutuliak	Unorganized Borough	NA	Unincorporated CDP	Yes	Calista Corporation	Tuntutuliak Land, Limited
Tununak	Tununeq (Central Yup'ik)	Native Village of Tununak	Unorganized Borough	NA	Unincorporated CDP	Yes	Calista Corporation	Tunurmiut Rinit Corporation

Source: DCRA community database, https://dcra-cdo-dcced.opendata.arcgis.com/

4.2.5 Norton Sound Economic Development Corporation (NSEDC)

NSEDC is the northernmost CDQ group representing 15 communities across the Norton Sound and Bering Strait region as well as on Little Diomede and St. Lawrence islands. NSEDC communities include: Brevig Mission, Diomede, Elim, Gambell, Golovin, Koyuk, Nome, Saint Michael, Savoonga, Saktoolik, Stebbins, Teller, Unalakleet, Wales, and White Mountain. In 2020, the U.S. Census determined NSEDC communities had 9,207 residents. The largest NSEDC community is Nome (3,699 residents) and the smallest NSEDC community is Wales (168 residents). Similar to other CDQ regions, a large portion of the region's residents identify as Alaska Native or American Indian (74.5% of the total population; see Table 4-37).

Three culturally distinct groups of have lived in the Bering Strait region as identifiable cultures for at least 3,000 years, although evidence of human habitation dates back at least 10,000 years. The Inupiaq reside on the Seward Peninsula and Diomede Island. The Yup'ik people primarily reside in the villages south of Unalakleet, although there are some Yup'ik people that live throughout the coastal region of southern Norton Sound. St. Lawrence Island Yupik live in the communities of Gambell and Savoonga and are most closely related culturally and linguistically to the Chukotka Native people of the far eastern Russia (Raymond-Yakoubian and Raymond-Yakoubian 2015).

Generally, settlements in this region are concentrated along the coast and river systems because the sea has historically been the principal focus of human activities. In this region, traditionally used subsistence species include marine mammals such as seals, walrus, and beluga whales for communities in the north and fish to the south including chum salmon (Tremayne et al. 2018). Subsistence hunting and fishing has long been the economic, cultural, nutritional and spiritual mainstay of the region. Today, some subsistence hunters are able to support their families through subsistence activities alone (Raymond-Yakoubian and Raymond-Yakoubian 2015), but many households and communities are engaged in a mixed economy that incorporates cash employment (Magdanz et al. 2007).

NSEDC communities are not incorporated into an organized borough but are located in the Nome Census Area. As a result, the communities themselves are responsible for basic services and tax administration. Every NSEDC community is incorporated into a municipality has as a federally recognized tribal government. The regional ANCSA chartered Native corporation for communities in the NSEDC region is the Bering Straits Native Corporation whereas the regional ANCSA non-profit corporation is Kawerak, Inc (Table 4-38).

Commercial and subsistence fisheries are economic mainstays for households and communities across the region. Shoreside processing has historically taken place in Nome, Saint Michael, Savoonga, and Unalakleet. Norton Sound Seafood Products is a subsidiary of NSEDC with shorebased plants located in Savoonga, Unalakleet, and Nome.[43] According to an AFSC survey conducted in 2011 (Himes-Cornell et al. 2013), the Norton Sound Seafood Products plant in Savoonga employed 4 to 10 persons with the largest number of workers present during the month of August. The plant in Unalakleet focused almost exclusively on processing salmon, although a modest volume of herring was processed for use as bait in the local crab and halibut fisheries. In contrast, the plant in Savoonga has in the past focused exclusively on halibut processing but has recently run small amounts of cod as well, as there is interest in diversifying the Savoonga community fisheries. The plant in Nome processed halibut, salmon, and crab. Norton Sound Seafood Products also has buying stations in Elim, Golovin, and Shaktoolik.

Norton Sound has the northernmost fisheries for both Pacific herring and red king crab. Residents across the region hold commercial fishing permits (e.g., salmon and herring) issued by the Commercial Fisheries

[43] 2022 Arctic-Yukon-Kuskokwim Region Shorebased Processors by Port. Accessed November 26, 2023. Available at: https://www.adfg.alaska.gov/static/fishing/pdfs/commercial/maps/ayk_shorebased_processors.pdf

Entry Commission (Himes-Cornell et al. 2013).[44] Select economic indicators for NSEDC communities estimated the average median household income was $53,371, ranging from a low of $34,167 (Wales) to a high of $103,542 (Nome).

[44] Mining is another economic driver in the region, with some tin and polymetallic resources found in the area and several small gold mines in operation around Nome. Some tourism occurs in conjunction with the Iditarod, the last third of which runs from Unalakleet to Nome within the NSEDC region.

Table 4-37 Select socioeconomic indicators for NSEDC communities

Community	2020 US Census					2022 ACS 5-year estimates (2018-2022)				
	Total Pop.	Alaska Native/ American Indian Residents		Minority residents		Households (Number)	Median Household Income (Average)	Average Household Income	Per Capita Income (Average)	Residents Below Poverty Threshold (Average, % of Total Pop.)
		Number	% of Total	Number	% of Total					
Brevig Mission	428	378	88.3%	406	94.9%	129	$58,438	$63,191	$13,032	53.9%
Diomede	83	72	86.7%	81	97.6%	20	NA	$26,800	$9,583	53.2%
Elim	366	325	88.8%	350	95.6%	68	$35,000	$48,803	$11,597	36.5%
Gambell	640	614	95.9%	621	97.0%	124	$39,375	$52,804	$14,773	35.4%
Golovin	175	159	90.9%	164	93.7%	68	$54,167	$67,859	$24,637	14.6%
Koyuk	312	277	88.8%	300	96.2%	99	$35,313	$47,277	$14,291	39.7%
Nome	3,699	1,878	50.8%	2738	74.0%	1,173	$103,542	$120,859	$41,722	6.1%
Saint Michael	456	410	89.9%	431	94.5%	65	$46,875	$58,609	$11,900	21.6%
Savoonga	835	803	96.2%	817	97.8%	165	$53,125	$65,822	$17,931	33.8%
Shaktoolik	212	185	87.3%	192	90.6%	74	$62,500	$66,319	$15,934	12.5%
Stebbins	634	577	91.0%	603	95.1%	164	$52,500	$58,189	$20,441	28.0%
Teller	249	224	90.0%	240	96.4%	89	$34,688	$63,621	$21,124	34.4%
Unalakleet	765	636	83.1%	654	85.5%	159	$84,375	$103,277	$44,740	12.5%
Wales	168	146	86.9%	160	95.2%	86	$34,167	$48,149	$12,759	29.5%
White Mountain	185	171	92.4%	173	94%	70	$53,125	$57,757	$20,967	21.6%

Source: 2020 U.S. Census and 2022 American Community Survey (5-year average, 2018-2022); Tables and Figures_CDQGroup_SocioeconomicIndicators

Table 4-38 Institutional governance summaries for NSEDC communities

Community	Alaska Native community name (language)	Federally recognized Tribal Government	Borough	Municipal Government	Incorporation Type (date)	ANCSCA Community	ANCSCA Regional Corporation	ANCSA Village Corporation
Brevig Mission	Sitaisaq (Iñupiaq)	Native Village of Brevig Mission	Unorganized Borough	City of Brevig Mission	2nd Class City (1969)	Yes	Bering Straits Native Corporation	Brevig Mission Native Corporation
Diomede	Iŋaliq (Iñupiaq)	Native Village of Diomede	Unorganized Borough	City of Diomede	2nd Class City (1970)	Yes	Bering Straits Native Corporation	Inalik Native Corporation
Elim	Neviarcaurluq (Central Yup'ik)	Native Village of Elim	Unorganized Borough	City of Elim	2nd Class City (1970)	Yes	Bering Straits Native Corporation	Elim Native Corporation
Gambell	Sivuqaq (St. Lawrence Island Yupik (Siberian Yupik)	Native Village of Gambell	Unorganized Borough	City of Gambell	2nd Class City (1963)	Yes	Bering Straits Native Corporation	Sivuqaq, Incorporated
Golovin	Cingik; Siŋik (Central Yup'ik; Inupiaq)	Chinik Eskimo Community	Unorganized Borough	City of Golovin	2nd Class City 234(1971)	Yes	Bering Straits Native Corporation	Golovin Native Corporation
Koyuk	Kuuyuk (Iñupiaq/Central Yup'ik)	Native Village of Koyuk	Unorganized Borough	City of Koyuk	2nd Class City (1970)	Yes	Bering Straits Native Corporation	Koyuk Native Corporation
Nome	Sitŋasuaq (Iñupiaq)	Nome Eskimo Community, King Island Native Community, Native Village of Council	Unorganized Borough	City of Nome	1st Class City (1901)	Yes	Bering Straits Native Corporation	Sitnasuak Native Corporation
Saint Michael	Taciq (Central Yup'ik)	Native Village of Saint Michael	Unorganized Borough	City of St.Michael	2nd Class City (1969)	Yes	Bering Straits Native Corporation	St. Michael Native Corporation
Savoonga	Sivunga (St. Lawrence Island Yupik/Siberian Yupik)	Native Village of Savoonga	Unorganized Borough	City of Savoonga	2nd Class City (1969)	Yes	Bering Straits Native Corporation	Kukulget, Incorporated
Shaktoolik	Saktuliq (Iñupiaq)	Native Village of Shaktoolik	Unorganized Borough	City of Shaktoolik	2nd Class City (1969)	Yes	Bering Straits Native Corporation	Shaktoolik Native Corporation
Stebbins	Tapraq (Central Yup'ik)	Stebbins Community Association	Unorganized Borough	City of Stebbins	2nd Class City (1969)	Yes	Bering Straits Native Corporation	Stebbins Native Corporation
Teller	Iġaluŋniaġvik (Iñupiaq)	Native Village of Mary's Igloo, Native Village of Teller	Unorganized Borough	City of Teller	2rd Class City (1963)	Yes	Bering Straits Native Corporation	Teller Native Corporation
Unalakleet	Uŋalaqliit; Ungalaqliit (Iñupiaq/Central Yup'ik)	Native Village of Unalakleet	Unorganized Borough	City of Unalakleet	2nd Class City (1974)	Yes	Bering Straits Native Corporation	Unalakleet Native Corporation
Wales	Kiŋigin (Iñupiaq)	Native Village of Wales	Unorganized Borough	City of Wales	2nd Class City (1964)	Yes	Bering Straits Native Corporation	Wales Native Corporation
White Mountain	Nasirvik (Iñupiaq)	Native Village of White Mountain	Unorganized Borough	City of White Mountain	2nd Class City (1969)	Yes	Bering Straits Native Corporation	White Mountain Native Corporation

Source: DCRA community database, https://dcra-cdo-dcced.opendata.arcgis.com/

4.2.6 Yukon Delta Fisheries Association (YDFDA)

YDFDA is a CDQ group that represents six communities across the lower Yukon River in the Yukon-Kuskokwim Delta. YDFDA communities include Alakanuk, Emmonak, Grayling, Kotlik, Mountain Village, and Nunam Iqua. The 2020 U.S. Census determined YDFDA communities had 3,284 residents. Emmonak is the largest YDFDA community (825 residents) and Nunam Iqua is the smallest (217 residents). In 2020, 94.5% of YDFDA residents self-identified as Alaska Native or American Indian (see Table 4-39).

YDFDA communities are located in the Kusilvak Census Area (formerly known as the Wade Hampton Census Area). All YDFDA communities are incorporated into a municipality and have as a federally recognized tribal government. The regional ANCSA chartered Native corporation for most communities in the YDFDA region is Calista Corporation and the regional ANCSA non-profit corporation is the Association of Village Council Presidents. An exception is Grayling, which is affiliated with Doyon Limited and the Tanana Chiefs Conference (see Table 4-40).

As described in Section 4.2.4, the Yukon-Kuskokwim Delta is a subarctic, coastal plain. The Yukon River delta—the northern portion of the Yukon-Kuskokwim Delta—is composed of lakes and meandering, low-gradient streams with high silt load from upstream erosion. This area has been home to the Central Yup'ik for thousands of years (Fienup-Riordan 2000). The Yukon River supports runs of all five species of Pacific salmon. Residents of the lower Yukon River rely on a variety of Pacific salmon and nonsalmon species for subsistence. Chinook and summer chum salmon compose the largest portion of the total subsistence fish harvest in some (if not most) communities along the lower Yukon River (Runfola et al. 2018). However, nonsalmon species are also important components of subsistence harvest, especially various species of whitefish (e.g., sheefish, broad whitefish, humpback whitefish, Bering cisco, and least cisco); other important nonsalmon fishes to the region's communities include herring burbot, Northern pike, and Arctic grayling (Brown et al. 2015).

Commercial and subsistence fishing are key components to the mixed economies of YDFDA communities. Historically, Yukon Delta Fish Marketing Co-op, Bering Sea Fisheries, and Kwik'pak Fisheries have processed and exported salmon from Emmonak. Kwik'pak Fisheries is a subsidiary of YDFDA and was formed in 2002 to provide economic security to villages on the Yukon River Delta. There has not been a commercial salmon fishery on the Yukon River in recent years as a result of the Chinook salmon and chum declines, and Kwik'pak Fisheries has not operated as a fish processor since 2020. Prior to recent years, Kwik'pak Fisheries was as a top employer for some YDFDA communities including Emmonak and Alakanuk (located eight miles apart from each other). During the plant's peak season, which included salmon and freshwater whitefish, the plant employed a maximum of 185 people (Himes-Cornell et al. 2013). Select economic indicators for YDFDA communities estimated the average median household income was $41,556, ranging from a low of $36,250 (Grayling) to a high of $45,655 (Emmonak).

Table 4-39 Select socioeconomic indicators for YDFDA communities

Community	2020 US Census					2022 ACS 5-year estimates (2018-2022)				
	Total Pop.	Alaska Native/ American Indian Residents		Minority residents		Households (Number)	Median Household Income (Average)	Average Household Income	Per Capita Income (Average)	Residents Below Poverty Threshold (Average, % of Total Pop.)
		Number	% of Total	Number	% of Total					
Alakanuk	756	718	95.0%	736	97.4%	246	$41,875	$55,756	$10,905	39.30%
Emmonak	825	759	92.0%	802	97.2%	343	$45,655	$57,161	$18,825	22.20%
Grayling	210	187	89.0%	205	97.6%	72	$36,250	$49,578	$16,326	27.10%
Kotlik	655	653	99.7%	654	99.8%	241	$42,344	$50,305	$10,256	35.40%
Mountain Village	621	585	94.2%	602	96.9%	200	$45,000	$61,790	$13,531	39.60%
Nunam Iqua	217	203	93.5%	215	99.1%	16	$38,214	$32,625	$8,772	74.60%

Source: 2020 U.S. Census and 2022 American Community Survey (5-year average, 2018-2022); Tables and Figures_CDQGroup_SocioeconomicIndicators.

Table 4-40 Institutional governance summaries for YDFDA communities

Community	Alaska Native community name (language)	Federally recognized Tribal Government	Borough	Municipal Government	Incorporation Type (date)	ANCSCA Community	ANCSCA Regional Corporation	ANCSA Village Corporation	Community
Alakanuk	Alarneq (Central Yup'ik)	Village of Alakanuk	Unorganized Borough	City of Alakanuk	2nd Class City (1969)	Yes	Calista Corporation	Alakanuk Native Corporation	AVCP
Emmonak	Imangaq (Central Yup'ik)	Emmonak Village	Unorganized Borough	City of Emmonak	2nd Class City (1964)	Yes	Calista Corporation	Emmonak Corporation	AVCP
Grayling	Sixno' Xidakagg (Doogh Qinaq (Holikachuk)	Organized Village of Grayling	Unorganized Borough	City of Grayling	2nd Class City (1969)	Yes	Doyon, Limited	Hee-Yea-Lingde Corporation	TCC
Kotlik	Qerrulliik (Central Yup'ik)	Native Village of Hamilton, Village of Kotlik, Village of Bill Moore's Slough	Unorganized Borough	City of Kotlik	2nd Class City (1970)	Yes	Calista Corporation	Kotlik Yupik Corporation	AVCP
Mountain Village	Asaacaryaraq / Asaucaryaraq (Central Yup'ik)	Asa'carsarmiut	Unorganized Borough	City of Mountain Village	2nd Class City (1967)	Yes	Calista Corporation	Azachorok Incorporated	AVCP
Nunam Iqua	Nunam Iqua (Central Yup'ik)	Native Village of Nunam Iqua	Unorganized Borough	City of Nunam Iqua	2nd Class City (1974)	Yes	Calista Corporation	Swan Lake Corporation	AVCP

Source: DCRA community database, https://dcra-cdo-dcced.opendata.arcgis.com/

4.2.7 Social and Economic Benefits Provided by CDQ Groups

The following section provides information on the types of social and economic benefit programs that CDQ groups provide to their residents and communities. The information herein is based on the CDQ group's Annual Reports for the most recent five years for which they are available (typically 2018-2022). Staff would note that the communities and CDQ groups are dynamic and some of the information may be outdated. Additionally, the programs supported by CDQ groups are diverse and cannot be fully captured here. The following paragraphs are organized based on key themes or types of programs provided by the CDQ groups. As appropriate, specific examples drawn from the Annual Reports are provided.

One of the most tangible economic benefits the CDQ groups have been able to support are various employment opportunities for residents. For example, in 2022, APICDA employed 152 individuals earning $1.6 million in compensation (APICDA 2022); CVRF employed 161 employees and Board members who earned $4.8 million in wages (CVRF 2022); YDFDA (and its subsidiaries) employed 396 in-region residents who earned $4.5 million in wages (YDFDA 2022). BBEDC operates a Seasonal Employment Opportunities Program which provides short-term employment opportunities for 4 to 16 weeks. Over the course of the 2021 seasonal employment cycle, BBEDC employed 23 residents earning $210,779 in compensation. BBEDC also assists residents that are interested in employment with fishing companies operating in the Bering Sea, including submitting applications to specific companies, pre-employment screenings, traveling to the job site, or obtaining gear and supplies that are necessary for new hires. Employment opportunities are available with BBEDC partners on pollock boats, longliners, crab boats, multi-species bottom fish boats, floating processors, and at shorebased processing facilities. In the first quarter of 2021, three residents worked for Alaska Leader Fisheries and earned wages that totaled $81,525 (BBEDC 2021).

The jobs generated by the CDQ groups have included work on a fishing vessel, internships with the business partners or government agencies, employment at processing plants, and administrative positions. CDQ groups have historically provided jobs associated with shoreside fisheries development projects in CDQ communities. Examples include building or improving seafood processing facilities, purchasing ice machines, purchasing and building fishing vessels, gear improvements, and construction of fish handling infrastructure. NSEDC's Norton Sound Seafood Products has operated processing plants and purchasing stations throughout the region that provide commercial fishing and employment opportunities to residents. Operating processing plants in Nome, Unalakleet, and Savoonga; buying stations in Shaktoolik, Golovin, Moses Point (Elim), and Koyuk; as well as a fleet of tender vessels in 2022, Norton Sound Seafood Products supported local fishermen through the purchase of four species of salmon, halibut, cod, and red king crab. NSEDC's 2022 Annual Report notes 128 seasonal employees processed nearly 1.2 million pounds of fish product in Norton Sound Seafood Product processing plants in Unalakleet, Nome, and Savoonga earning $960,613 in wages; 18 residents from NSEDC member communities were employed at buying stations earning $296,540 in wages.

YDFDA's Kwik'pak Fisheries has provided funding for the Emmonak Tribal Council's fish processing plant. Capital investments in processing equipment have allowed plants to produce processed seafood products for sale in global seafood markets. Kwik'Pak Fisheries did not have commercial operations in 2021 and 2022 as a result of the poor projected salmon run sizes on the Yukon River. However, Kwik'pak workers have transitioned to assisting with the development and expansion of the Youth Agricultural project by developing site upgrades, helping to construct additional greenhouses, among other tasks. In 2022, Kwik'pak Fisheries employed 33 people earning $643,342 in wages (YDFDA 2022).

CDQ groups have also created vocational training programs for CDQ and non-CDQ residents. For example, the goal of BBEDC's Vocational/Technical Training Program is to help those who are unemployed or under employed gain required certifications or attend trainings to increase employability. The program also works with residents that need training to maintain current certifications or that are

mandated by their employer. In 2021, 32 applications were approved with 29 BBEDC CDQ residents receiving training at an expense of $113,864 (BBEDC 2021). CVRF's Youth to Work Maritime Program has offered local Alaska Native youth opportunities for training and experience in commercial fishing; in 2022, 24 students received basic skills training and maritime education (e.g., knots, different roles and stations on ships, and more) (CVRF 2022).

Many CDQ groups have provided financial support for local participation in small boat fisheries. For example, the local halibut fishery is a major source of employment, income, and subsistence for St. Paul residents. CBSFA has provided the local fleet harvesting opportunities through its CDQ halibut allocation, and the group provides support services for these fishermen through its Local Fleet Support program and has worked closely with Trident Seafoods (the primary shorebased processor operating in St. Paul) to provide halibut processing services. In a typical year, CBSFA purchases the halibut from the local fleet and partners with Trident Seafoods to process and market the fish. Any halibut CDQ not able to be caught by the local fleet is leased to the *F/V Saint Paul* and *F/V Saint Peter* (vessels wholly owned by CBSFA) if they are available at the end of the season (CBSFA 2021). APICDA has supported the Nelson Lagoon Coho Fishery, a cooperative project between APICDA and Peter Pan Seafoods designed to extend the fall coho fishing season and market access for resident fishermen in Nelson Lagoon. In 2022, this program extended fishing opportunities for five days which allowed fishermen to earn additional income before the end of the season (APICDA 2022).

Another way CDQ groups have worked to benefit their regions and communities is through expenditures that support community development and infrastructure. APICDA awarded member communities a total of $1.8 million in funding through its Community Development Grant Program in 2022 to support projects that are identified through an inclusive community-wide strategic planning process undertaken annually by leadership from the local tribal government, Alaska Native Corporation, and municipal government with additional engagement from APICDA employees. Some examples of community-specific projects funded by this grant program include community housing repairs in Atka, Harbor house construction in False Pass, sea wall reinforcement in Nelson Lagoon (APICDA 2022). BBEDC operates the Community Block Grant Program which provides BBEDC communities with the opportunity to fund projects that promote sustainable community and regional economic development. In 2021, the Board of Directors allocated $500,000 per BBEDC community. Examples of community-specific investments include crab quota purchases in Aleknagkik and Manokotak, Tribal facilities or buildings in Dillingham and Pilot Point, fire truck and community infrastructure purchases in Ekwok and Ekuk, among others (BBEDC 2022). CBSFA has supported the Elders Residential Assistance Program which provides annual payments of $4,000 per household to energy suppliers or housing entities on behalf of community elders. Additionally, the Community Internet Service Contribution is a joint venture between Tanadgusix Corporation and CBSFA to increase the local internet speed in Saint Paul (CBSFA 2021).

All CDQ groups have provided post-secondary educational scholarship opportunities to residents. While the CDQ Program is intended to support economic and social development activities in eligible communities, many non-CDQ communities also benefit from an educated and well-trained workforce that is able to work in local, fisheries-based positions. Fishermen and community members from non-CDQ villages utilize the infrastructure, including maintenance and repair facilities, and training available as a result of CDQ revenues. In addition, non-member fishermen contribute catch to CDQ processing plants and residents of non-member communities gain employment in CDQ-related projects.

Several CDQ groups also support salmon assessment and enhancement projects intended to benefit salmon runs throughout western Alaska. For example, NSEDC supports the Norton Sound Fisheries Research and Development program to increase regional knowledge and understanding of fishery resources through salmon enumeration projects, salmon enhancement projects (incubation and salmon lake fertilization), research projects involving salmon, halibut, and cod tagging, among others. Additionally, many CDQ groups expend revenues and royalties in programs that subsidize fuel, gear, or

equipment purchased for subsistence harvests. For example, APICDA invested $98,593 into its Gear Reimbursement Grant. Through this program, residents who commercial fish and/or participate in subsistence harvests in the communities of Akutan, Atka, False Pass, Nikolski, Nelson Lagoon, and St. George are eligible to receive reimbursement for up to 50% of their out-of-pocket expenses (APICDA 2022). CVRF's People Propel provides financial support for adult resident's purchase of ATVs, outboards, snow machines, and skiffs which offsets the expense of equipment frequently used for subsistence. In 2022, CVRF invested $1.7 million into equipment purchases through its People Propel program benefitting 533 residents (CVRF 2022). Additionally, in a partnership with Honda Motor Company, CVRF has developed Mechanic/Welding Shops in 18 of their communities to service equipment vital to subsistence (e.g., ATVs, snowmachines, boats, etc.) as well as other mechanical household needs. CVRF has hired certified mechanical technicians for these shops and residents can pay for labor and parts or they can rent the space to do their own maintenance (Hughes 2023).

4.3 Subsistence Harvests of Salmon

The following sections of Chapter 4 provide information on subsistence harvests of chum salmon. This portion of the analysis begins by providing a high-level overview of total subsistence harvests of all resources across the state (see Section 4.3.1). Next, the regional patterns of subsistence harvests of salmon and nonsalmon fish are provided for the Yukon Area (see Section 4.3.2), the Kuskokwim Area (see Section 4.3.3), and the Norton Sound-Port Clarence Districts (see Section 4.3.4). Section 4.3.5 provides a qualitative overview of the economic and cultural importance of subsistence to rural and Alaska Native communities. ADF&G, Division of Subsistence, and the KRITFC provided substantial input to these sections of the SIA through their roles as cooperating agencies.

The analysts acknowledge that chum salmon, and all species of salmon, are an important part of the subsistence diet and a key component of cultural identity for many rural and Alaska Native communities. That this SIA provides information specific to the Yukon, Kuskokwim, and Norton Sound-Port Clarence regions is not meant to diminish the important role that chum salmon play in the subsistence economies and ways of life for people and communities in other regions across the state.[45] The portion of the SIA focused on the patterns of subsistence harvests of salmon in these regions for several reasons, a primary being the timeline for initial review and the amount of information that would need to be prepared and made available to have consistent information available for multiple Districts and sub-districts.

Additionally, staff considered the geographical footprint of ADF&G Management Areas for Western and Interior Alaska against the genetic component of WAK chum salmon. The genetic stock reporting group for WAK includes chum salmon from Coastal WAK and the Upper/Middle Yukon reporting groups. The Coastal WAK component includes stocks returning to rivers from a large area spanning from Kotzebue Sound in the north, down through Bristol Bay in the south. Staff did consider that subsistence harvests of salmon by Bristol Bay residents provide important nutritional, economic, and sociocultural benefits to many households across the region. However, of the five Pacific salmon species found in Alaska (all of which are utilized for subsistence in the Bristol Bay region), Chinook salmon, sockeye, and coho contribute to the majority of harvests. In 2020, the estimated subsistence salmon harvest in the Bristol Bay Area was 96,561 fish; of these 78,679 were sockeye (81%), 9,369 were Chinook (10%), 5,493 were coho (6%), and 2,425 were chum (3%) (see Table 6-1 in Brown et al. 2023: 118).

[45] Disaster determinations were made by the Secretary of Commerce for the Norton Sound chum and coho fisheries, the Yukon River Chinook and chum salmon fisheries, and the Kuskokwim Chinook, chum and coho commercial fisheries for 2020-2022 (with a determination for the Kuskokwim still pending for 2022). These fishery disasters for the listed areas considered impacts to both the commercial and subsistence portions of the fisheries. Positive determinations make these fisheries eligible for disaster assistance from NOAA. A declared fishery disaster must meet specific requirements under the MSA and/or the Interjurisdictional Fisheries Act.

Staff also considered the nutritional and cultural importance of subsistence harvests of salmon to households and communities in the Kotzebue District of the Northern region (the Northern region includes the Kotzebue[46] and Arctic[47] Districts). When looking at information on the species composition of salmon harvests for subsistence, chum salmon have historically contributed the majority of harvests. For example, in 2020, the estimated subsistence harvest of salmon was 61,636 fish; of these, 51,861 were estimated to be chum salmon (84%), 5,527 were coho (9%), 2,975 were pink salmon (5%), 702 were sockeye (1%), and 457 were Chinook (1%) (see Table 3-2 in Brown et al. 2023: 46). The communities encompassed within the Kotzebue District include Ambler, Buckland, Deering, Diomede, Kiana, Kivalina, Kobuk, Kotzebue, Noatak, Noorvik, Point Hope, Selawik, Shishmaref, Shungnak, and Wales. However, in light of the time constraints, staff considered that, with the exception of Diomede and Wales, the communities in the Kotzebue District are not located within the BSAI Management Area or included in the CDQ program.[48] [49]

The reader will notice this SIA does not specify particular communities or regions that are *substantially* engaged in or dependent on subsistence harvests of chum salmon (see Section 2.2 for a discussion on the National Standard 8 guidelines).[50] Information on regional- and community-level variations in the species composition of subsistence harvests is provided in the following subsections of the SIA. The analytical choice to not identify a subset of communities substantially dependent on chum salmon is not meant to suggest that the relative magnitude of dependence on chum salmon (by person, household, or community, or in a given period of the year) does not vary. For example, summer chum salmon do not typically migrate past the Tanana River in the Yukon. As such, it would be reasonable to infer lower Yukon River communities may be more dependent on the summer chum run than communities along the upper portion of the river, while communities in the upper river rely more heavily on fall chum. Additionally, chum salmon return to spawn at the headwaters of the Kuskokwim River whereas other species like sockeye do not. Communities at the headwaters of the Kuskokwim River have a greater relative dependence on chum salmon compared to some communities located lower on the river that also harvest sockeye.

However, the information that can be provided may over emphasize quantitative indicators of subsistence harvest such that the cultural importance of subsistence may be under emphasized. For example, while some households or communities may harvest (or use) comparatively small amounts of chum for subsistence, their relative degree of dependence on subsistence harvests of chum cannot be measured quantitatively when viewed through the lens of cultural identity. Kawagley (2006: 8) explains that "the subsistence-based worldview" is a "complex way of life with specific cultural mandates regarding the ways in which the human being is to relate to other human relatives and the natural and spiritual worlds."

[46] Kotzebue Sound residents have relied on fish as a key nutritional and cultural resource for thousands of years. Most residents in the region continue to participate in mixed subsistence-cash economies. The role of salmon in the wild food diet varies from community to community and is driven primarily by salmon abundance. Communities that harvest few salmon typically harvest large numbers of nonsalmon fish, such as sheefish, other whitefishes, and Dolly Varden (Brown et al. 2023).

[47] For generations, many North Slope families have included fish as a key nutritional and cultural resources, even though harvesting fish for subsistence is not the focus of all households. The Arctic District includes the subsistence fishing areas used by Anaktuvuk Pass, Atqasuk, Utqiagvik, Kaktovik, Nuiqsut, Point Hope, Point Lay, and Wainwright. The role of salmon and nonsalmon in the wild food diet varies from community to community and is affected by resource availability (Brown et al. 2023).

[48] ADF&G Division of Subsistence conducted annual salmon harvest surveys in select Kotzebue District communities from 1994 through 2004, but not in all communities. Little systematic or comprehensive subsistence harvest information has been collected since 2004 and ADF&G relies on interpolated harvest estimates for a core set of communities. This is the best scientific information available for the Northern region but may warrant some caution when comparing to other Districts and Management Areas.

[49] If the Council feels the addition of subsistence harvest information for other areas of the state, including Bristol Bay and Kotzebue would better inform its decision-making, it can direct the analysts to include this information in the next iteration of the analysis.

[50] It may be important to note the concept of "engagement" is not regularly used in ADF&G research on subsistence harvests of salmon or nonsalmon species. This term is used here, however, in line with the National Standard 8 guidelines.

This quote demonstrates the holistic nature of subsistence where attention to the individual components (i.e., the person, the resource, the local environment) fades away (Trainor et al. 2021: 4; NPFMC 2023: 9-10). **As such, this SIA considers all Alaska Native and rural communities across Western and Interior Alaska as culturally dependent on subsistence harvests of chum, noting their degree of dependence on this resource as a food source may vary.**

4.3.1 Overview of Subsistence Harvests

> *When we speak of "subsistence," we don't just mean using the resource, but using tribal methods and acting out culture and complying with those values, and we do those things because they are a measure of protection for the land and its resources. – A Venetie hunter, as quoted by ADF&G, Division of Subsistence*

State and federal laws define subsistence uses as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade (see also Chapter 3 of the preliminary DEIS). Subsistence uses are central to the customs and traditions of many cultural groups in Alaska, including Unangax̂, Athabascan, Alutiiq, Haida, Inupiaq, Tlingit, Tsimshian, Yup'ik, among others. State law (AS 16.05.258(c)) requires the Joint Board of Fisheries and Game to identify "nonsubsistence areas" where subsistence is not "a principal characteristic of the economy, culture, and way of life."[51] Outside these nonsubsistence areas, called "rural areas" subsistence fishing and hunting are important sources of employment and nutrition as discussed below (Fall 2018).[52]

[51] The Joint Board of Fisheries and Game is required to identify nonsubsistence areas, which are defined as areas where dependence upon subsistence (customary and traditional uses of fish and wildlife) is not a principal characteristic of the economy, culture, and way of life (AS 16.05.258(C)). There are 12 socioeconomic characteristics that the Joint Board examines when it defines nonsubsistence areas. The Alaska BOF may not authorize subsistence fisheries in nonsubsistence areas – in these areas the subsistence priority does not apply. Personal use fisheries provide opportunities for harvesting fish with gear other than rod and reel in nonsubsistence areas. The Joint Board has identified five nonsubsistence areas: Ketchikan, Juneau, Anchorage-Matsu-Kenai, Fairbanks, and Valdez.
[52] Federal and state laws currently differ in who qualifies for participation in subsistence fisheries and hunts. Rural Alaska residents qualify for subsistence harvesting under federal law. Under state law, all state residents have qualified.

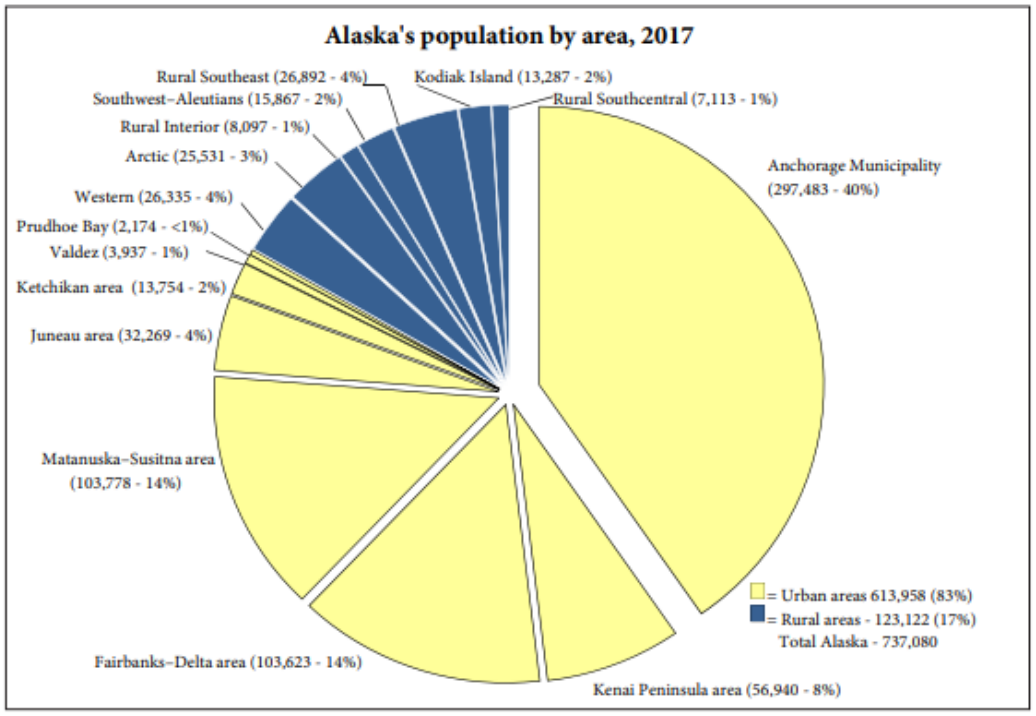


Figure 4-19 Alaska's population by area (urban and rural), 2017
Source: Fall (2018:1)

Most families and households outside of Alaska's nonsubsistence areas depend on subsistence hunting and fishing (Wolfe 2004; Brown et al. 2020). Fish resources account for a significant component of annual subsistence harvests throughout rural Alaska. For surveyed communities outside nonsubsistence areas, 92-100% of sampled households used fish, 79-92% used wildlife, 75-98% harvested fish, and 48-70% harvested wildlife (Fall 2018).

Percentage of households participating in subsistence activities in rural areas

Area	Harvesting game	Using game	Harvesting fish	Using fish
Arctic	63%	92%	78%	96%
Interior	69%	88%	75%	92%
Southcentral	55%	79%	80%	94%
Southeast	48%	79%	80%	95%
Southwest	65%	90%	86%	94%
Western	70%	90%	98%	100%
Total rural	**60%**	**86%**	**83%**	**95%**

Figure 4-20 Percentage of households participating in subsistence activities in rural areas
Source: Fall (2018:2)

In terms of the composition of subsistence harvest, outside the nonsubsistence areas, most of the wild food harvested by local residents is composed of fish (about 54% by weight), along with land mammals (22%), marine mammals (14%), birds (3%), shellfish (3%), and plants (4%) (Figure 4-21). Fish varieties include salmon (32% of all harvests), Pacific halibut, Pacific herring, and whitefishes. Seals, sea lions, walruses, and whales compose the marine mammal harvest. Moose, caribou, deer, bears, Dall sheep, mountain goats, and beavers are commonly used land mammals, depending on the community and area.

These harvests for food occur within a range of regulatory categories, including subsistence and general hunting, and subsistence, personal use, and rod and reel fishing (Fall 2018).

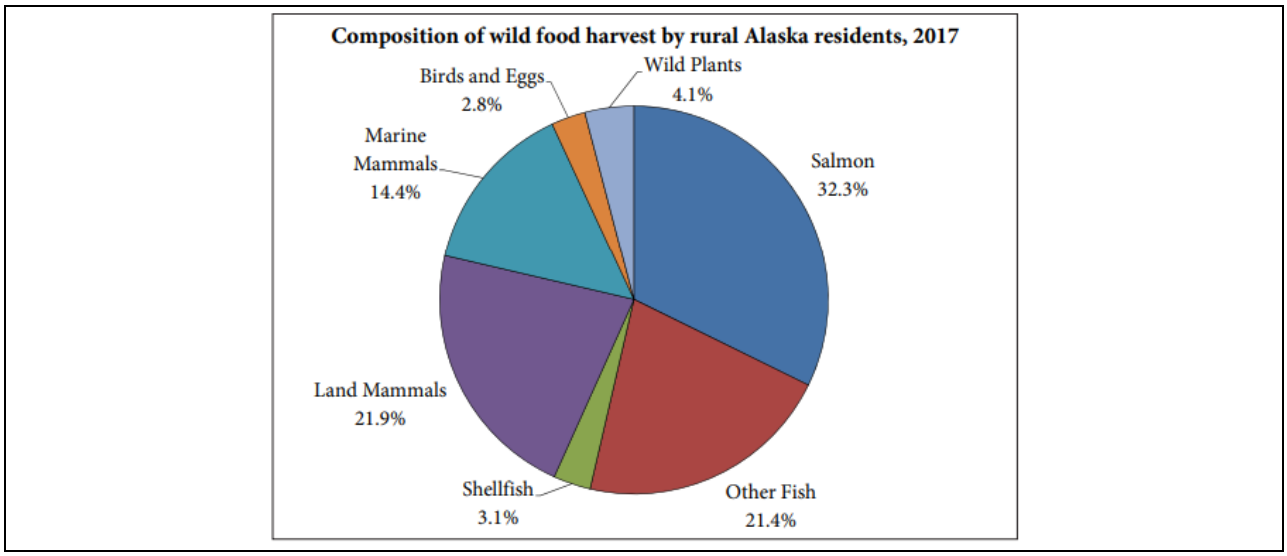


Figure 4-21 Composition of wild food harvest by rural Alaska residents, 2017
Source: Fall (2018: 2).

ADF&G, Division of Subsistence, estimated in 2017 that approximately 33.6 million pounds of wild foods were harvested annually by residents of rural Alaska, which represents approximately 276 usable pounds per person (Fall 2018). Annual per capita subsistence harvest rates in rural Alaska range from 402 pounds of wild foods per person in Arctic communities to 293 pounds per person in rural Interior Alaska communities along the Yukon River, to 379 pounds per person among Yukon-Kuskokwim Delta and Kuskokwim River communities (Fall 2018). Despite these significant contributions to the food supply in Alaska, subsistence harvests (fishing and hunting) account for less than 1% of the total harvest of Alaska's wild resources. Commercial fishing takes the largest component at 98.6% of the total resource harvest while nonresidents take about 0.3% (Fall 2018:2).

4.3.2 Yukon Area

4.3.2.1 Regional Background

Salmon are central to the subsistence cycles and cultural identity for many Yukon Area communities. For the primarily Yup'ik communities in the lower river and Athabascan communities in the middle and upper river, salmon are an important food source for both people and dogs, accounting for sometimes more than half of the total annual subsistence harvest (see also Section 4.3.2.3). The Yukon Area is divided into six in-river districts for management purposes, each of which has a unique fishing profile based on species availability, river conditions, community demographics, the use of dog teams, among other factors. Districts are further divided into subdistricts to allow fisheries managers to tailor regulations to the unique characteristics of each area (see Figure 4-22). Subsistence harvesters in the Yukon Area usually base their fishing activities either from fish camps or from their home communities. Throughout the Yukon Area, extended family groups, typically representing several households, often cooperate to harvest, process, preserve, and store salmon for subsistence uses (Brown et al. 2015).

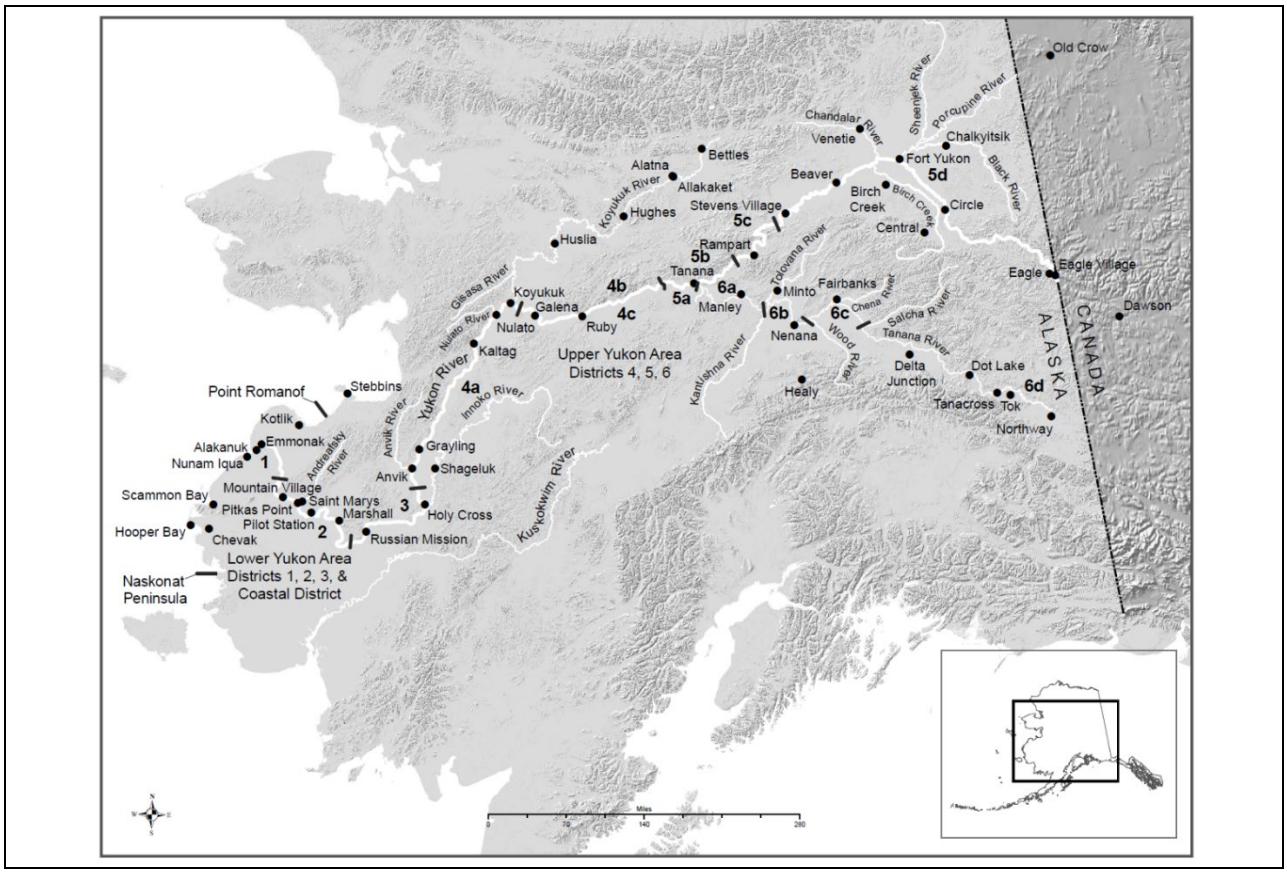


Figure 4-22 Yukon Area Map
Source: ADF&G

Salmon fishing begins in late May at the mouth of the Yukon River with Chinook salmon, which are the first to enter the river. Fishing activity picks up sequentially in other communities as fish migrate upstream. Chinook salmon typically co-migrate with summer chum until mid-July. At that time (mid-July), fall chum begin entering the river. Fall chum salmon are followed by coho salmon. Salmon fishing can continue late into the fall when the river begins to freeze, especially in the upper river where salmon arrive much later and where the runs are not as concentrated. Chinook salmon, fall chum, and coho salmon stocks migrate the full length of the Yukon River into Canada and thus are available to most communities across the Yukon River. However, summer chum salmon do not typically migrate further upriver than the Tanana River drainage. Some pink and sockeye salmon are present in the lower portions of the river but are not actively managed.

Primarily occurring in the lower river, commercial salmon fishing is a vital component of the local economy, and fishers may retain salmon from their commercial harvest for subsistence purposes. Since 2008 when the last directed commercial opportunities for Chinook salmon were offered, commercial opportunities have centered on summer and fall chum salmon, often using nonlethal gear, such as dip nets and manned, fish-friendly fishwheels to protect migrating Chinook salmon.

Yukon Area fishers primarily use drift gillnets (46% of households in 2021), set gillnets (47% of households in 2021), fish wheels (2% of households in 2021), and other gear types (5% of households in 2021) to harvest large quantities of salmon that they preserve by freezing, drying, smoking, and jarring for consumption throughout the rest of the year. Due to river conditions and the availability of wood for building materials, fish wheels are almost exclusively used in the middle and upper Yukon River and Tanana River. Summer and fall chum salmon are used to provide food for both people and dogs. While the use of subsistence caught fish to feed sled dogs is a longstanding practice that continues in present

day, the number of dogs and fish used to feed them has greatly decreased since snowmachines replaced sled dogs as the primary winter transportation (Andersen and Scott 2010).

Regulatory authority for Yukon River salmon management is shared by the Alaska BOF and the FSB and salmon fisheries are managed in accordance with the Pacific Salmon Treaty (see also Chapter 3 of the preliminary DEIS). The majority of the Alaskan portion of the Yukon Area is open to subsistence fishing, except for a portion of the Tanana River that lies within the Fairbanks Nonsubsistence Area (5 AAC 99.015). The harvest of fish for home uses in these nonsubsistence areas occurs under personal use and sport fishing regulations.

Residents of Yukon River communities harvest and use the different species of Pacific salmon in variable ways but will often catch different species at the same time; this is because species co-migrate and they might also replace the harvest of a low abundance species with harvest of another, more abundant species if possible. Further, residents harvest and use salmon in different ways depending on historical practices, availability and abundance, river morphology, weather conditions, personal preferences, among other reasons. For example, summer chum are the primary eating fish in the lower river, are preferred dried by elders in the middle river, and are not really present in the upper river. As a result, assessments of subsistence harvests of Chinook salmon, summer chum, fall chum, and coho salmon should be evaluated together.

In 2000, the Alaska BOF classified the Yukon River Chinook salmon stock as a "stock of yield concern" because of the inability to maintain expected yields and harvestable surpluses above escapement goals for several years (Lingnau and Salomone 2003). This designation has remained in place to the present date, being most recently renewed at the 2022 Alaska BOF meetings. In 2001, the BOF declared Yukon River fall chum salmon a stock of concern, due to a failure to achieve escapement goals at times, but this designation was lifted in 2007 after run sizes showed improvement. The fall chum salmon run was low again from 2020 through 2023; the summer chum salmon run has returned at disastrously lower levels since 2021. However, given the short duration of these low runs so far and the strong age-4 fish component of the runs, ADF&G did not recommend a stock of concern designation to the Alaska BOF in 2022 (Jallen et al. 2022).

As noted earlier, many of the restrictions to subsistence summer and fall chum salmon fishing in the Yukon River have resulted from efforts to protect Chinook salmon, at least until 2020 when the fall chum run itself failed to return at high enough levels to provide for subsistence fishing or meet most escapement goals and 2021 when the summer chum run followed suit. For example, the need for additional conservation measures for Chinook salmon have frequently limited gillnet mesh size to six inches through ADF&G's inseason Emergency Order authority. Limiting mesh size is intended to allow more Chinook salmon to escape to spawning grounds while continuing to allow other species of salmon, and smaller, less fecund Chinook salmon, to be harvested. Beginning in 2014, allowable subsistence gear for summer chum salmon was limited to dip nets, beach seines and manned fish wheels, during years when concerns about the conservation of Chinook salmon prevented the use of gillnets. Use of beach seines and dipnets allows fishers to harvest chum salmon selectively and return all Chinook salmon to the water unharmed.

4.3.2.2 Methods for ADF&G Postseason Harvest Assessments

ADF&G collects subsistence salmon harvest information in the Yukon Area is collected in three ways: voluntary daily harvest calendars, voluntary postseason household harvest surveys, and through mandatory permits in select, primarily road-accessible, areas. Calendars are a limited data source in developing community harvest estimates because of their relatively low response rates and because they are not distributed to all fishing households, but they do provide Yukon Area run and harvest timing information that is not obtained by other data collection methods, except in those cases where fishers provide daily harvest reporting on their subsistence fishing permits. Because harvest calendar return rates

are so low (usually <5%), ADF&G primarily relies on data collected through the postseason harvest surveys and the very high rate of returned fishing permits in order to estimate total subsistence harvests.[53]

Household harvest surveys are conducted in-person by ADF&G Division of Commercial Fisheries staff in communities in October and November following the salmon season. Survey administration is based on a stratified sampling design to achieve a representative sample of all households at all fishing levels. It is important to note that during the COVID-19 pandemic, survey methods were modified to avoid the transmission of the virus in 2020 and 2021. Instead of in person surveys, households were contacted by telephone, mail and online. The sampling protocol was adjusted to boost response rates by contacting all households, rather than the stratified sampling design described above. The most recent year of finalized data available from household harvest assessments is 2021. In total, department staff surveyed 1,418 of 2,564 households (55%) in 33 communities in the Yukon Area concerning their subsistence salmon harvests in 2021. An estimated 223 households participated in the fishery; most households were unable to participate because of the severe nature restrictions in 2021.

ADF&G Division of Subsistence staff have conducted comprehensive subsistence surveys in 35 Yukon Area communities.[54] These are door-to-door studies that document all major subsistence harvests in select communities to provide an overall subsistence proxy profile for a region. Data for communities is publicly available at the Community Subsistence Information System website.[55] In contrast to the annually occurring post-season household harvest surveys described above, comprehensive subsistence studies document the harvest of all wild resources used by a community for a single year and contextualize these data with ethnographic information about subsistence uses in the community. As a result, comprehensive surveys allow researchers to understand the relative contribution and importance of salmon to the overall subsistence harvest in a community.

More information on postseason harvest assessment methods and comprehensive subsistence surveys can be provided by ADF&G.

4.3.2.3 Patterns of Subsistence Harvests in the Yukon Area

The primary salmon species harvested for subsistence in the Yukon Area are Chinook salmon, summer chum, fall chum, and coho. Figure 4-23 shows the estimated historical subsistence harvests of salmon by species from 1988 through 2021. As shown, there has been a decline in subsistence harvests of salmon in the Yukon Area over time.

[53] Annual subsistence harvest data are largely dominated by fish harvested under efficient gear types authorized by regulation, which, especially for salmon, generally means fish taken with gillnets, beach seines, or fish wheels. However, in portions of the Kotzebue Fisheries Management Area (5 AAC 01.120(b) &(f)), Norton Sound-Port Clarence Area (5 AAC 01.170(b) & (h)), and Yukon-Northern Area (5 AAC 01.220(a) & (k)), as well as the entire Kuskokwim Fisheries Management Area (5 AAC 01.270(a)), hook and line attached to a rod or pole (i.e. rod and reel) are recognized as legal subsistence gear under state subsistence fishing regulations. In these areas, significant numbers of households take salmon for subsistence uses with rod and reel or retain salmon from commercial harvests for home use. Where the BOF has recognized rod and reel gear as legal subsistence gear, annual harvest assessment programs or subsistence fishing permits also document salmon harvested with rod and reel.
[54] **Upper River:** Central (2016), Circle (2017), Eagle (2017), Eagle Village (2017), Fort Yukon (2017), Stevens Village (2014), Venetie (2009), Beaver (2011); **Middle River:** Hughes (2014), Huslia (1983), Galena (2010), Kaltag (2018), Manley Hot Springs (2012), Minto (2012), Nenana (2015), Nulato (2010), Rampart (2014), Ruby City (2010), Tanana (2014), Alatna (2011), Allakaket (2011), Bettles (2011); **Lower River:** Alakanuk (1980), Emmonak (2008), Kotlik (1980), Marshall (2010), Mountain Village (2010), Nunam Iqua (Sheldon Point) (1980), Pilot Station (2013), Russian Mission (2011), Scammon Bay (2017), Anvik (2011), Holy Cross (1990), Grayling (2011), Shageluk (2013).
[55]The Community Subsistence Information System is accessible here.

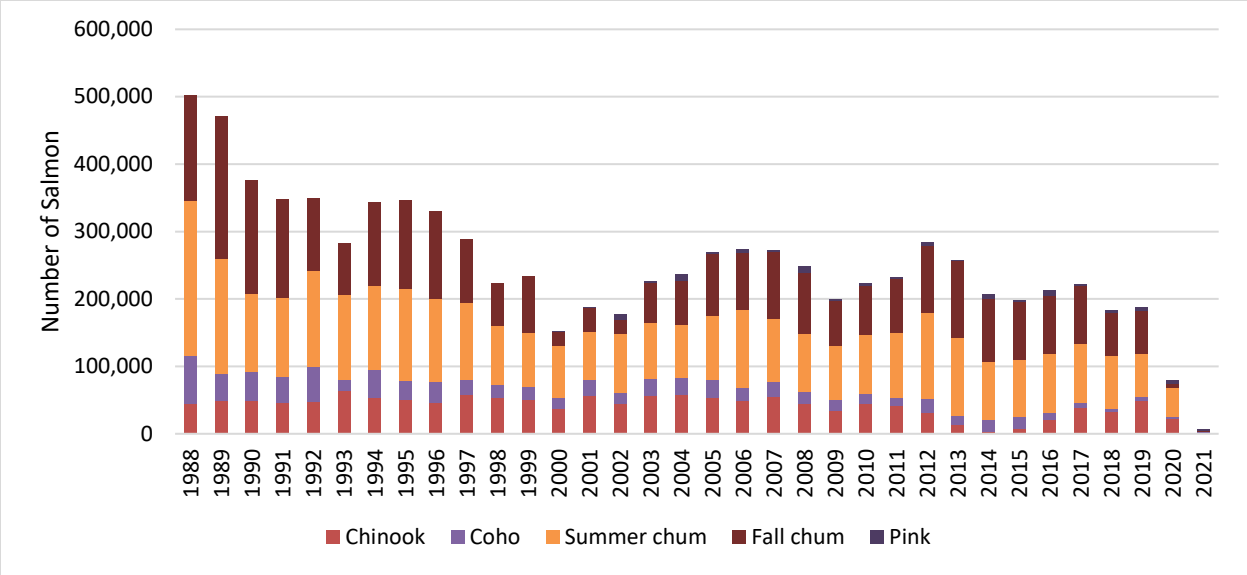


Figure 4-23 Historical subsistence salmon harvests, Yukon Area, 1988-2021
Source: ADF&G.
Notes: While the estimates of subsistence harvests of salmon are available for the Yukon Area since 1976, comprehensive and comparable subsistence harvest estimates have been available for all species except for pink salmon since 1988. It is for this reason that analytical staff have chosen to use the 1988-2021 time series. Estimates of subsistence harvests of pink salmon are available since 2000 in the Yukon Area.

Table 4-41 provides the estimated subsistence harvest level by species from 1988 through 2021, as well as the most recent 3-year (2019-2021), 5-year (2017-2021), 10-year (2012-2021), and historical average (1988-2021). Across the time series, estimated subsistence harvests of all salmon ranged from 502,087 (1988) and 6,689 fish (2021). The historical average level of subsistence harvests for all species of salmon was 253,806 fish, and the most recent 3-year average was 91,368 fish. The estimated 2021 subsistence harvest of all salmon in the Yukon Area was 6,869 fish which was the lowest level on record.

Table 4-41 Estimated subsistence harvest of salmon, Yukon Area, 1988-2021

	Estimated salmon harvest[a]					
Year	Chinook	Coho	Summer chum	Fall chum	Pink	Total
1988	45,495	69,679	229,838	157,075		502,087
1989	48,462	40,924	169,496	211,303		470,185
1990	48,587	43,460	115,609	167,900		375,556
1991	46,773	37,388	118,540	145,524		348,225
1992	47,077	51,980	142,192	107,808		349,057
1993	63,915	15,812	125,574	76,882		282,183
1994	53,902	41,775	124,807	123,565		344,049
1995	50,620	28,377	136,083	130,860		345,940
1996	45,671	30,404	124,738	129,258		330,071
1997	57,117	23,945	112,820	95,141		289,023
1998	54,124	18,121	87,366	62,901		222,512
1999	50,515	19,984	79,250	83,420		233,169
2000	36,844	16,650	77,813	19,402	1,591	152,300
2001	56,103	23,236	72,392	36,164	403	188,298
2002	44,384	16,551	87,599	20,140	8,425	177,100
2003	56,872	24,866	83,802	58,030	2,167	225,737
2004	57,549	25,286	79,411	64,562	9,697	236,506
2005	53,547	27,357	93,411	91,667	3,132	269,114
2006	48,682	19,985	115,355	84,320	4,854	273,196
2007	55,292	22,013	93,075	99,120	2,118	271,618
2008	45,312	16,905	86,652	89,538	9,529	247,936
2009	33,932	16,076	80,847	66,197	2,300	199,352
2010	44,721	14,107	88,692	71,854	4,199	223,573
2011	41,069	12,576	96,459	80,549	2,291	232,944
2012	30,486	21,633	127,313	99,719	5,150	284,301
2013	12,575	14,566	115,252	113,767	1,079	257,239
2014	3,287	17,072	87,135	92,507	6,932	206,933
2015	7,582	18,252	83,787	86,680	2,645	198,946
2016	21,684	9,088	88,258	84,933	8,719	212,682
2017	38,225	7,513	87,875	85,719	2,449	221,781
2018	32,013	5,527	77,435	65,008	3,712	183,695
2019	48,623	5,887	63,597	64,270	5,029	187,406
2020	22,663	2,922	42,592	6,207	5,444	79,828
2021	1,984	296	1,234	705	2,650	6,869
3-year average (2019-2021)	24,423	3,035	35,808	23,727	4,374	91,368
5-year average (2017-2021)	28,702	4,429	54,547	44,382	3,857	135,916
10-year average (2012-2021)	21,912	10,276	77,448	69,952	4,381	183,968
Historical average (1988-2021)	41,344	22,359	99,891	87,432	4,296	253,806

Source: ADF&G.
Notes: While subsistence fishing for Chinook salmon was closed in 2021, there was some minimal harvest. These are usually fish that trickle in early before the fishery is officially closed and may be caught in gill nets set for sheefish and other whitefish that migrate before salmon. This number also includes salmon from assessment projects; these fish are donated to local communities.

Figure 4-24 shows the estimated number of summer and fall chum salmon harvested for subsistence from 1988 through 2021. Across the time series, subsistence harvests of summer chum ranged from 229,838 (1988) and 1,234 (2021) fish. Subsistence harvests of summer chum were relatively stable from 2011 through 2020 and were primarily affected by efforts to conserve Chinook salmon which co-migrate with summer chum salmon until 2021. Summer chum returned to the Yukon River at a historically low level in 2021 which continued in 2022 and 2023 (although not shown quantitatively here).

Subsistence harvest of fall chum have ranged from 211,303 (1989) and 705 (2021). Two periods of very low harvests are apparent for fall chum salmon from 2000–2002 and again in 2020 and 2021. Historically high levels of summer chum and fall chum harvest declined by the mid-1990s because of the end of the chum commercial roe fishery in the middle river where roe was stripped and sold, and the fish carcasses were used for subsistence. Additionally, declines in the fall chum salmon harvests are tied to a decline in the number of dog teams along the Yukon River (Andersen & Scott 2002; 2010).

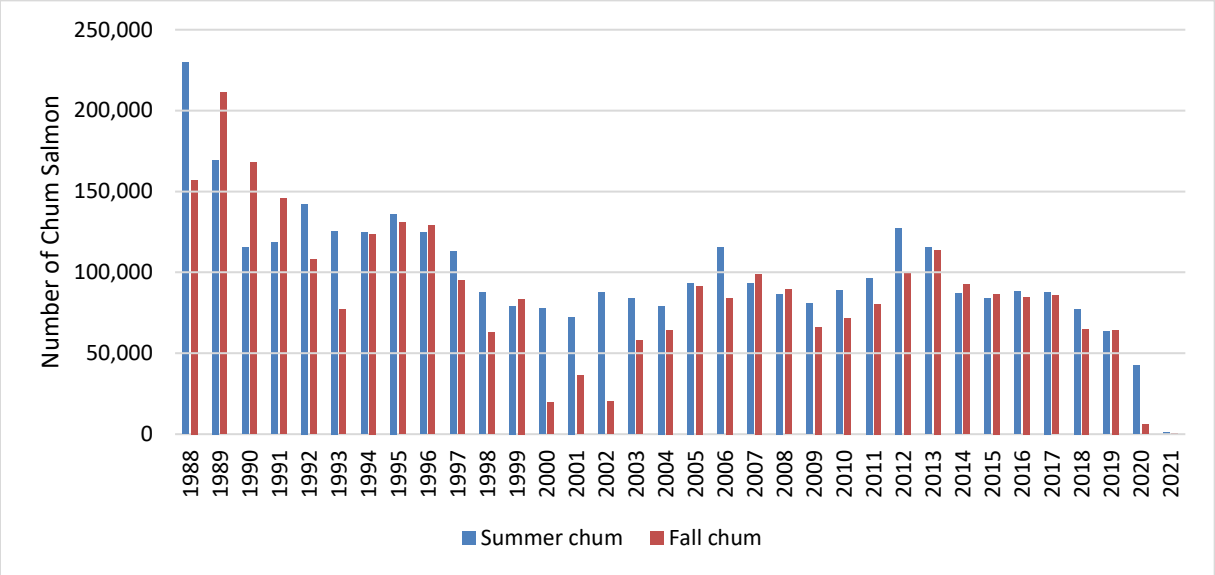


Figure 4-24 Estimated summer and fall chum subsistence harvests, Yukon Area, 1988-2021
Source: ADF&G

Table 4-42 provides a comparison of the Yukon Area amounts necessary for subsistence (ANS) and the estimated subsistence harvests of salmon from 1998 through 2021. In 2001, the BOF made species-specific ANS determinations for Chinook, summer chum, fall chum, and coho salmon for the Yukon Area (prior to 2001, species-specific ANS ranges did not apply). While harvest levels of summer chum have changed over time, the BOF decided against revising the ANS for Yukon salmon at its 2013 meeting in response to changing harvests of summer chum salmon for roe and dog food. At that time, it was unclear whether Chinook salmon would continue to decline, and the BOF received testimony from subsistence users that they would need to harvest more of other salmon species to meet their subsistence needs, given the reduction in Chinook salmon harvest opportunities.

Table 4-42 Comparison of amounts necessary for subsistence salmon harvests, Yukon Area, 1998-2021

ANS range	Chinook 45,500–66,704	Coho 20,500–51,980	Summer chum 83,500–142,192	Fall chum 89,500–167,900	Pink[b] 2,100–9,700
Year	Estimated number of subsistence salmon harvested[a]				
1998[c]	52,910	**16,606**	**81,858**	**59,603**	
1999[c]	50,711	**20,122**	**79,348**	**84,203**	
2000[c]	**33,896**	**11,853**	**72,807**	**15,152**	
2001	53,462	21,977	**68,544**	**32,135**	
2002	**42,117**	**15,619**	**79,066**	**17,908**	
2003	55,221	22,838	**78,664**	**53,829**	
2004	55,102	24,190	**74,532**	**61,895**	
2005	53,409	27,250	93,259	91,534	
2006	48,593	**19,706**	115,093	**83,987**	
2007	55,156	21,878	92,891	98,947	
2008	**45,186**	**16,855**	86,514	**89,357**	
2009	**33,805**	**16,006**	**80,539**	**66,119**	
2010	**44,559**	**13,045**	88,373	**68,645**	
2011	**40,980**	**12,344**	96,020	**80,202**	
2012	**30,415**	21,533	126,992	99,309	
2013	**12,533**	**14,457**	115,114	113,384	**1,076**
2014	**3,286**	**16,898**	86,900	92,229	6,932
2015	**7,577**	**18,107**	83,567	**86,600**	2,645
2016	**21,627**	**8,822**	88,082	**84,650**	8,719
2017	**38,100**	**7,313**	87,437	**85,093**	2,449
2018	**31,812**	**5,527**	**76,926**	**64,494**	3,712
2019	48,379	**5,819**	**63,303**	**63,862**	5,029
2020	**21,531**	**2,339**	**41,595**	**5,696**	5,443
2021	**1,984**	**1,234**	**705**	**296**	2,650

Source: Padilla et al. (2023)
a. Estimates for 1998–2004 do not include personal use harvests, ADF&G test fishery distributions, or salmon removed from commercial harvests. Estimates for 2005–2021 include test fishery distributions because the amounts necessary for subsistence (ANS) are based on harvests from 1990–1999 and include test fishery distribution. Bold underlined cells indicate harvest amounts are below the minimum ANS.
b. ANS for pink salmon added by BOF in 2013.
c. Species-specific ANS ranges do not apply before 2001.
Other notes: the harvest levels reported in the ANS tables are less than the total subsistence harvests because the latter also include personal use harvests of salmon.

While salmon are a key subsistence food source for most communities across the Yukon Area, the composition of species harvests for subsistence vary based on the geographic distribution of resources. For example, in the Coastal District and Districts 1 and 2 in the lower river, summer chum salmon contribute in greater magnitude to the total subsistence salmon harvests. When Districts are compared in sequence moving upriver (i.e., from the lower river region to the upper river region), there is a gradual shift in subsistence use towards fall chum salmon. These patterns can be seen in Figure 4-25 which shows the average species composition of subsistence salmon harvests by District for the most recent 10-years for which data are available (2012-2021). This information is based on estimated subsistence salmon

harvests by community, aggregated to the district-level to show subsistence harvest information at a smaller spatial scale across multiple years.[56]

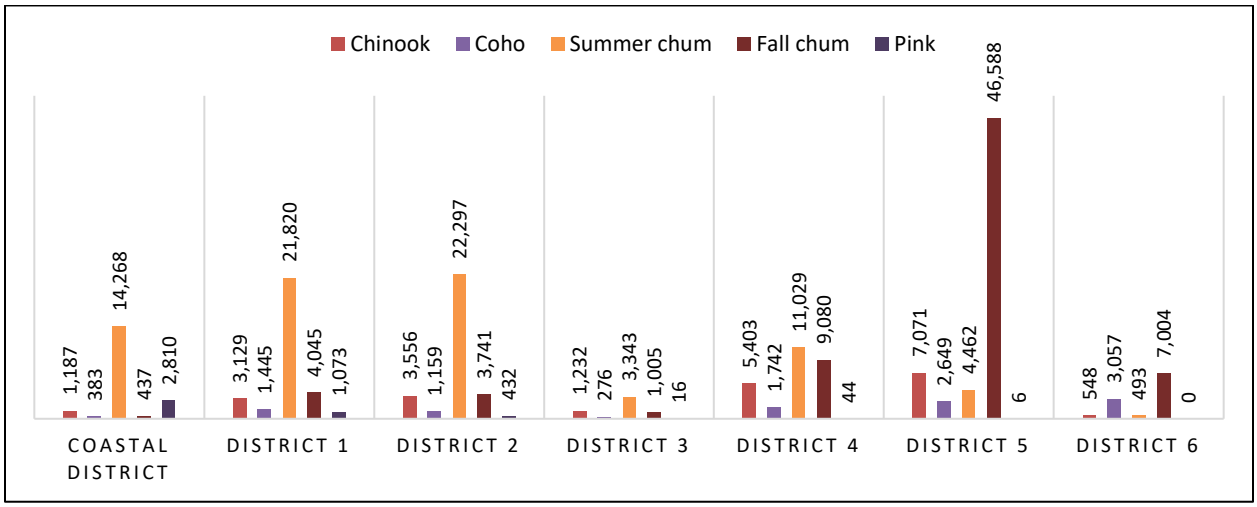


Figure 4-25 Average level of historical species composition of subsistence harvest estimates by Yukon Area district, 2012-2021

Source: ADF&G.

Further considering subsistence harvests of chum salmon within the context of total subsistence harvests (i.e., all resources used for subsistence) provides insight into the relative importance of chum salmon as part of the subsistence diet and economies for Yukon Area residents. Overall, chum salmon (summer and fall) harvested in the Yukon Area provide hundreds of thousands of pounds of wild foods to local residents each year (Brown et al. *In prep*; CSIS). Harvest data are represented in usable (or edible) pounds so that individual resource categories or species of harvest can be compared with others to better understand the subsistence economies within and across communities.

Across all subregions of the Yukon Area, chum salmon are important for their nutritional and cultural value (see Section 4.3.5). Results from comprehensive subsistence surveys in 35 Yukon Area communities show summer and fall chum accounted for approximately 69% of the total salmon harvest by weight for study communities in the upper and middle regions and 56% of total salmon harvest by weight for study communities in the lower region. Summer and fall chum accounted for approximately 43% of the total subsistence harvest weight (i.e., all resources including small and large land mammals, marine mammals, vegetation, and others) for study communities in the Upper region, 36% of total subsistence harvest weight in the Middle region, and 19% of the total subsistence weight in the lower region (see Table 4-43). In the lower region of the river there are generally more subsistence resources available, primarily because of marine mammals. As such, subsistence harvests of salmon contribute a relatively smaller proportion of total subsistence harvests for these communities. However, summer chum salmon are harvested in the largest proportion compared to all species of salmon. Moving upriver, salmon, and chum salmon in particular, play an increasingly important role in the subsistence harvest composition of these communities.

[56] In the Yukon Area, management of coho salmon is tied to fall chum salmon management because of run timing. As such, it is difficult to assess reasons for trends in coho salmon harvests over time, especially considering they are not specifically targeted by a large number of fishing households for subsistence. This is because of their lower abundance compared to fall chum salmon and late run timing. Pink salmon harvests are typically only reported in lower river communities, although the species is included on harvest surveys and catch calendars in all regions of the drainage. Although sockeye salmon are occasionally found in the lower portion of the Yukon River, their numbers are so low that they are not actively managed in the Yukon Area.

Table 4-43 Usable pounds (lb.) of summer and fall chum harvested for subsistence compared to all salmon species (lb.) and all subsistence harvests (lb.) by region, Yukon Area

	Upper Region	Middle Region	Lower Region
Summer and Fall Chum (Usable lb.)	210,745	353,411	406,039
All Salmon Species (Usable lb.)	305,034	514,292	730,258
As Percent of Total Salmon Harvests	69%	69%	56%
All Subsistence Harvests (Usable lb.)	489,089	970,580	2,127,795
As Percent of Total Subsistence Harvest	43%	36%	19%

Source: ADF&G.

Although salmon are the focus of most management actions in the Yukon Area, nonsalmon fish harvests are also significant components of the annual subsistence round for Yukon Area fishers. Some nonsalmon species are available year-round, while salmon are only available seasonally (typically May-October depending on the region along the river). Nonsalmon fishes not only provide additional sources of nutrition for residents of the Yukon Area, but they also represent a significant cultural resource for subsistence fishers in the region. In 1987, and again in 1993, the Alaska BOF made a positive customary and traditional use determination for freshwater fish species in the Yukon Area, including sheefish, whitefish species, Arctic lamprey, burbot, longnose sucker, Arctic grayling, northern pike, and Arctic char (5 AAC 01.236).

ADF&G Division of Commercial Fisheries collects nonsalmon harvest data on an annual basis as part of the postseason subsistence salmon harvest survey. Although these data have value as the only annual estimate of nonsalmon fish harvests in the Yukon Area, the stratified sample of salmon fishing households to which the survey is administered may not be the most representative methodology for collecting nonsalmon harvest information. Other single year nonsalmon harvest data collection efforts suggest that the postseason survey may significantly underestimate harvests (Andersen et al. 2004; Brown et al. 2005). As such, these data should be interpreted with some caution as they likely represent minimum amounts of nonsalmon fishes harvested for subsistence. Table 4-44 shows harvest estimates of whitefish, sheefish, and northern pike by surveyed by district as well as the Yukon Area total for 2021.

Table 4-44 Estimated subsistence harvest of whitefish, northern pike, and sheefish by community, Yukon Area, 2021

	Households		Estimated nonsalmon harvest				
Community	Total	Surveyed[a]	Large whitefish[b]	Small whitefish[b]	Northern pike	Sheefish	Total
Coastal District subtotal	343	185	1,122	2,474	2,173	8	4,655
District 1 subtotal	502	333	1,292	4,186	3,611	2,667	10,464
District 2 subtotal	533	309	3,084	959	2,160	1,168	4,287
District 3 subtotal	156	84	725	250	566	362	1,903
District 4 subtotal	595	314	390	537	396	628	1,951
District 5 subtotal	435	211	366	1,908	854	127	3,255
Total	**2,564**	**1,436**	**6,979**	**10,314**	**9,760**	**4,960**	**26,515**

Source: Padilla et al. (2023)
The number of households contacted per species may vary. The number of households indicated is the greatest number of households contacted for a given species.
Large whitefish were considered to be 4 pounds or larger and small whitefish were considered to be less than 4 pounds.

4.3.3 Kuskokwim Area

4.3.3.1 Regional Background

The subsistence salmon fisheries in the Kuskokwim Area are some of the largest in the state of Alaska, both in terms of the number of residents who participate, and the number of salmon harvested (Fall et al. 2014). There are 38 communities along the Kuskokwim, 37 of which are permanently occupied year-round. A majority of Kuskokwim Area households reside in the lower river area. Bethel, in the lower river, is the largest community in the region (6,325 residents based on the 2020 U.S. Census), accounting for roughly half of the households for the entire Kuskokwim Area (McDevitt et al. 2021).

Most Kuskokwim Area fishers harvest in the main stem or local tributaries. The north Kuskokwim Bay communities of Kwigillingok, Kongiganak, and Kipnuk are also not located on the Kuskokwim River, but some residents travel to the Kuskokwim River to fish as well as in many small salmon bearing coastal rivers or marine waters (Andrew 2008; Himmelheber 1987:7; Ikuta et al. 2016a; Stickney 1984:60–61; Walker and Coffing 1993:1). The communities on the Bering Sea coast (Mekoryuk [on Nunivak Island], Newtok, Tununak, Toksook Bay, Nightmute, and Chefornak) harvest salmon from local rivers and coastal waters, which likely include coastal stocks as well as mixed stocks that were not bound for the Kuskokwim River (Fienup-Riordan 1983:112; Godduhn et al. 2020b; Walker and Coffing 1993:1). Data available for these Bering Sea coast communities is limited to a 2011 study conducted by the Association of Village Council Presidents (AVCP), which provides the most recent subsistence harvest data for this portion of the Kuskokwim Area (Wolfe et al. 2012).

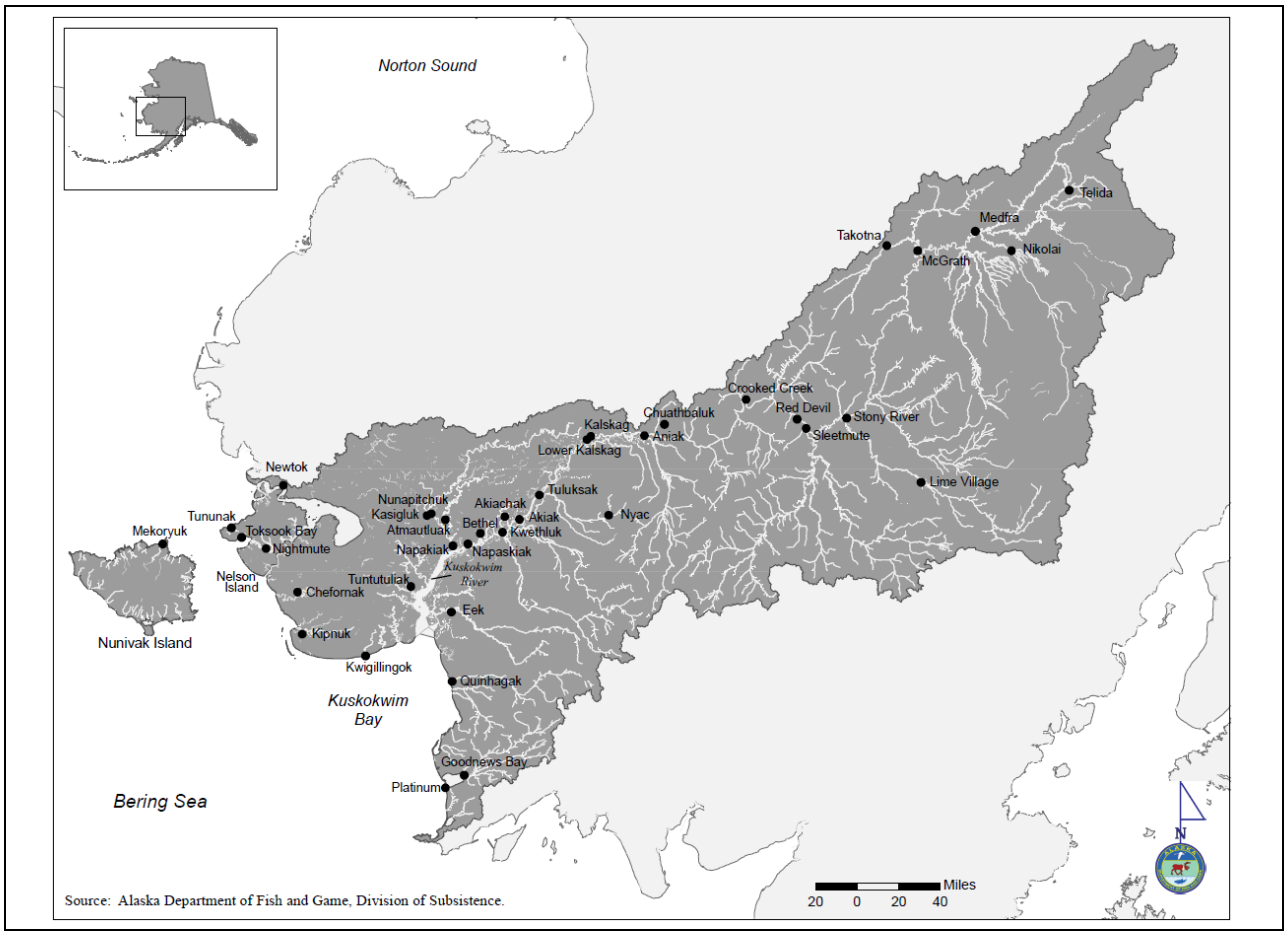


Figure 4-26 Kuskokwim Area Map
Source: ADF&G

Thirty-three of the regional tribes comprising the KRITFC have designated the Kuskokwim Fisheries Management Area into 7 distinct geographic units to ensure broad geographic representation throughout the region (see Figure 4-27). Moving from the Kuskokwim River headwaters down the drainage to the Bering Sea coast, they are as follows: **Unit: 1** Nikolai, Telida, McGrath, Takotna; **Unit 2:** Stony River, Lime Village, Sleetmute, Red Devil, Georgetown Crooked Creek; **Unit 3:** Napaimute, Chuathbaluk, Aniak, Upper Kalskag, Lower Kalskag; **Unit 4:** Tuluksak, Akiak, Kwethluk, Akiachak; **Unit 5:** Bethel; **Unit 6:** Oscarville, Napaskiak, Napakiak, Atmautluak, Kasigluk, Nunapitchuk; **Unit 7** Tuntutuliak, Eek, Kongiganak, Kwigillingok, Chefornak, Kipnuk, Quinhagak.[57]

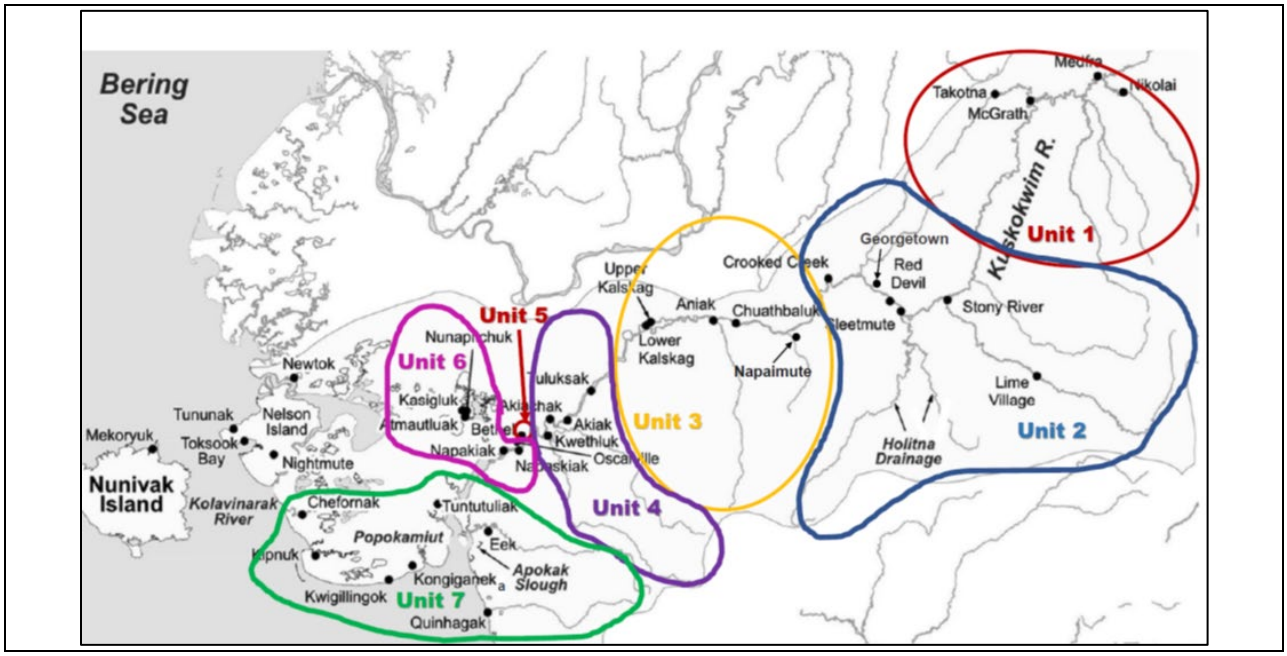


Figure 4-27 The Kuskokwim watershed and major tributaries with the 7 geographic regions delineated by KRITFC

Source: KRITFC

Most residents of the Kuskokwim River are Yup'ik but the communities of the very upper portion have historically been primarily Athabascan and Denia'ina. As in other parts of the state, Kuskokwim Area communities rely heavily on the annual returns of all five species of Pacific salmon found in Alaska—Chinook salmon, chum, sockeye, coho, and pink salmon—as a food source and as part of their cultural identity and values (Andrews 1989:154; Brown et al. 2012; 2013; Fienup-Riordan 1990:184; 1995:120, 123; Ikuta et al. 2013; 2014; Oswalt 1963a; 1963b; 1990; Pete 1993; Senecal-Albrecht 1998; 1990).

Regulatory authority for Kuskokwim River salmon management in the upper portion of the Kuskokwim River is shared by the FSB and the Alaska BOF and their respective agencies. On the Kuskokwim, ADF&G is responsible for implementing the Kuskokwim River Salmon Management Plan (5 AAC 07.365) and also has inseason discretionary management authority for salmon in Alaska's navigable waters. The portion of the Kuskokwim River drainage from the Aniak River downstream to Kuskokwim Bay is within the boundaries of the Yukon Delta National Wildlife Refuge. As such, the U.S. Fish and Wildlife Service (USFWS) shares inseason subsistence fishing management decision-making with ADF&G in this part of the Kuskokwim River. The USFWS holds final decision-making authority over management of salmon in these waters in the event that the federal subsistence program determines that

[57] Not all Kuskokwim region communities are specifically listed within the units established by KRITFC, namely in Unit 7 stretching along the Bering Sea coast and Kuskokwim Bay. For example, Platinum, Goodnews Bay, Nunivak Island, and Nelson Island (*Qaluyaat*) communities are not members of the KRITFC but are grouped in this analysis with Unit 7 communities for the purposes of data presentation.

subsistence uses by non-federally qualified users must be eliminated in order to meet the federal subsistence priority.

In 1988, the Alaska BOF formed the Kuskokwim River Salmon Management Working Group (Working Group) in response to requests from stakeholders in the Kuskokwim Area who sought a more active role in the management of salmon fishery resources (Bailey and Shelden 2014:1; Smith and Linderman Jr. 2008:1). In May of 2016, USFWS and the KRITFC established a Kuskokwim River Partnership Memorandum of Understanding, formal partnership for fisheries management with the U.S. Department of the Interior (DOI), USFWS, and KRTIFC. The KRITFC is made up of fish commissioners representing all 33 federally recognized tribes on the Kuskokwim River. In line with Title VIII of ANILCA (ANILCA; 16 U.S.C. 3112), KRITFC was created with the intention of enabling Kuskokwim River residents to move beyond solely an advisory role and establish a system in which rural residents participate in a co-management of Kuskokwim River fisheries resources.

KRITFC and YDNWR's joint 2022 and 2023 Kuskokwim River Salmon Management Strategies (Salmon Management Strategies) outline the co-management partnership's approach to Kuskokwim chum salmon management, which was federalized under provisions of Title VIII of ANILCA in 2022 and 2023 following a severe decline in chum salmon returns in 2021.[58] The Strategies state the partnership's intent to rebuild Kuskokwim chum salmon populations by implementing conservation management to avoid collective overharvest and achieve tributary escapements, while also providing for as much customary and traditional salmon harvest as possible. The Salmon Management Strategies between KRITFC and YDNWR, as well as federal Special Action management announcements made at the beginning of the 2022 and 2023 seasons, reflect uncertainty.[59]

Subsistence harvest of salmon in the Kuskokwim River is allowed without a permit (5 AAC 01.280) and with generally no closed seasons (5 AAC 01.260; 50 CFR §100.27), except as specified in the management plan or otherwise ordered for conservation purposes, as has been the case in recent years. Preferred gear types vary between the different subregions of the Kuskokwim Area, and fishers often select gear based on targeted species and local environmental factors such as river morphology and water level. In recent decades, drift gillnets have been the most common gear type deployed by fishers in the lower and middle Kuskokwim River communities where river depth and width permit the efficient use of this type of net. In communities along the upper Kuskokwim River, a narrower and generally shallower river channel typically restricts fishers to the use of set gillnets and occasionally fish wheels. Also, subsistence fishers who reside in communities near clearwater streams often harvest salmon by rod and reel (e.g., Kwethluk, Takotna, and Nikolai), and dipnets are a traditional salmon fishing gear of Lime Village residents.

There is overlap in the returns of Chinook salmon, sockeye, and chum in June and July, and between chum and coho salmon in July and August. These dynamics pose management challenges because it is difficult for subsistence fishers to harvest significant numbers of abundant sockeye salmon with drift gillnets, the favored gear type, without impacting chum and Chinook salmon populations as the run timing of these three species overlaps. Figure 4-28 provides information on the overlapping run timing of Chinook, chum, and sockeye salmon in the Kuskokwim River. Providing harvest opportunities with drift gillnets requires the management of all three species to ensure Chinook and chum salmon conservation and rebuilding. As a result of this overlapping run timing, during most of the season harvesters using driftnets take a mixture of species, including currently declined populations of Chinook, chum and coho salmon.

In 2022 and 2023, subsistence fishing opportunities provided during the chum run between mid-June and early August (and during the tail-end of Chinook salmon run, occurring between late May to mid-July)

[58] The 2022 Kuskokwim River Salmon Management Strategy is available here. The 2023 Kuskokwim River Salmon Management Strategy can be found here.
[59] The 2022 management action is available here and the 2023 action is available here.

were primarily aimed at expanding sockeye salmon harvests while avoiding harvest of chum, Chinook, and coho. KRITFC and YDNWR managers restricted gear types (e.g., permitting the operation of dipnets or short bank-oriented set gillnets) and fishing times (e.g., 6- or 12-hour gillnet opportunities following the tide cycle; providing drift gillnet opportunities near the peak of the sockeye salmon run) informed by LKTK about sockeye salmon being strongly bank-oriented and chum salmon migrating in deeper off-shore water. These restricted gear openings allow for higher chum salmon escapement during times of conservation. Chum salmon are incidentally caught in such "sockeye-targeted" opportunities, but in minimal numbers, especially when compared to drift gillnet opportunities, which make harvesting chum salmon (and Chinook salmon) swimming in deeper, main channel waters easier. In effect, subsistence fishing opportunities provided during Kuskokwim chum salmon returns in 2022 and 2023 were sockeye salmon opportunities, with the explicit objective of minimizing the harvest of chum salmon.

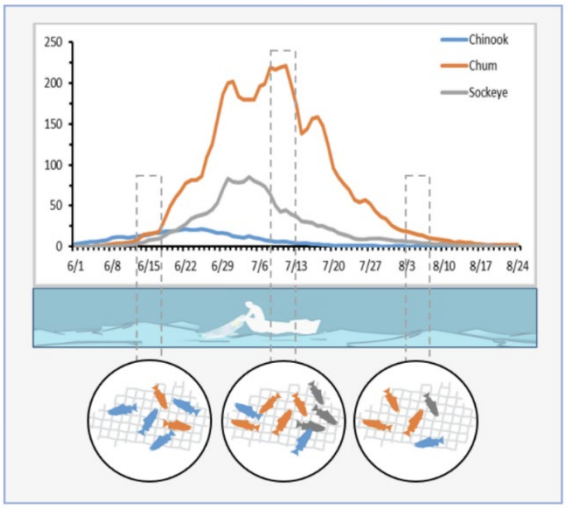


Figure 4-28 Average Chinook salmon, chum, and sockeye run timing at Bethel Test Fishery (2011-2021)
Source: KRITFC
Note: Numbers on the left side of the figure are not numbers of salmon, but simply an index of abundance based on many years of information from Bethel Test Fish Fishery Project.)

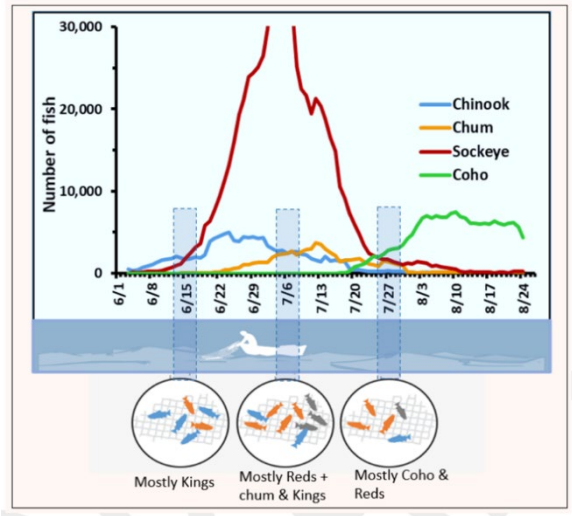


Figure 4-29 Average Chinook salmon, chum, and sockeye run timing Bethel sonar (2019-2022)
Source: KRITFC

In-season data, including LKTK about run timing and harvest needs, was used by KRITFC and YDNWR managers to determine when the chum salmon run was near complete (i.e., 90% completed) and management restrictions could be lifted.[60] Attainment of escapement goals and ANS was evaluated postseason.

4.3.3.2 Methods for Harvest Assessments

4.3.3.2.1 ADF&G Postseason Salmon Harvest Assessments

As on the Yukon River, ADF&G's salmon harvest estimates are based on postseason surveys with Kuskokwim Area households and supplemented by harvest calendar data. ADF&G has been estimating Kuskokwim Area subsistence salmon harvests annually by postseason subsistence survey since 1960; methods were improved and standardized in 1988 and data are comparable since 1989 (Hamazaki 2011; McDevitt et al. 2020). The Orutsararmiut Native Council (ONC) has been involved with subsistence salmon harvest monitoring in Bethel since 1999. As in the Yukon Area, the 2020 and 2021 survey

[60] Examples of LK and TK used to inform these management decisions include observations on historic run timing, when the peak of the run or near completion tends to be, migration patterns and appearance of other fish (including coho salmon and whitefish) or wild foods (e.g., berries), weather patterns, and arrival at their spawning grounds.

seasons were characterized by numerous challenges as a result of the COVID-19 pandemic and associated community health and safety guidelines and travel restrictions (McDevitt et al. 2021); an online survey and an abbreviated phone survey was created to provide households with an additional opportunity to participate without direct contact with a surveyor.

In 2021, household surveys were attempted in 28 of the 38 communities within the Kuskokwim Management Area, including most communities along the Kuskokwim River and all communities within South Kuskokwim Bay. In 2021, there was an estimated total of 4,037 households in the 28 study communities. This estimate of households does not include the north Kuskokwim Bay communities of Kwigillingok, Kongiganak, or Kipnuk or the Bering Sea coast communities of Nightmute, Mekoryuk, Newtok, Toksook Bay, Tununak, and Chefornak, where researchers have been unable to gain approval to conduct the research. Out of the 4,291 estimated 2020 households, surveys were conducted with 1,639 households (38%) in 26 Kuskokwim Area communities.

ADF&G Division of Subsistence staff have conducted comprehensive subsistence surveys in 25 Kuskokwim River communities. As with the Yukon Area, these are door-to-door studies that document all major subsistence harvests in select communities to provide an overall subsistence proxy profile for a region. More information on postseason harvest assessment methods and comprehensive subsistence surveys can be provided by ADF&G.

4.3.3.2.2 Kuskokwim River Community-Based Harvest Monitoring and Inseason Harvest Estimation

This section of the analysis was prepared by KRITFC, and it describes KRITFC's Community-Based Harvest Monitoring (CBHM) program for the lower Kuskokwim River. Inseason harvest estimation has not been a typical tool utilized in subsistence salmon management in Alaska. It is not intended to estimate total season or total river subsistence harvests but is principally utilized as an inseason management tool.

The CBHM program for the lower Kuskokwim River began in 2017 as part of an inseason harvest estimation framework initially developed by YDNWR staff in 2016 (Staton and Coggins 2016*),* and now operated by KRITFC in conjunction with YDNWR and ONC. Bering Sea Fishermen's Association (BSFA) provided administrative support for this program before turning it over to KRITFC in 2021. Given that no inseason harvest data were available, this assessment program was developed to inform fisheries managers on inseason harvests of depressed Chinook salmon stocks during specific directed subsistence fishing windows (e.g., 6-, 12-, or 24-hour opportunities announced by YDNWR and KRITFC) in order to meet escapement goals while providing some subsistence harvest opportunities. This information also has become important for documenting harvests of chum salmon that drastically declined in recent years, and for coho salmon in 2023 following a severe decline in the 2022 return. The harvest estimation framework requires two primary information types: 1) an estimate of the total number of fishing trips each day; and 2) trip interview data from subsistence harvesters to document fishing trip gear and catch characteristics (Staton and Coggins 2016*,* 2017*;* Staton 2018*;* Decossas 2019*,* 2020*;* Russell et al. 2021*;* Bechtol and Schomogyi 2022; Bechtol et al. 2024*)*.[61]

The number of fishing trips each day is based on aerial survey counts of nets fishing from the Kuskokwim River mouth near Eek Island to Bogus Creek near the community of Tuluksak (Figure 4-30). For each fishing opportunity, one to two flights are conducted between low and high tides, when the tides have the strongest flow, and which are the most popular times to fish. Flights last 1½ to 2½ hours and are typically conducted by YDNWR staff and a USFWS pilot but may be conducted with KRITFC or ONC observers and on flights chartered by KRITFC or ONC.

[61] These reports are available at https://www.kuskosalmon.org/cbhm.

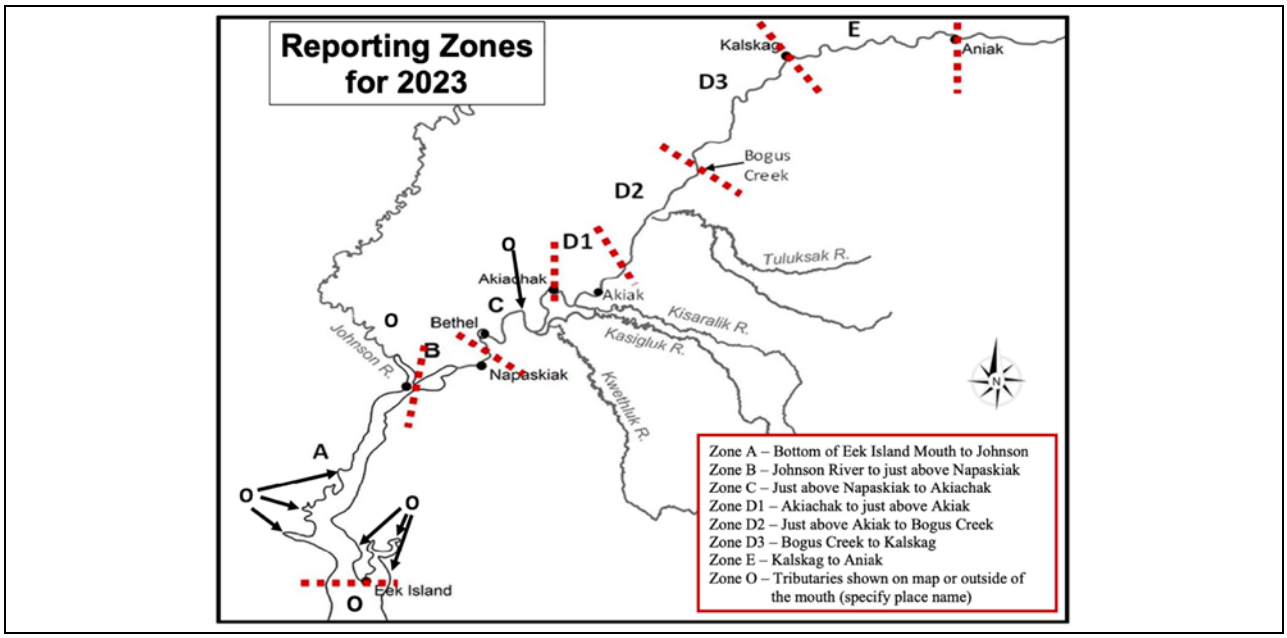


Figure 4-30 Map of the Yukon Delta National Wildlife Refuge waters in the lower Kuskokwim River
Source: Kuskokwim River Inter-Tribal Fish Commission
Notes: Figure shows the waters that compose the survey area with geographic strata noted (A – E). Dashed lines indicate strata boundaries. Harvests in stratum D2 were included in inseason harvest estimation code beginning in 2023. Harvests in strata D3, E, and O are not currently included in inseason harvest estimations but are included in interview data.

Trip interview data are obtained by interviewing subsistence harvesters at three sources: (1) the Bethel boat harbor; (2) Bethel, Oscarville, and Napaskiak area fish camps; and (3) lower Kuskokwim River villages and fish camps other than Bethel. Harvester interview data includes: gear used, trip start and stop time, net-in-water time, general fishing location (harvest zone; see Figure 4-30), catch by species, and progress towards annual harvest goals by species. Species documented in the CBHM interviews include Chinook, chum, sockeye, and coho salmon, sheefish, and other whitefish. In addition, catches of other species such as northern pike were noted anecdotally, but harvests were not estimated. Interviews also provide an opportunity for harvesters to share information, including Local Knowledge/Traditional Knowledge and feedback, with fisheries managers.

Interviews at sources (1) and (2) are collected by ONC, although YDNWR and KRITFC staffs occasionally conduct interviews at the Bethel Boat Harbor to assist with ONC staff capacity. Data from lower Kuskokwim River villages other than Bethel were collected by KRITFC community harvest monitors and transferred to an online database by a smart phone app. The number of interviews conducted annually by the CBHM increased from 263 in 2017 to 558 in 2023. The number of community harvest monitors hired each year has ranged from 6 to 14, while the number of villages represented by those monitors ranged from 4 to 8 (see Table 4-45).

Aerial net counts and interview data are transferred to one or more lead individuals for quality control and running the harvest analysis with the interview and aerial net data. Data analysis is typically conducted 12–24 hours after the end of a fishing opportunity. Analytical methods in most years are similar to those described in Staton (2018), except that in 2023: (1) the harvest area was extended to include stratum D2 (Figure 4-30); (2) coho salmon harvest data were included following a poor return in 2022; and (3) the harvest estimation period was extended into August to better identify the coho salmon return and harvests.

Harvests are estimated using a custom software package for program R that: (1) facilitates installation of the software to estimate harvests and generate reports, and (2) sets consistency and removes subjectivity in data quality checking. By comparing the timing of a fishing trip from interview data to aerial net counts, the analysis determines if an interviewed harvest was counted on one or multiple flights, or not

counted on any flight. From the estimated total effort (number of nets fished in a fishing opportunity) and average catch per unit of time and net length, harvest is estimated by fishing stratum (Figure 4-30), and then summed across the area considered. More details on the analytical approach are described in Staton (2018). More information on the CBHM can be provided by KRITFC.

Table 4-45 Number of community monitors hired, interviews conducted, and villages represented by the monitors in the CBHM program, 2017-2023

Year	Number of			Villages included
	Monitors	Interviews	Villages	
2017	7	263	5	Tuntutuliak, Napakiak, Napaskiak, Kwethluk, Akiak
2018	9	364	5	Tuntutuliak, Napaskiak, Kwethluk, Akiachak, Akiak
2019	8	438	4	Tuntutuliak, Napaskiak, Kwethluk, Akiak
2020	6	443	4	Tuntutuliak, Napaskiak, Kwethluk, Akiak
2021	9	526	5	Eek, Tuntutuliak, Napakiak, Napaskiak, Kwethluk
2022	10	514	7	Eek, Napakiak, Napaskiak, Kwethluk, Akiachak, Akiak, Tuluksak
2023	14	558	8	Eek, Tuntutuliak, Napakiak, Napaskiak, Kwethluk, Akiachak, Akiak, Tuluksak

Source: KRITFC
Notes: This table does not include interviews collected by ONC at the Bethel boat harbor and in Bethel, Oscarville, and Napaskiak fish camps or by ADF&G staff in Atmautluak and Kasigluk in 2018; but it does include stratum O data that is not used for inseason harvest estimates. Interviews were generally collected each year between June 1 and mid-July capturing the majority of the chum salmon fishing season, though the program period extended into August in 2023 due to extended federal management for coho salmon concerns and captured the entirety of the chum salmon fishing season.

4.3.3.3 Patterns of Subsistence Harvests

The primary species of salmon harvested for subsistence by Kuskokwim Area residents are Chinook salmon, chum, sockeye, coho, and pink. Overall, Kuskokwim Area subsistence salmon harvest trends show a general decline from 1989-2021 (see Figure 4-31).

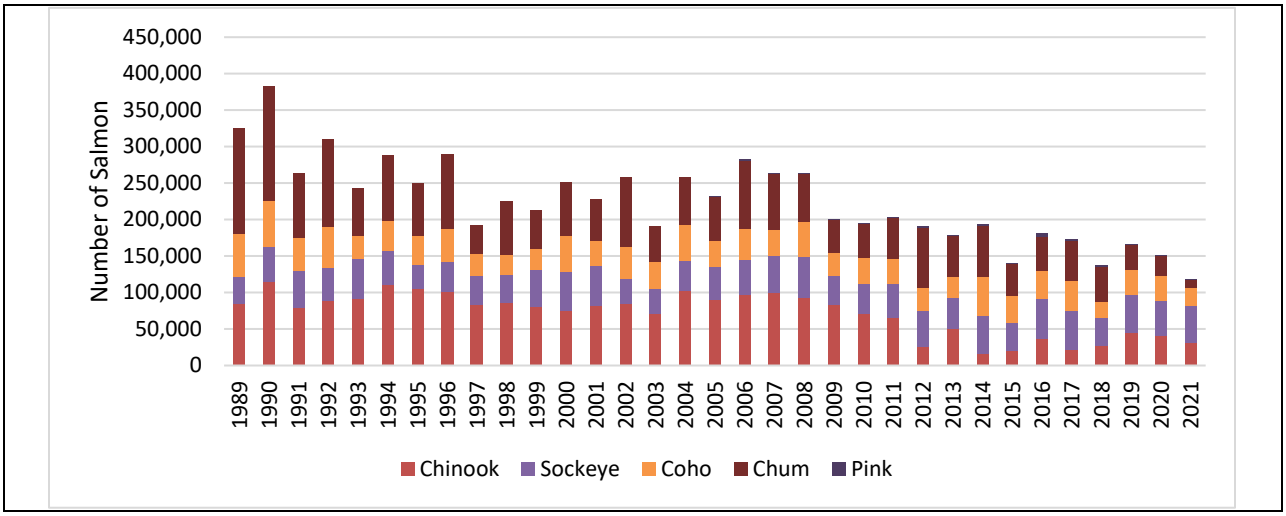


Figure 4-31 Historical subsistence salmon harvests, Kuskokwim Area, 1989-2021
Source: ADF&G.

Table 4-46 below shows the estimated subsistence harvests of salmon by species from 1988 through 2021, as well as the most recent 3-year (2019-2021), 5-year (2017-2021), 10-year (2012-2021), and historical (1989-2021) average levels of harvest for the Kuskokwim Area. Across the time series, subsistence harvests of salmon ranged from 383,390 fish (1990) and 117,693 (2021) fish. The estimated 2021 harvest of 117,693 salmon was the lowest overall harvest on record, followed by 2018 when 137,076 salmon were estimated to have been harvested for subsistence.

Patterns of subsistence harvests of salmon generally reflect trends in abundance. For example, Chinook salmon harvests have also declined steeply since 2008 corresponding with lower run sizes and increased subsistence fishing restrictions. However, a significant portion of the overall subsistence chum and coho salmon harvest was taken for use as dog food in the Kuskokwim Area (similar to the Yukon Area). Over the course of decades, the number of households harvesting salmon specifically for dog food has declined due to decreased use of dog teams for transportation and other uses.

Table 4-46 Subsistence harvests of salmon, Kuskokwim Area, 1989- 2021

	Estimated salmon harvest					
Year	Chinook	Sockeye	Coho	Chum	Pink[a]	Total
1989	85,322	37,088	57,786	145,106	--	325,302
1990	114,219	48,752	63,084	157,335	--	383,390
1991	79,445	50,383	44,222	89,008	--	263,058
1992	88,106	45,994	56,907	119,794	--	310,801
1993	92,305	53,442	32,207	64,966	--	242,920
1994	111,027	46,172	40,706	89,508	--	287,413
1995	105,805	32,019	39,492	72,054	--	249,370
1996	100,437	41,644	45,101	102,033	--	289,215
1997	83,000	39,868	31,293	38,419	--	192,580
1998	85,928	38,296	27,408	73,145	--	224,777
1999	80,545	51,321	27,757	52,414	--	212,037
2000	75,201	53,498	49,158	72,896	--	250,753
2001	81,927	55,163	33,031	57,410	--	227,531
2002	84,701	34,890	43,433	94,759	--	257,783
2003	70,375	34,772	37,242	47,949	--	190,338
2004	102,336	41,558	48,693	65,805	--	258,392
2005	90,311	44,933	35,170	59,762	1,343	231,519
2006	96,733	47,763	43,211	93,091	2,710	283,508
2007	100,297	49,613	35,890	76,281	1,259	263,340
2008	92,977	56,205	47,476	66,275	1,341	264,274
2009	83,838	38,795	31,933	46,047	561	201,174
2010	70,576	41,722	35,695	46,797	751	195,541
2011	65,850	46,290	33,943	55,990	739	202,812
2012	25,353	50,781	30,086	82,030	2,160	190,410
2013	50,708	42,834	27,841	55,828	741	177,952
2014	15,434	53,030	52,587	70,687	2,620	194,358
2015	19,437	39,429	36,816	43,516	1,233	140,431
2016	36,268	54,627	39,388	46,026	4,527	180,836
2017	22,150	53,522	40,082	54,459	2,292	172,505
2018	26,478	39,057	21,922	47,843	1,776	137,076
2019	44,542	52,535	33,291	35,521	932	166,821
2020	41,476	46,952	34,120	28,149	1,095	151,793
2021	31,837	50,048	24,324	10,690	794	117,693
3-year average (2019-2021)	39,285	49,845	30,578	24,787	940	145,436
5-year average (2017-2021)	33,297	48,423	30,748	35,332	1,378	149,178
10-year average (2012-2021)	31,368	48,282	34,046	47,475	1,817	162,987
Historical average (1988-2021)	71,362	45,848	38,827	68,533	1,581	225,385

Source: ADF&G.
Prior to 2008, harvest estimates for pink salmon were calculated by ADF&G Division of Subsistence.
'—' Data not available.

Table 4-47 Minimum annual harvest estimates by salmon species from the lower Kuskokwim River inseason harvest estimation program, 2016–2023.

	2016	2017	2018	2019	2020	2021	2022	2023	Average
Chinook Salmon	28,019	8,630	20,870	40,120	23,210	21,630	29,950	21,050	24,633
Chum Salmon	27,398	54,420	43,570	7,170	5,590	4,220	3,630	11,930	20,857
Sockeye Salmon	25,026	24,080	23,320	13,400	6,710	23,600	25,400	28,940	20,219
Coho Salmon	ND	ND	ND	ND	ND	ND	ND	7,420	ND
Total Salmon	80,443	87,130	87,750	60,710	35,500	49,440	58,980	69,350	65,708

Source: KRITFC.
Notes: Inseason harvest information in this table comes only from the communities mentioned in Table 4-45 Number of community monitors hired, interviews conducted, and villages represented by the monitors in the CBHM program, 2017-2023 and thus is not representative of harvests throughout Kuskokwim Drainage. Though these data provide a minimum, inseason estimate of subsistence harvest in select communities, the reader can note the decline in chum harvests in 2019-2023 compared to 2018-2018. This trend is also observable in the ADF& postseason harvest information presented above.

Figure 4-32 shows the estimated subsistence harvest of chum salmon in the Kuskokwim Area from 1989 through 2021. Across the time series, subsistence harvests of chum salmon have ranged between 157,335 fish (1990) and 10,690 fish (2021). The historical average level of subsistence harvests of chum salmon was 68,533 fish, and the most recent 3-year average level of harvest was 24,787 fish.

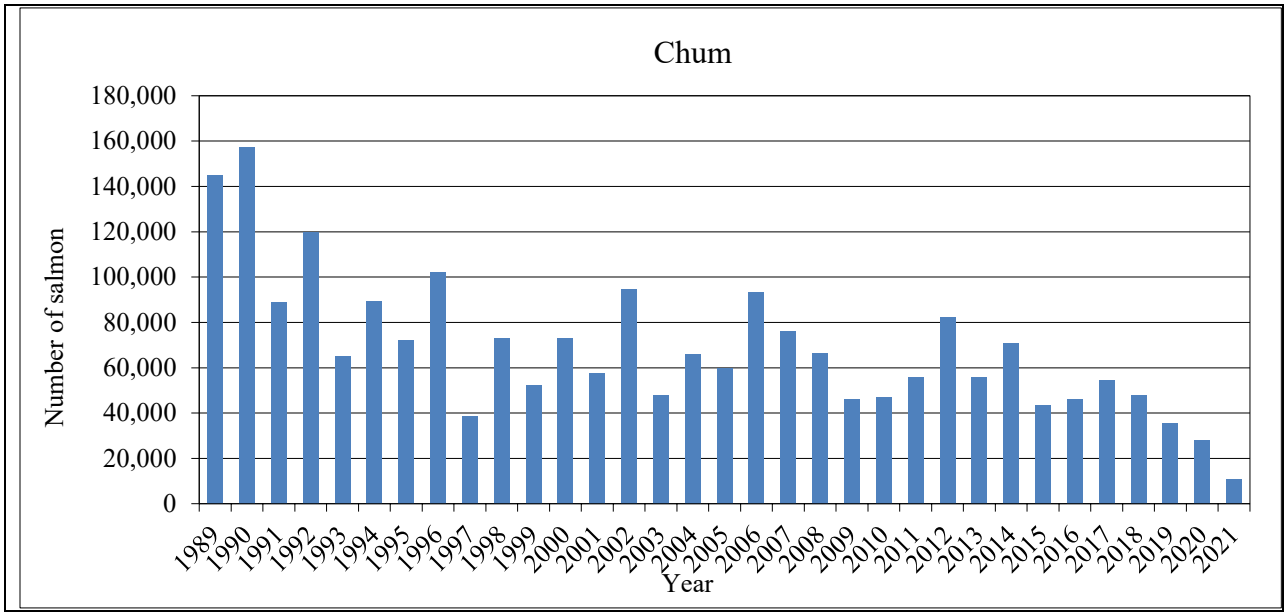


Figure 4-32 Estimated subsistence harvests of chum salmon, Kuskokwim Area, 1989-2021
Source: ADF&G.

In 2001, the BOF amended a previous all-salmon ANS range for Kuskokwim River to reflect species-specific harvest and use patterns. In 2013, the BOF again modified ANS ranges by species for the Kuskokwim River drainage and other portions of the Kuskokwim Area. The current ANS ranges for salmon in the Kuskokwim Management Area can be found in 5 AAC 01.286(b) and include 41,200–116,400 chum salmon in the Kuskokwim River drainage. In the nine years since the ANS was revised by the Alaska BOF in 2013, the annual chum harvests have fallen below the lower bound of the ANS range four times, including 2019-2021.

Table 4-48 Comparison of amounts necessary for subsistence (ANS) and estimated subsistence salmon harvests, Kuskokwim River drainage, 2013-2021

ANS range	Chinook 67,200–109,800	Chum 41,200–116,400	Sockeye 32,200–58,700	Coho 27,400–57,600	Pink 500–2,000	Kuskokwim Area remainder 12,500-14,400
Year	Estimated number of subsistence salmon harvested[a]					
2013	**47,616**	52,620	39,544	**26,442**	650	**10,771**
2014	**11,234**	68,398	48,372	49,736	2,551	14,067
2015	**16,124**	**40,872**	36,781	33,939	1,168	**9,168**
2016	**30,693**	44,881	51,580	36,816	4,351	12,515
2017	**16,380**	52,589	48,462	37,786	2,098	15,190
2018	**22,264**	45,918	35,448	**19,981**	1,695	**11,770**
2019	**37,846**	**34,440**	48,388	31,030	865	14,252
2020	**35,869**	**27,105**	43,653	32,190	869	**12,106**
2021	**28,643**	**9,759**	44,534	**22,808**	742	**11,207**

Source: ADF&G, Division of Subsistence.
Note: Bold underlined harvest quantities are lower than the amount necessary for subsistence.
a. Includes harvests using rod and reel and the removal of salmon from commercial harvests as well as subsistence nets.

While salmon are a key subsistence food source for most communities across the Kuskokwim Area, the composition of species harvests for subsistence varies based the geographic distribution of resources. Figure 4-33 shows the average species composition of subsistence salmon harvests by ADF&G subregions within the Kuskokwim Area for the most recent 10-years for which data are available (2012-2021). This information is based on estimated subsistence salmon harvests by community, aggregated to the subregion level to show subsistence harvests at a smaller spatial scale across multiple years. In general, subsistence harvests of salmon are distributed across the Kuskokwim Area consistent with the distribution of the human population where roughly 80% of the total harvest occurs in the lower river where the human population is the largest, primarily in Bethel.

Figure 4-33 Average species composition of subsistence harvest estimates by Kuskokwim Area sub region, 2012-2021

Source: ADF&G.
Notes: Information for the communities in the North Kuskokwim Bay sub region was only available 2012-2014. Additionally, a reader with general knowledge of the Kuskokwim Area will notice the Bering Sea Coast sub region is not included. Information was not available for the 2012-2021 period.

Among the seven geographic units identified by KRITFC, subsistence harvest and use of chum salmon differ from one part of the river to another. KRITFC prepared subsistence harvest composites using comprehensive subsistence harvest surveys collected by ADF&G over a broad time period (1984-2013).[62] Harvest data are represented in usable (or edible) pounds so that individual resource categories or species of harvest can be compared with others to better understand community subsistence economies. Representing the best available information on the role of salmon species in the overall subsistence economies of Kuskokwim area communities, these generalized subsistence harvest composition figures help to show the overall importance of individual salmon species to community economies and ways of life in the various geographic units of the Kuskokwim watershed. The data are summarized by KRITFC unit to provide an overview of the varying composition of wild food harvests along the Kuskokwim River drainage and coastal areas, with a particular focus on the reliance of chum salmon for subsistence purposes. The results of these studies show that salmon provide a large portion of the total subsistence food supply in Kuskokwim River communities.

Figure 4-34 shows the subsistence harvest composition for communities in KRITFC Units 1 and 2. Unit 1 communities include Nikolai, Telida, McGrath, and Takotna near the headwaters of the Kuskokwim watershed. Unit 1 residents live the farthest from the coast and therefore rely more on non-coastal resources, and land mammals made up the highest percentage (49%) of the total subsistence harvest among Unit 1 communities. Overall Chinook salmon, chum salmon, coho salmon, and sockeye salmon contributed together 35% to the overall subsistence economy of the Unit 1, or headwaters area. Chinook salmon alone contribute the second highest resource harvest to headwaters communities at 14% of the total subsistence harvest, followed closely by chum salmon (13%). Unit 2 communities include Stony River, Lime Village, Sleetmute, Red Devil, Georgetown, and downriver to Crooked Creek. Unit 2 residents relied more on salmon than any other resource and more so than any other KRITFC unit in the Kuskokwim area. All salmon species together contribute 66% of the total annual subsistence harvest from Unit 2 communities. Chinook salmon made up the highest percentage of salmon harvest at 24%, followed by sockeye salmon (18%), chum salmon (14%), and coho salmon (10%).

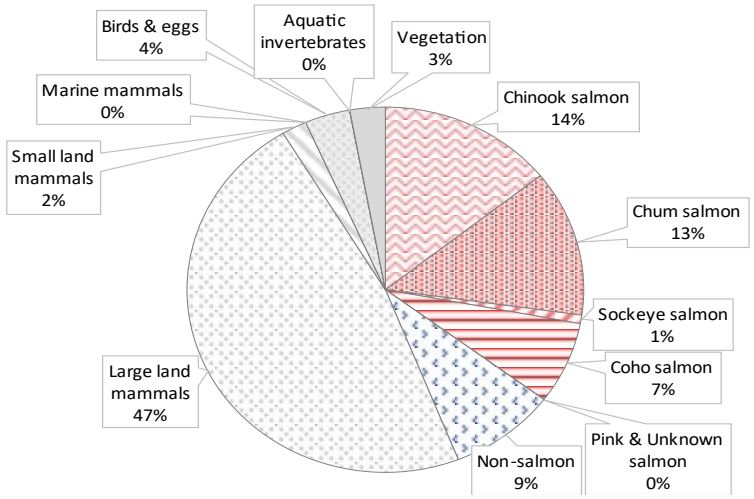
Figure 4-35 shows the total subsistence overview in communities located in KRITFC Units 3 and 4. Unit 3 includes communities from Napaimute and Chuathbaluk downriver to Aniak, Upper Kalskag, and Lower Kalskag. Unit 3 residents also relied more on salmon than any other resource, with all species of salmon accounting for 62% of the total annual subsistence harvest. Chinook salmon contributed the highest amount at 29% of total subsistence harvests, followed by chum salmon (15%), coho salmon (11%), sockeye salmon (6%), and pink and unknown salmon (1%). Chum salmon harvests are tied for the second highest contribution to Unit 3 total subsistence harvest with nonsalmon (also at 15%) and large land mammals (also at 15%). Unit 4 includes the communities of Tuluksak, Akiak, Kwethluk, and Akiachak. Unit 4 residents also relied more on salmon than any other resource category, with all species of salmon accounting for 50% of the total annual subsistence harvest. Chinook salmon contributed the highest amount at 25% of total subsistence harvests, followed by chum salmon (12%), sockeye salmon (8%), and coho salmon (5%).

Figure 4-36 shows the total subsistence harvest composition for communities located in KRITFC Units 5 and 6. Unit 5 represents the community of Bethel, the major regional hub of the Yukon-Kuskokwim Delta. The annual composition of Bethel residents' subsistence harvests was markedly different and more diverse than that of the other Kuskokwim area communities. All salmon species together contributed 41% of the total annual subsistence harvests, with chum salmon providing the largest contribution (12%) followed by relatively similar contributions by coho salmon (11%), sockeye salmon (10%), and Chinook salmon (8%). Pink salmon and unknown salmon contributed less than 1% to the total subsistence harvests. It is likely that the contribution provided by Chinook salmon to Bethel residents in 2012 under-represents typical Chinook salmon contributions to total subsistence harvests because of the low return of

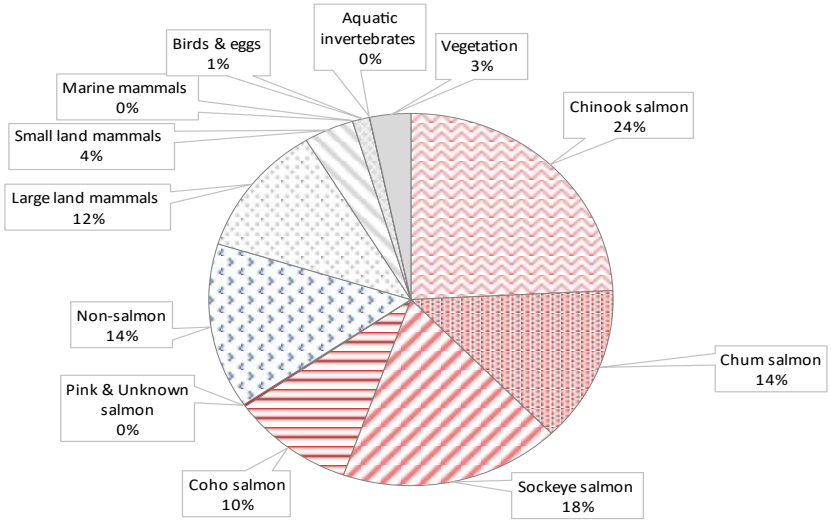
[62] All data is sourced from https://www.adfg.alaska.gov/sb/CSIS/.

Chinook salmon that year. After the resource category of salmon, large land mammals contributed the most (26%) to the total subsistence harvests of Bethel residents followed by non-salmon fishes (20%). Unit 6 includes the communities of Oscarville, Napaskiak, Napakiak, Atmautluak, Kasigluk, and Nunapitchuk. Unit 6 residents also relied more on salmon than any other resource category, with all species of salmon accounting for 39% of the total annual subsistence harvest. Chinook salmon contributed the highest amount at 18% of total subsistence harvests, followed by chum salmon (12%), sockeye salmon (5%), and coho salmon (4%).

Figure 4-34 shows the total subsistence harvest composition for communities located in KRITFC Unit 7 which includes information for Eek, Tuntutuliak, Quinhagak and Tununak. Unit 7 residents relied more on nonsalmon fishes (33%) than any other resource category, followed closely by salmon with all species of salmon accounting for 30% of the total annual subsistence harvest. Chinook salmon contributed the largest amount of salmon (13%) of total subsistence harvests, followed by chum salmon (6%), coho salmon (5%), and sockeye salmon (4%). Pink salmon and unknown salmon accounted for 2% of the total subsistence harvests. Marine mammals (15%) provided the next largest contribution to the total annual subsistence harvests, followed by large land mammals (10%), birds and eggs (6%), vegetation (5%), and small land mammals (1%)

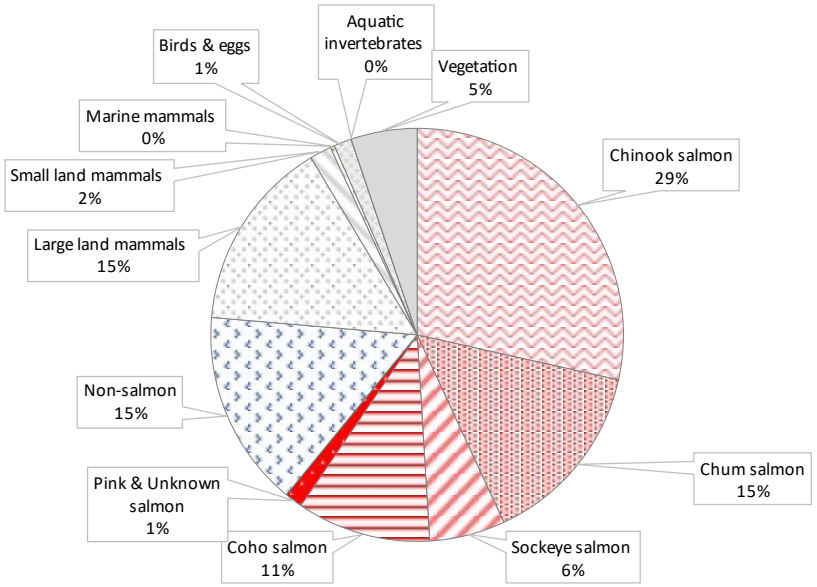


Unit 1 Generalized subsistence harvest composition

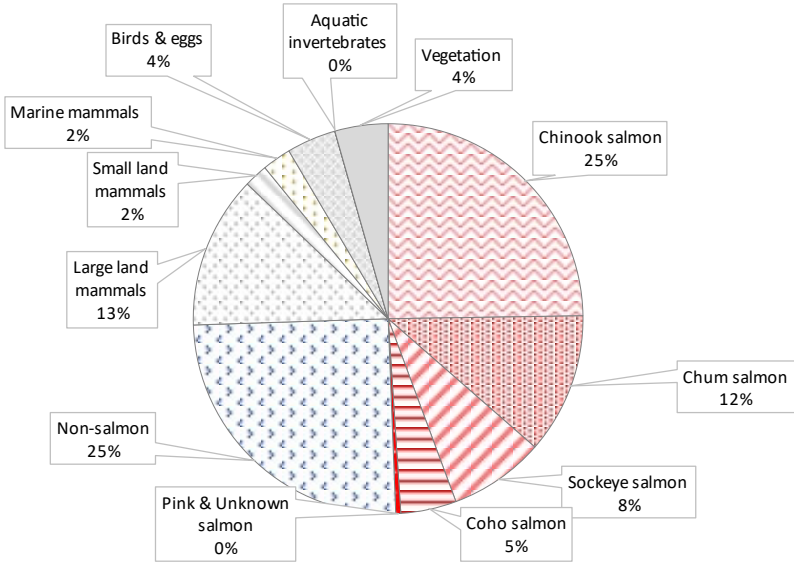


Unit 2 Generalized subsistence harvest composition

Figure 4-34 KRITFC Units 1 and 2 generalized subsistence harvest composition (in edible pounds)
Source: KRITFC
Notes: Unit 1 data includes Data includes Nikolai 1984, 2002, 2011; McGrath 1984, 2011; Takotna 2011; no data available for Telida or other Unit 1 communities or residences; Unit 2 data includes Stony River 2009, Lime Village 2007, Sleetmute 2009, Red Devil 2009, Crooked Creek 2009; no data available for Georgetown or other Unit 2 communities or residences.

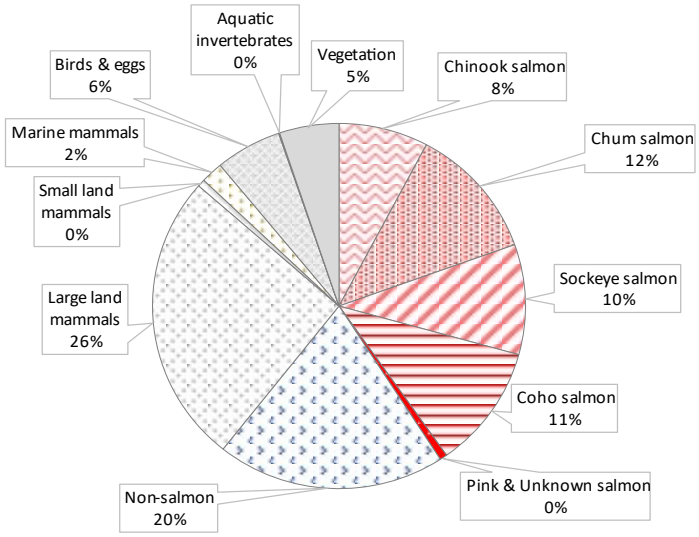


Unit 3 Generalized subsistence harvest composition

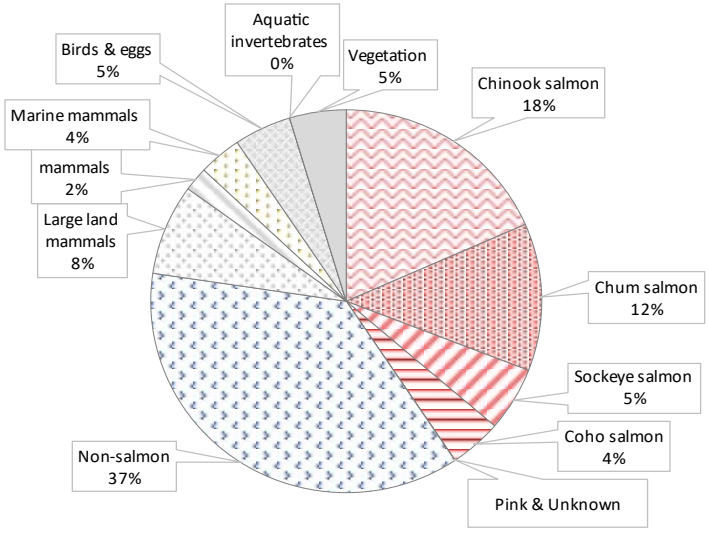


Unit 4 Generalized subsistence harvest composition

Figure 4-35 KRITFC Units 3 and 4 generalized subsistence harvest composition
Source: KRITFC
Notes: Unit 3 data includes Chuathbaluk 2009, Aniak 2009, Upper Kalskag 2009, Lower Kalskag 2009; no data available for Napaimute or other Unit 3 communities or residences. Unit 4 data includes Tuluksak 2010, Akiak 2010, Kwethluk 1986, 2010; Akiachak 1998.



Unit 5 Generalized subsistence harvest composition



Unit 6 Generalized subsistence harvest composition

Figure 4-36 KRITFC Units 5 and 6 generalized subsistence harvest composition

Source: KRITFC
Notes: Unit 5 data include Bethel 2012. Unit 6 data includes Oscarville 2010, Napaskiak 2011, Napakiak 2011, and Nunapitchuk 1983; no data available for Atmautluak or Kasigluk or other communities or residences.

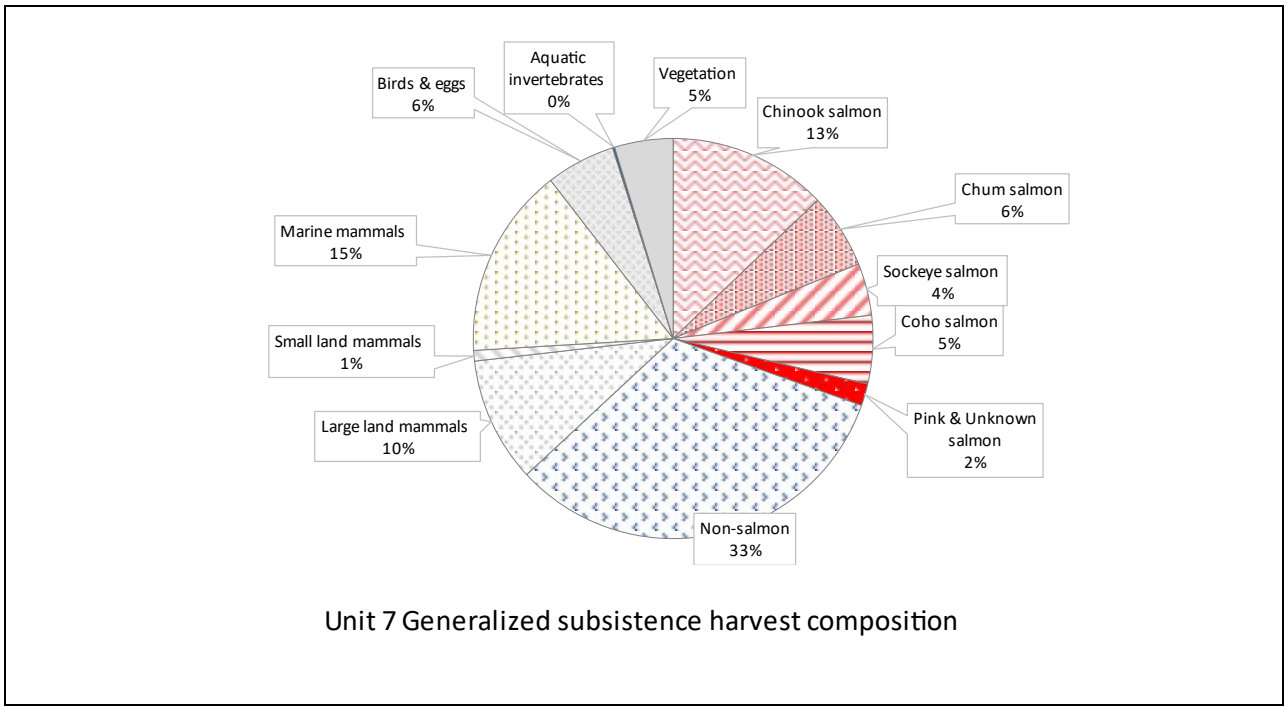


Figure 4-37 KRITFC Unit 7 generalized subsistence harvest composition
Source: KRITFC
Notes: Unit 7 data includes Eek 2013, Tuntutuliak 2013, Tununak 1986, and Quinhagak 1982, 2013.

Table 4-49 shows the estimated subsistence harvests of nonsalmon species in 2021 for communities across the Kuskokwim Area, aggregated to the subregion level. Declines in salmon abundance have increased residents' efforts to catch other species of nonsalmon fishes, although Kuskokwim Area residents continue to express a strong preference for Chinook salmon which is the most oil-rich of all area fishes (Godduhn et al. 2020). Estimated 2021 harvests of nonsalmon species by residents of surveyed communities in the Kuskokwim Area included 12,062 humpback whitefish, 11,269 broad whitefish, 41,755 Northern pike, 75,432 smelt, among others.

Table 4-49 Subsistence nonsalmon fish harvests by subregion, Kuskokwim Area, 2021

	Households		Reported nonsalmon harvest												
Community	Total	Contacted	Humpback whitefish	Broad whitefish	Cisco	Sheefish	Burbot	Northern pike	Blackfish	Grayling	Char/Dolly Varden	Herring	Smelt	Rainbow trout	Total
North Kuskokwim Bay	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower Kuskokwim	3,043	569	10,586	10,331	777	873	6,165	41,050	56,330	115	11	1,201	67,936	459	195,834
Middle Kuskokwim	339	139	519	521	105	278	57	156	1,120	45	19	0	875	40	3,735
Upper Kuskokwim	281	156	833	334	377	288	6	446	10	306	0	0	0	0	2,600
Kuskokwim River	3,753	864	11,938	11,186	1,259	1,439	6,228	41,652	57,460	466	30	1,201	68,811	499	202,169
South Kuskokwim Bay	284	153	124	83	243	0	0	103	0	123	1,080	8,231	6,621	262	16,870
Bering Sea Coast	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	**4,037**	**1,017**	**12,062**	**11,269**	**1,502**	**1,439**	**6,228**	**41,755**	**57,460**	**589**	**1,110**	**9,432**	**75,432**	**761**	**219,039**

Source ADF&G Division of Subsistence, ASFDB 2021 (ADF&G 2022).
'—' Data not available.

4.3.4 Norton Sound-Port Clarence

4.3.4.1 Regional Background

The archeological record of the Norton Sound and Port Clarence region provides physical evidence of subsistence fishing dating back in the archaeological record to the Arctic Small Tool/Norton Tradition, ca. 1500–1000 B.C.E. (Harritt 2010; Smith and Vreeman 1995). The region is also marked by a more recent history of resource extraction that has affected salmon and salmon fishing (Menard et al. 2009; 2020; Thomas 1980; 1982). Dredging damaged salmon spawning grounds while the growing immigrant population in the early 1900s increased the demand for salmon, especially around Nome. Similar to other regions of Alaska, salmon supported the integration of the subsistence way of life and the emerging cash economy, first through customary trade and later through commercial fishing which began in Unalakleet in 1961 (Menard et al. 2020:7–8).

Nome is the region's "hub" community and has a contemporary population estimate of 3,699 based on the 2020 U.S. Census. There are 13 smaller communities located in the Norton Sound District that range in size between 83 (Diomede) and 765 (Unalakleet) residents based on the 2020 U.S. Census. The vast majority of residents of the Nome Census Area identify as Alaska Native, primarily of Inupiaq, Yup'ik, and Siberian Yup'ik descent. Most residents of the region continue to participate in a mixed subsistence-cash economy and depend on wild foods for cultural and nutritional sustenance. While more opportunities for wage work exist in Nome itself, subsistence activities are still an important facet of life in many Nome households (Brown et al. 2023).

The Norton Sound-Port Clarence Management Area includes two the Districts (as mentioned above), which span from Point Romanof in the southern portion of the region northward to Cape Prince of Wales (see Figure 4-38). The Norton Sound District includes all waters from Point Romanof to Cape Douglas as well as the peripheral coastal areas: Cape Woolley (northwest of Nome) and southern Norton Sound. The Port Clarence District (Cape Douglas to Cape Prince of Wales) includes the single commercial fishing subdistrict of Grantley Harbor. The Norton Sound District is divided into six subdistricts: 1) Nome, 2) Golovin, 3) Moses Point/Elim, 4) Norton Bay, 5) Shaktoolik, and 6) Unalakleet.

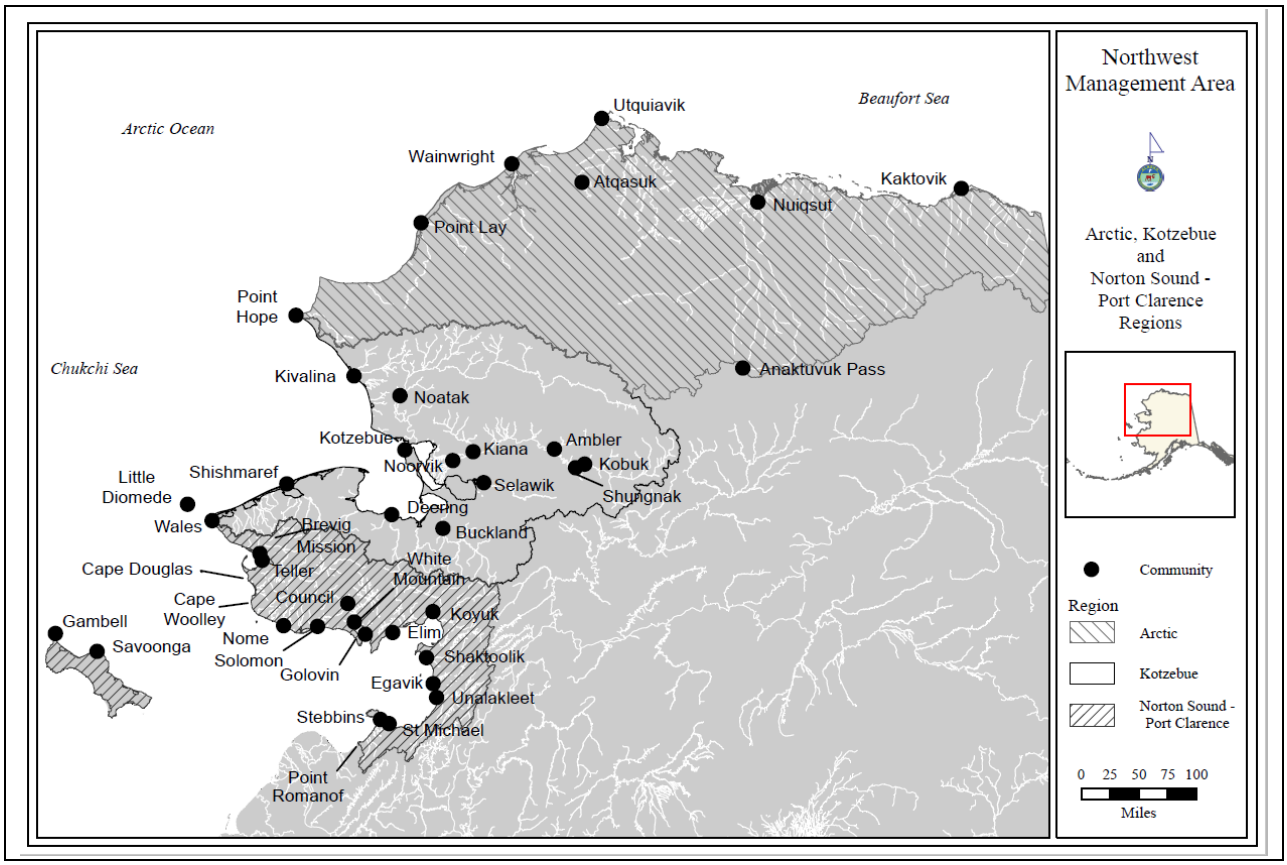


Figure 4-38 Northwest and Northern Regions
Source: ADF&G

Run timing for each species of salmon in the Northwest region can vary somewhat due to environmental factors but generally follow consistent patterns. Chinook salmon are the first to arrive in waters within the Norton Sound District in early June, followed by chum salmon around early July, and coho salmon toward the end of July through August. Pink salmon are more abundant in the region in even-numbered years, and usually arrive in June and are present through July. Sockeye salmon runs generally take place mid-July through August (Menard et al. 2022).

In summer, subsistence fishers harvest salmon with gillnets or seines in the main Seward Peninsula rivers and coastal marine waters. Beach seines are also used near the spawning grounds to harvest schooling or spawning salmon and other species of fish. A major portion of fish taken during the summer months is air dried or smoked for later consumption by residents. Chum and pink salmon are the most abundant salmon species across the Norton Sound and Port Clarence Management Area; coho and Chinook salmon are present throughout the area but are more common in eastern and southern Norton Sound. Sockeye salmon are primarily found in two Seward Peninsula River systems: Glacier Lake and the Sinuk River in the Nome subdistrict, which is difficult to access, and Salmon Lake and the Pilgrim River in the Port Clarence District, much of which is road accessible to Nome residents. The history of variation and change to specific salmon harvests across the region motivate fishers to travel to adjacent or nearby units for subsistence fishing opportunities, as may be feasible and necessary. For example, the concentrated population at Nome generally relies on pink salmon from Subdistrict 1 and sockeye salmon from the Port Clarence District (Brown et al. 2023).

In subdistricts 1 (Nome) and 6 (Unalakleet), there are restrictions on fishing gear, fishing periods, and areas open to fishing for subsistence. Subsistence fishing regulations are most restrictive in these two subdistricts because these are the largest communities in the Norton Sound District. For example, the only

Tier II fishery in the state's history occurred for chum salmon in Subdistrict 1 (Nome) from 1999 through 2005. In Nome, the Tier II fishery restricted subsistence fishing opportunities to a limited number of qualified Nome households. These qualified households were determined to have the highest dependency on salmon for food, giving these households priority over other subsistence fishers when only a small number of chum salmon were available for harvest. Household dependency was determined by a point system based on criteria specified in regulation.[63]

Tier I fishing permits were available to all other households when ADF&G determined run strength was adequate to meet escapement goals. In a "Tier I" subsistence fishery, all interested Alaska residents may participate. Other fishers (commercial, sport, and personal use) are prohibited or restricted because the harvestable surplus is sufficient only to provide for customary and traditional subsistence uses (AS 16.05.258). During this time (1999-2005), Nome fishers increased their use of adjacent units to fish for salmon (Menard et al. 2009), but that practice later decreased likely in response to the easing of fishing restrictions in the Nome Subdistrict and rising fuel costs (Menard et al. 2010). Chum salmon returns gradually improved until 2006, when the fishery came out of Tier II status and has been managed as a Tier I fishery since. In 2007, the Alaska BOF changed the classification of Subdistrict 1 (Nome) chum salmon from a "stock of management concern" to a "stock of yield concern." The Alaska BOF later rescinded the yield concern designation in 2016 (Menard et al. 2020:14). In 2019, new chum salmon escapement goals were updated for subdistrict 1 (Nome), based on improved ADF&G sustainable escapement guidelines; the 2021 chum salmon run was lower than in recent years.

In Subdistrict 2 (Golovin and White Mountain) and Subdistrict 3 (Elim), chum salmon escapement and commercial subsistence harvests dropped significantly through the 1990s. Chum salmon stocks were designated as a "yield concern" in 2000 (Menard and Bergstrom 2006: 2). Restrictions primarily affected commercial fishing, but subsistence restrictions were in place in 2003. In 2019, the Alaska BOF dropped "stock of yield concern" status for Subdistricts 2 (Golovin/White Mountain) and 3 (Elim) chum salmon stocks. Subdistrict 5 (Shaktoolik) and Subdistrict 6 (Unalakleet) are typically managed together because actions in one are known to affect the movement of fish in the other. Poor Chinook salmon runs in these subdistricts since the early 2000s resulted in their designations as "stocks of yield concern" and restrictions on all types of fishing in 2003, 2004, and since 2006 (Menard at al. 2016). No directed Chinook salmon commercial fishery has occurred since 2005 and a conservative Chinook salmon management plan was adopted in 2007 (5 AAC 04.395; Menard et al. 2020).

The Port Clarence District includes all waters from Cape Douglas north to Cape Prince of Wales including Salmon Lake and the Pilgrim River drainage. Residents of Teller and Brevig Mission, both located in the Grantly Harbor Subdistrict, use these waters for salmon and other subsistence needs. Fishers from Nome also have a long history of fishing in the Port Clarence District (Magdanz 1992), especially when regulations restrict fishing opportunities in the Nome Subdistrict, such as the 1990s (Magdanz 2003). Since 2004, subsistence salmon permits have been required in all Port Clarence waters.

Finally, Norton Sound and Port Clarence are among the few places in the state where the customary trade of fish caught in state waters is legal. Effective July 1, 2007, regulations allowed cash sales, up to $200, of subsistence-caught finfish per household per year. Persons who wanted to participate had to obtain a customary trade record keeping form from Nome ADF&G. Sales could not be made to a fishery business nor the fish resold by the buyer. Sales could occur only within the Norton Sound and Port Clarence Area (Soong et al. 2008: 34). Effective April 13, 2013, the Alaska BOF increased the annual limit for selling subsistence-taken finish as customary trade from $200 per year to $500 total per household in a calendar yar (5 AAC 01.188).

[63] The Tier II fishery subsistence restrictions imposed substantial hardships for the residents of Nome. Local fish camps and traditional fishing areas went unused for a period of time, forcing a change in fishing activities away from rivers to marine harvest areas and more distance locations. At times, these dynamics also created competition with neighboring villages (see Mendard et al. 2009; Wolfe & Spaeder 2009)

4.3.4.2 ADF&G Postseason Harvest Assessment Methods

Two methods are normally used by ADF&G to assess subsistence salmon harvests in northwest Alaska: (1) fishing permits in the northern portion of Norton Sound (Subdistricts 1, 2, and 3) and the Port Clarence District; and (2) postseason household surveys in the eastern and southern portions of Norton Sound District (Subdistricts 4, 5, and 6). However, in 2021, ADF&G conducted salmon harvest surveys with households only in Unalakleet (located in subdistrict 6), forgoing subdistricts 4 (Norton Bay) and 5 (Shaktoolik) because of COVID-19 restrictions. Researchers attempted to contact all the households in Unalakleet, with 129 of 219 Unalakleet households (59%) contacted.

Permits have been required for subsistence salmon fishing in Norton Sound Subdistrict 1 (Nome) since 1974. Since 1998, the Nome permit data have not been expanded to account for households whose permits were not returned. Permits have been required to fish the Pilgrim River since 1974 (Magdanz 1992b:10, 27) and all Port Clarence waters since 2004. Of the permits issued in 2021, 405 were for the Pilgrim River only, down from the 2020 record of 592 subsistence permits. In the Port Clarence District, 153 permits were issued for other waters in that district. Of the 152 returned, 57 reported fishing in marine waters. Very little salmon fishing has been allowed in recent years in Salmon Lake because of the crash of the sockeye salmon run in 2009 and poor runs in 2010–12 (Menard et al. 2013). One permit was issued over three years (2015–2017) but was only fished in 2017 (Menard et al. 2017; 2018), and no permits were issued for Salmon Lake in 2021 (Menard et al. 2022a).

It is important to note the Norton Sound and Port Clarence Districts are embedded within the larger Northwest Area. However, there is no longer an annual subsistence harvest monitoring program for the Kotzebue Fisheries Management Area. Similarly, since 2004 annual harvest monitoring in the eastern and southern portions of Norton Sound has been limited to postseason household surveys in Shaktoolik and Unalakleet[64] and through catch and gear information obtained from subsistence fishing permits in other parts of Norton Sound-Port Clarence Area.

ADF&G Division of Subsistence staff have conducted comprehensive subsistence surveys in several communities throughout Norton Sound and Kotzebue Sound. As with other regions, these are door-to-door studies that document all major subsistence harvests in select communities to provide an overall subsistence proxy profile for a region. Data for communities is publicly available at the Community Subsistence Information System website. In contrast to the annually occurring post-season household harvest surveys described above, comprehensive subsistence studies document the harvest of all wild resources used by a community for a single year and contextualize these data with ethnographic information about subsistence uses in the community. As a result, comprehensive surveys allow researchers to understand the relative contribution and importance of salmon to the overall subsistence harvest in a community.[65]

More information on postseason harvest assessment methods and comprehensive subsistence surveys can be provided by ADF&G.

4.3.4.3 Patterns of Subsistence Harvests

The primary species of salmon harvested for subsistence by Norton Sound residents are Chinook salmon, sockeye, coho, chum, and pink. Figure 4-39 shows the estimated historical subsistence harvests of salmon among households in the Norton Sound District from 1994 through 2021. Overall, patterns of subsistence harvests in the Norton Sound District show a general decline across the time series.

[64] In 2020 and 2021, household subsistence salmon surveys were not conducted in the villages of Koyuk or Shaktoolik because of COVID-19 restrictions but were conducted by DCF staff in the village of Unalakleet.
[65] This portion of the analysis does not provide information on nonsalmon harvests in the region because it is not readily available; this information would have to be assembled by hand from other comprehensive studies and has not been done to date. Personal communication, ADF&G, Division of Subsistence.

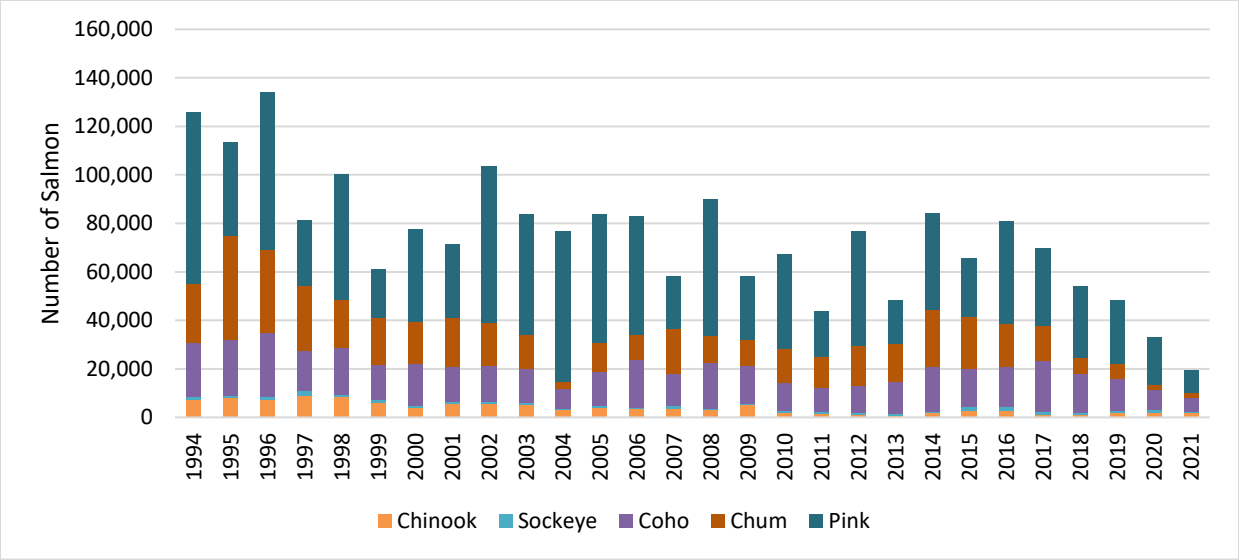


Figure 4-39 Historical subsistence salmon harvests, Norton Sound District, 1994-2021
Source: ADF&G.

Table 4-50 shows the estimated subsistence harvests of salmon by species from 1994 through 2021, as well as the most recent 3-year (2019-2021), 5-year (2017-2021), 10-year (2012-2021), and historical (1994-2021) average level of harvest for the Norton Sound District. Across the time series, estimated subsistence harvests of all species of salmon have ranged between 134,050 fish (1996) and 19,331 fish (2021). Historically, subsistence harvests of pink salmon have comprised the majority of total salmon harvests in the district at 51% of the total followed by chum salmon at 22%.

Subsistence harvests of chum salmon have ranged between 43,014 (1995) and 1,681 (2021) fish. The historical average level of subsistence harvests of chum salmon was 16,297 fish (1994-2021), and the 3-year average level of harvest was 3,141 fish (2019-2021). As shown, subsistence harvests of chum salmon are marked by two period lows, one in 2004 and the other in 2020 and 2021.

Table 4-50 Estimated subsistence salmon harvests, Norton Sound District, 1994-2021

	Norton Sound District					
Year	Chinook	Sockeye	Coho	Chum	Pink	Total
1994	7,212	1,161	22,108	24,776	70,821	126,077
1995	7,766	1,222	23,015	43,014	38,594	113,612
1996	7,255	1,182	26,304	34,585	64,724	134,050
1997[a]	8,998	1,892	16,476	26,803	27,200	81,370
1998[a]	8,295	1,214	19,007	20,032	51,933	100,480
1999	6,144	1,177	14,342	19,398	20,017	61,078
2000	4,149	682	17,062	17,283	38,308	77,485
2001	5,576	767	14,550	20,213	30,261	71,367
2002	5,469	763	15,086	17,817	64,354	103,490
2003	5,290	801	14,105	13,913	49,674	83,782
2004	3,169	363	8,225	3,200	61,813	76,770
2005	4,087	774	13,896	12,008	53,236	84,000
2006	3,298	901	19,476	10,306	48,764	82,745
2007	3,744	923	13,564	18,170	21,714	58,116
2008	3,087	399	18,889	11,505	56,096	89,976
2009	5,131	388	15,852	10,599	26,110	58,080
2010	2,074	554	11,517	14,295	38,710	67,149
2011	1,645	562	10,155	12,946	18,576	43,883
2012	1,290	437	11,500	16,247	47,050	76,524
2013	859	571	13,343	15,491	18,007	48,271
2014	1,713	766	18,257	23,802	39,673	84,210
2015	2,524	1,855	15,628	21,538	24,167	65,712
2016	2,649	1,423	16,514	18,144	42,051	80,781
2017	1,076	1,354	21,083	14,230	31,977	69,720
2018	1,162	850	15,868	6,571	29,615	54,066
2019	1,710	1,104	13,234	5,813	26,389	48,251
2020	2,134	905	8,413	1,928	19,390	42,770
2021	1,703	402	6,101	1,681	9,444	19,331
3-year average (2019-2021)	1,849	804	9,249	3,141	18,408	36,784
5-year average (2017-2021)	1,557	923	12,940	6,045	23,363	46,828
10-year average (2012-2021)	1,682	967	13,994	12,545	28,776	58,964
Historical average (1994-2021)	3,900	907	15,485	16,297	38,167	75,112

Source: ADF&G.
a. Includes Gambell and Savoonga.

While salmon are a key subsistence food source for communities across the Norton Sound District, the composition of species harvests varies based on the geographic distribution of resources. Figure 4-40 shows the average species composition of subsistence salmon harvests by subdistrict for the most recent 10-years for which data are available (2012-2021). This information is based on estimated subsistence salmon harvests by community, aggregated to the subregion level to show subsistence harvests at a smaller spatial scale across multiple years. In general, pink salmon are harvested in higher numbers across subdistricts and chum salmon contribute in larger proportions to the total subsistence harvests of salmon in Nome, Elim, and Unalakleet compared to other subdistricts.

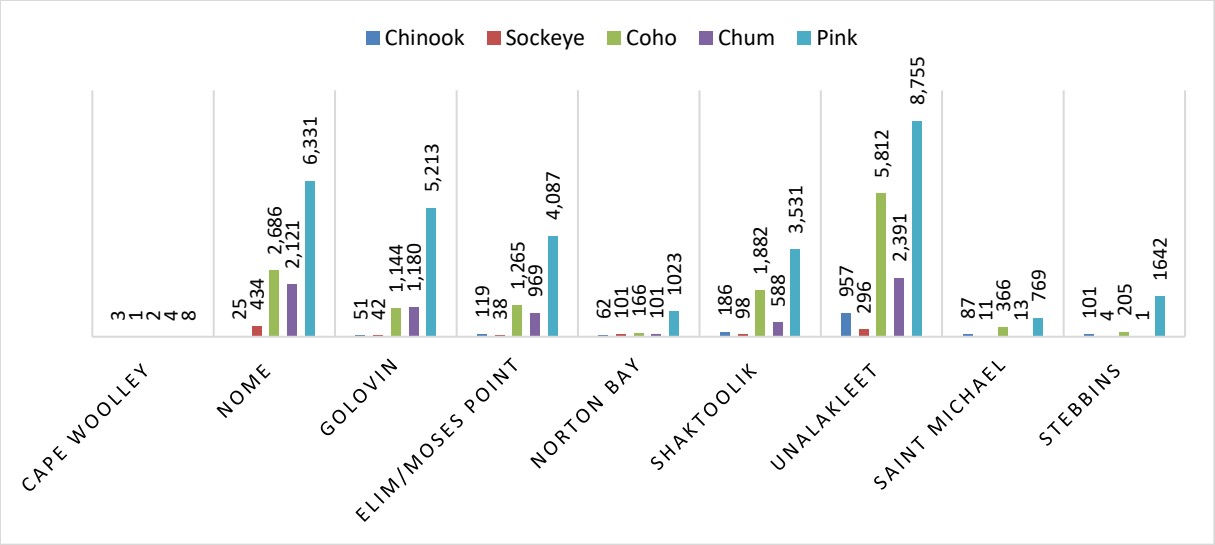


Figure 4-40 Average species composition of subsistence salmon harvest estimates for subdistricts, Norton Sound District, 2012-2021

Source: ADF&G.

Notes: Figure contains all years from 2012-2021 for which data are available in each subdistrict. Stebbins, Unalakleet, Saint Michael, Koyuk, and Shaktoolik are community household surveys; some are surveyed annually while others are surveyed by ADF&G on and off.

The primary species of salmon harvested for subsistence by Port Clarence residents are Chinook salmon, sockeye, coho, chum, and pink. Figure 4-41 shows the estimated historical subsistence harvests of all species of salmon among households in the Port Clarence District from 1994 through 2021.

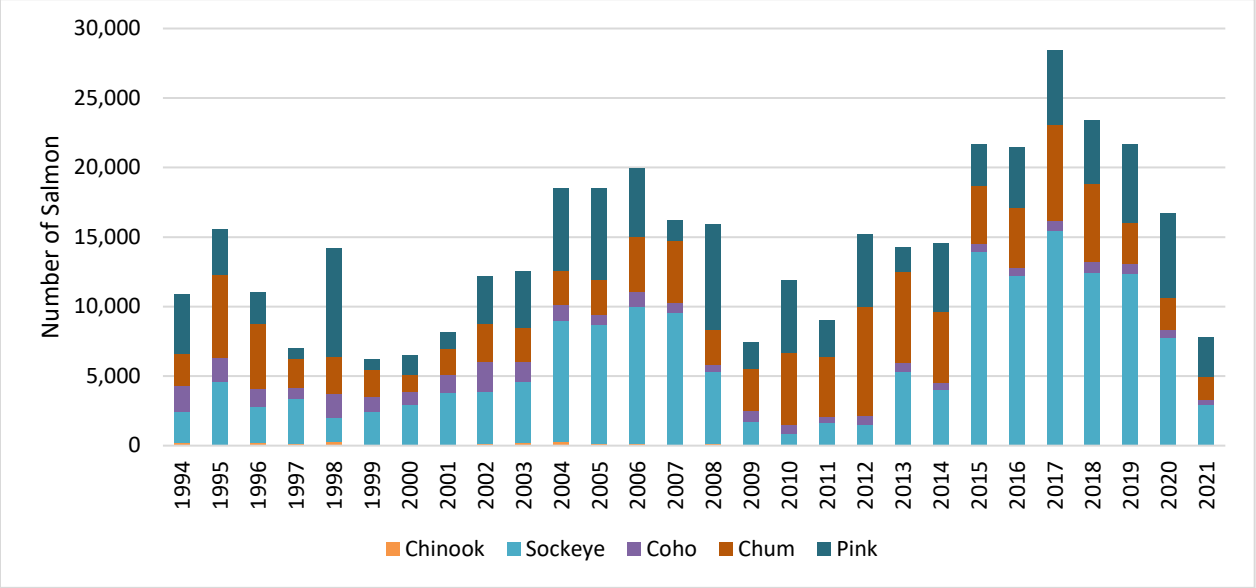


Figure 4-41 Historical subsistence salmon harvests, Port Clarence District, 1994-2021
Source: ADF&G.

Table 4-51 shows the estimated subsistence harvests of salmon among households in the district by species from 1994 through 2021, as well as the most recent 3-year (2019-2021), 5-year (2017-2021), 10-year (2012-2021), and historical (1994-2021) average level of harvest. Across the time series, estimated subsistence harvests of all species of salmon have ranged between 28,411 fish (2017) and 7,429 fish (2009). Historically, subsistence harvests of sockeye salmon have comprised the majority of total salmon harvested in the district at 40% of the total followed by pink salmon at 27% of total (1994-2021).

Subsistence harvests of chum salmon have ranged between 6,886 (2017) and 1,275 (2000) fish. As shown, subsistence harvests of chum salmon are marked by two period lows, one in 2000 and the other in 2020 and 2021. The estimated subsistence harvest of 1,719 chum salmon in 2021 the second lowest harvest level on record.

Table 4-51 Estimated subsistence salmon harvests, Port Clarence District, 2011-2021

	Port Clarence District					
Year	Chinook	Sockeye	Coho	Chum	Pink	Total
1994	203	2,220	1,892	2,294	4,309	10,918
1995	76	4,481	1,739	6,011	3,293	15,600
1996	194	2,634	1,258	4,707	2,236	11,029
1997	158	3,177	829	2,099	755	7,019
1998	289	1,696	1,759	2,621	7,815	14,179
1999	89	2,392	1,030	1,936	786	6,233
2000	72	2,851	935	1,275	1,387	6,521
2001	84	3,692	1,299	1,910	1,183	8,167
2002	133	3,732	2,194	2,699	3,394	12,152
2003	176	4,436	1,434	2,425	4,108	12,578
2004	278	8,688	1,131	2,505	5,918	18,520
2005	152	8,532	726	2,478	6,593	18,481
2006	133	9,862	1,057	3,967	4,925	19,944
2007	85	9,484	705	4,454	1,468	16,196
2008	125	5,144	562	2,499	7,627	15,957
2009	40	1,643	799	3,060	1,887	7,429
2010	57	824	596	5,232	5,202	11,911
2011	56	1,611	393	4,338	2,610	9,008
2012	44	1,422	703	7,802	5,201	15,172
2013	38	5,243	651	6,588	1,788	14,308
2014	21	3,969	564	5,085	4,940	14,579
2015	64	13,872	550	4,231	2,982	21,699
2016	40	12,140	627	4,303	4,322	21,432
2017	39	15,424	697	6,886	5,365	28,411
2018	55	12,381	764	5,625	4,556	23,381
2019	60	12,309	733	2,906	5,654	21,662
2020	40	7,745	560	2,297	6,049	16,691
2021	31	2,869	363	1,719	2,805	7,787
3-year average (2019-2021)	44	7,641	552	2,307	4,836	15,380
5-year average (2017-2021)	45	10,146	623	3,887	4,886	19,586
10-year average (2012-2021)	43	8,737	621	4,744	4,366	18,512
Historical average (1994-2021)	101	5,874	948	3,713	3,898	14,534

Source: ADF&G.

Figure 4-42 shows the average species composition of subsistence salmon for Port Clarence District (there are no subdistricts) for the most recent 10-years for which data are available (2012-2021). On average, subsistence harvests of sockeye salmon contributed the largest proportion at 47%, followed by chum (26%) and pink (24%).

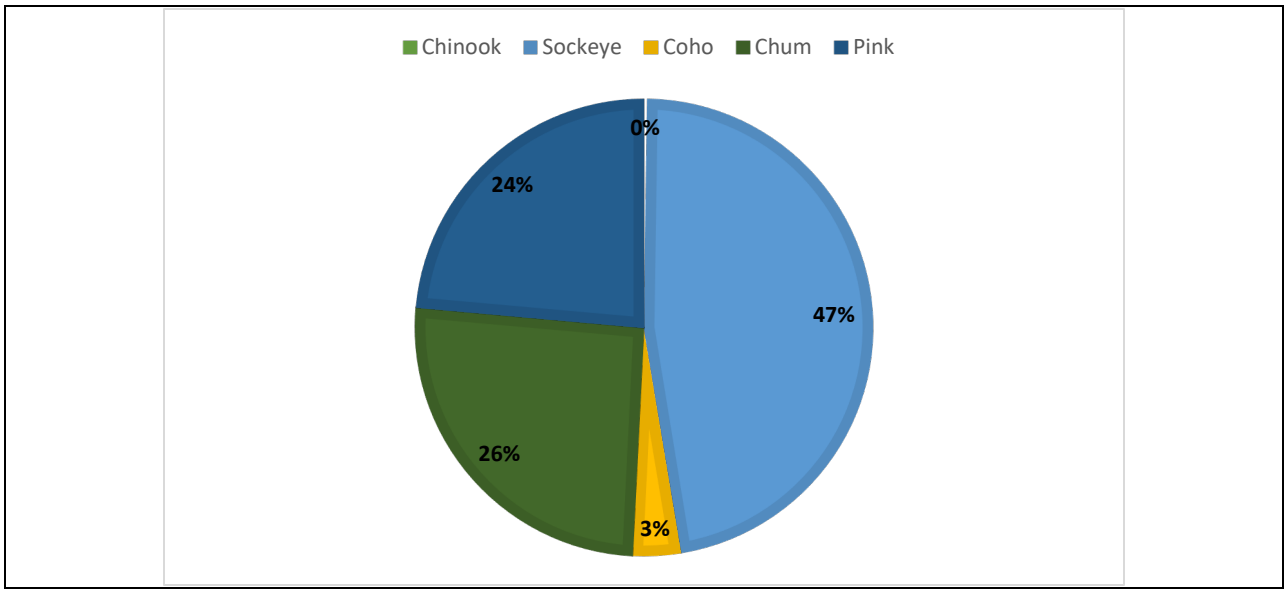


Figure 4-42 Average species composition of subsistence harvest estimates for Port Clarence District, 2012-2021

Source: ADF&G.

While the Alaska BOF did find that salmon are customarily and traditionally harvested for subsistence in the Arctic-Kotzebue Area (5 AAC 01.136), they did not create an ANS. In the Norton Sound-Port Clarence Area, the Alaska BOF also found that salmon are customarily and traditionally harvested for subsistence and created an ANS of 96,000 - 160,000 salmon in the Norton Sound-Port Clarence Area and 3,430 - 5,716 chum salmon in Subdistrict 1 of the Norton Sound District (see Table 4-52 below).

Table 4-52 Comparison of amounts necessary for subsistence and estimated subsistence salmon harvests, Norton Sound-Port Clarence, 1994-2021

ANS range	All salmon 96,000-160,000	Chum - Subdistrict 1 3,430-5,716
Year	Estimated number of subsistence salmon harvested	
1994	136,995	NA
1995	129,212	5,344
1996	145,079	4,333
1997	88,389	4,996
1998	114,659	**964**
1999	**67,311**	**337**
2000	**84,006**	**535**
2001	**79,534**	**858**
2002	115,642	**1,114**
2003	96,361	**619**
2004	**95,290**	**685**
2005	102,481	**819**
2006	102,689	**940**
2007	**74,312**	**2,938**
2008	105,933	**739**
2009	**65,509**	**387**
2010	**79,060**	**3,123**
2011	**52,891**	**1,428**
2012	**91,696**	**2,521**
2013	**62,579**	**3,065**
2014	98,789	3,844
2015	**87,411**	3,967
2016	102,213	**3,260**
2017	98,131	**1,326**
2018	**83,969**	**1,195**
2019	**69,913**	**629**
2020	**59,461**	**1,002**
2021	**27,118**	**405**

Source: ADF&G Division of Commercial Fisheries.
Note: Bold underlined harvest quantities are lower than the amount necessary for subsistence.

Further considering subsistence harvests of chum salmon within the context of total subsistence harvests (i.e., of all resources used for subsistence) provides insight into the relative importance of chum salmon as part of the subsistence diet and economies for residents across the region. Table 4-53 provides information on subsistence harvest data, which are represented in usable (or edible) pounds so subsistence harvests of chum salmon can be compared to other resource categories or species to better understand the subsistence economies within and across communities. Table 4-53 includes results from comprehensive subsistence surveys in Brevig Mission (2006), Elim (2006), Golovin (2012), White Mountain (2006), Teller (2006), Stebbins (2013), Unalakleet (2006), and Koyuk (2006) from the Norton Sound region. As shown, subsistence harvests of chum salmon accounted for 22% of the total harvest of all species of salmon by weight (pounds or lbs.) and 7% of the total subsistence harvest of all species and resources for these communities. Table 4-53 also includes results from comprehensive subsistence surveys in Kotzebue

(2014), Selawik (2011), Kiana (2006), Deering (2013), Noorvik (2012), Shismaref (2014), and Buckland (2018) from Kotzebue Sound. As shown, show chum salmon account for 84% of the total harvest of all species of salmon by weight (pounds or lbs.) and 13% of the total subsistence harvest of all species and resources.

Table 4-53 Usable pounds (lb.) of chum salmon harvested for subsistence compared to all salmon species (lb.) and all subsistence harvests (lb.) for Norton Sound and Kotzebue Sound

	Norton Sound	Kotzebue Sound
Chum Salmon (Usable lb.)	92,452	322,162
All Salmon Species (Usable lb.)	420,112	382,512
As Percent of Total Salmon Harvests	22%	84%
All Subsistence Harvests (Usable lb.)	1,215,475	2,349,059
Chum as Percent of Total Subsistence Harvest	7%	13%

Source: ADF&G.

Table 4-54 provides the estimated 2021 subsistence harvest of salmon for the Norton Sound, Port Clarence, Kotzebue, and Arctic districts as additional context for the comprehensive community information provided in Table 4-53. The total estimated subsistence harvest of salmon for these districts was 99,615 fish in 2021. Chum salmon were harvested in the largest numbers in the Kotzebue District (which mirrors historical trends).

Table 4-54 Subsistence harvests by district, Norton Sound, Port Clarence, Kotzebue, and Arctic, 2021

	Estimated salmon harvest[a]					
District	Chinook	Sockeye	Coho	Chum	Pink	Total
Norton Sound District[b]	1,703	402	6,101	1,681	9,444	19,331
Port Clarence District[c]	31	2,869	363	1,719	2,805	7,787
Kotzebue District[d]	580	779	5,538	53,856	3,412	64,165
Arctic District[e]	126	519	846	4,247	2,594	8,332
Total	**2,440**	**4,569**	**12,848**	**61,503**	**18,255**	**99,615**

Source: ADF&G Division of Subsistence, ASFDB 2022 (ADF&G 2023).
a. Harvests reported during household surveys are expanded into estimates to account for uncontacted households. Harvests reported on permits are not expanded.
b. Household surveys conducted in Unalakleet. Permits issued for Cape Woolley, Nome Subdistrict (Tier I), Golovin Subdistrict, and Elim Subdistrict.
c. Permits issued for Port Clarence District, Pilgrim River, and Salmon Lake.
d. New harvest data was collected for Kiana in 2021. Harvest estimates are imputed based on the most recent three years of data for the remaining eight core communities in the district, plus 2014 values for Point Hope.
e. No new harvest data were collected. Estimates for 2014 used to represent 2021 harvests.

As noted previously, ADF&G Division of Subsistence conducted annual salmon harvest surveys in select Kotzebue District communities from 1994 through 2004, but not in all communities. Little systematic or comprehensive subsistence harvest information has been collected since 2004, although there was a three-year effort to collect some harvest monitoring data from 2012 through 2014. As such, ADF&G relies on interpolated harvest estimates for a core set of communities. This is the best scientific information available for the Northern region but may warrant some caution when comparing to other Districts and Management Areas. Additionally, these data gaps limit the analysts' ability to identify meaningful information on recent trends or harvest patterns for the area.[66] However, some ethnographic work and survey data indicate chum salmon numbers have increased in the region over time, that the timing of chum salmon runs is widening, and these fish are remaining in prime condition later into the season (Braem, Mikow & Kostick 2017). There is also commercial fishing in the region, and a 2014 study

[66] Personal communication, ADF&G, Division of Subsistence.

identified that Kotzebue fishers removed 18% of their subsistence harvest from commercial catches (ibid). Combined, these factors mean Kotzebue area fishers have greater subsistence opportunity to harvest chum.

4.3.5 The Economic Role and Cultural Importance of Subsistence

The following sections discuss the role of subsistence in supporting mixed economies, the importance of subsistence for rural and Alaska Native communities' food security, and the many ways in which subsistence is the backbone for social relationships and cultural identity. When preparing this portion of the SIA, the analysts used the analytical template prepared by the LKTKS Taskforce and referenced the 2017 analysis prepared by ADF&G, Division of Subsistence, for Amendment 110. These documents were starting points used to outline key themes for consideration and inclusion.

The analysts also used the LKTKS search engine to identify potentially useful sources of information. The search engine contains scientific articles in peer-reviewed journals, white papers, archival references, and other sources of information related to LK, TK, the social science of LK and TK, and subsistence information. Published sources of LK, TK, and subsistence information contained in this database were identified as a starting point for this review and the analysts expanded the literature search using those sources. An important point to note for the reader before moving forward is that this information is not organized under discrete regions, rather it is organized thematically. This is not meant to suggest there may not be important cultural differences in what "subsistence" means within and across communities. As appropriate, the analysts have attributed the regional location of research and participants.

4.3.5.1 The Economic Role of Subsistence and Mixed Economies

The cost of living in rural Alaska is high (this includes areas across the Bering Sea perimeter, Western, and Interior Alaska). Reedy (2016) notes that, aside from housing, groceries are the largest household expenditure for many communities in the Aleutians. Goods have to be transported long distances, usually by air or seasonally by barge, to areas with limited transportation and distribution infrastructures. There are few road connections between villages and the primary transportation connection with the state's cities is by air. Rural Alaska has a large subsistence economy in which residents provide a significant share of their income through hunting, fishing, and harvesting local wild products (Huskey et al. 2004). However, the economic role subsistence plays is often "unmeasured in the state's indices of economic growth or social welfare" (Wolfe and Walker 1987:56). When describing Alaska's rural economy, Goldsmith (2007: 45) noted:

> *"Even with consistency in definitions and improvements in the quality of data collected, the standard indicators would not provide a complete or balanced picture of the complexity of the [rural Alaska] economy. This is because the subsistence and informal sectors are nowhere captured by indicators which are designed only to measure activity in the cash economy. Because these non- market activities consume a considerable amount of time and effort for rural residents and contribute significantly to the economic well-being of the region, they should be included for several reasons. Without them the well-being of residents is undervalued, comparisons with urban areas are misleading, and economic development strategies are not grounded in reality."*

Attaching a dollar value to wild food harvests is challenging because subsistence products are not circulated in markets, but the literature on rural Alaska economies notes that "the basic core of the local village economy is subsistence production" (Wolfe & Spaeder 2009: 353). If households did not have subsistence foods, it is reasonable to assume that substitutes would have to be purchased. If an assumed replacement expense of $5.00-$10.00 per pound is applied, the simple "replacement value" of wild food harvests of communities outside nonsubsistence areas was estimated in 2017 by ADF&G at a minimum

of $170-$340 million annually, and at $227-$454 million for all Alaska communities (Fall 2018). While the 2018 report from ADF&G using 2017 data is the most recent comprehensive, state-wide subsistence harvest report available, it is expected that these replacement values would be higher today due to inflation and a decrease in the amount of wild foods accessed by subsistence communities.

Contemporary subsistence uses in rural Alaska occurs within a mixed economy. Communities engaged in mixed economies include both a subsistence fishing and hunting component as well as a cash component. Commercial fishing has long played an important role in mixed economies for rural and Alaska Native communities across Alaska (Wolfe 1982; Reedy 2009). Wolfe & Spaeder (2009: 350) describe at length the connections between subsistence and commercial fishing across Western Alaska (Norton Sound, Kuskokwim, and Yukon areas) in the following way:

> *"…In Western Alaska, commercial salmon fisheries offered special benefits to Alaska Native villages. Selling fish was an income source for cash-poor villages, an income source that potentially was renewable and sustainable. Commercial fishing also drew on traditional fishing skills and required the use of boats, motors, and nets already owned by families for subsistence fishing. For local families, commercial fishing income was used to purchase equipment and supplies used for subsistence fishing and hunting. The industry helped reduce the balance of trade deficits of rural areas, paying for imported manufactured goods with fish exports… fishing labor was supplied by the local communities, the technology used was small scale, and risks were love to the participants. Core village subsistence activities were not eroded or replaced but reinforced with earnings of commercial fishers."*

Indeed, commercial fishing has long been a vital component of the local economy in the Yukon Area for many years as fishermen often retain some salmon from their commercial harvests for subsistence purposes (Brown et al. 2023). However, in the Yukon Area, the last directed commercial opportunity for Chinook salmon occurred in 2008. Since then, commercial opportunities have centered on summer and fall chum salmon often with use of nonlethal gear like dipnets and manned fishwheels to protect Chinook.

In mixed economies, cash income, including that which is earned from commercial fishing, is used to purchase goods like fuel oil, electricity, clothing, and shelter as well as goods that are necessary for subsistence activities such as firearms, ammunition, nets, boats, snowmachines, and other personal gear and for the repair of such gear (Wolfe et al. 2010). Families invest money into small-scale, efficient technologies to harvest wild foods, such as fish wheels, gillnets, motorized skiffs, and snowmachines. Subsistence food production is directed toward meeting the needs of families and communities, not market sale as in commercial production. In this way, families (or households and communities) will engage economic strategies that use household income (e.g., from commercial fisheries, fur trapping, wage employment, seasonal jobs, and dividends) to support subsistence activities. It is this combination of money from paid employment and subsistence food production that characterizes the mixed, subsistence economies in many areas (Fall 2018).

Information on the replacement cost of subsistence resources, as well as the mixed economies of rural Alaska, are provided for context and this information should not be taken as conveying the primary value or only role of subsistence activities. "Subsistence," or more aptly the subsistence or traditional way of life, encompasses a myriad of cultural values and practices that are about more than an economic system, and it cannot be solely measured by harvest levels or commodified by calculating replacement costs. For example, Alaska Native funerary, memorial, and religious ceremonies typically require the harvest, preparation, and consumption of wild foods as communion, which is why the Alaska Supreme Court has ruled that certain harvests out-of-season are protected by the state constitution regarding freedoms of religious expression. Such religious aspects of subsistence ways of life or tribal ways of life cannot be quantified. As discussed below, subsistence is the backbone for many rural and Alaska Native communities.

4.3.5.2 Food Security, Diet, and Nutrition

Food security is defined by the U.S. Department of Agriculture (USDA) as "access by all people at all times to enough food for an active, healthy life." Food security has multiple dimensions, including food production, processing capacity, distribution systems, price, food quality, among others (Hanna et al. 2012). Compared to other U.S. states, Alaska faces unique food security challenges because of its remoteness (including many communities that are only accessible by plane, boat, snowmachine, or other all-terrain vehicles), limited agricultural production, and high reliance on both locally harvested wild foods and imported foods. Also unique to Alaska is the major role that subsistence harvests play in supporting food security (Fall 2018; ICC 2015). Section 4.3.1 provides an overview of subsistence harvests across the State and is not repeated here.

The Inuit Circumpolar Council (ICC 2015: 14, 34-35) prepared a conceptual framework for food security which identifies six different dimensions which are important for understanding it here in Alaska:

- **Availability** [of traditional foods]: biodiversity within the ecosystem across the seasons.
- **Culture:** values, skills, and spirituality that inform harvesting of traditional foods.
- **Decision-making power and management**: the ability and opportunity to use indigenous and scientific knowledge within the management system.
- **Health and wellness:** physical health of all life within an ecosystem, and mental health related to social relations and cultural identity.
- **Stability:** sustainable natural resource management, protection against pollutants, and legal protections for access.
- **Accessibility:** the ability to access food resources, to share resources, and to obtain the cash, skills, and technology needed to harvest and process traditional foods.

As the ICC's (2015) conceptual framework indicates, one dimension of achieving food security is having access to a sufficient quantity of healthy and culturally preferred foods. "Food security" in Alaska is not static but rather a constantly unfolding condition and process where people try to align their immediate needs with their long-term goals of health and sustainability (Fall & Kostick 2018). The USDA administers an annual, nationwide survey to assess food security. For the most recent three-year average available (2014-2016), 87.0% of the U.S. population was found to be food secure, 7.8% was food insecure, and 5.2% was very food insecure. For the same period, the USDA food security findings for Alaska were 87.3% food secure, 9.1% food secure, and 3.6% very insecure (Coleman-Jensen et al. 2017; Fall & Kostick 2018).

Since 2003, ADF&G Division of Subsistence has administered a modified version of the USDA questionnaire as a food security module within comprehensive household surveys in over 100 Alaska communities. Working closely with USDA, the module was modified to account for differences in access to wild and store-bought foods and to record the months in which any reported food-insecure conditions occurred. Food security scores in 99 Alaska communities where the module was administered between 2009 and 2017 ranged widely from 100% of households being food secure to about 54% of households being food secure (Fall 2018). In 42 of these communities, 87% or more of households were food secure, equal to or higher than the USDA average score for Alaska for 2014-2016; in 31 communities, between 75-87% of households were food secure, while 26 communities, less than 75% of households were food secure. An analysis of food security scores for 1,113 households in 25 Yukon and Kuskokwim River communities for study years 2009, 2010, and 2011 found that 77% of households were food secure, 11 percentage points below the USDA findings for Alaska overall in those years (Magdanz et al. 2013). In that same analysis, household maturity, access to subsistence foods, and cash income were found to be related to food security; some low-income households were forced to choose between using limited cash to heat their homes or to obtain food, illustrating seasonal patterns to food security (Magdanz et al. 2013).

Food security, specifically through the lens of subsistence harvests, can be affected by a myriad of factors. Ahmasuk, Trigg, Magdanz, and Robbins (2008) conducted a project across the Bering Strait region to comprehensively assess subsistence harvests by Alaska Native and non-Native people. Comprehensive surveys were completed to understand subsistence uses of residents in Brevig Mission, Teller, Elim, Shishmaref, Wales, Gambell, Savoonga, White Mountain, Koyuk, Unalakleet, Saint Michael, and Stebbins. An important finding of this study directly related to food security is the number of days per week a household used subsistence foods. Figure 4-43 below shows the number of days per week households surveyed in communities use subsistence foods, and the authors note "without question, the amount of time that a household dedicates to subsistence activities is a factor of the subsistence lifestyle." Other known factors (besides time spent harvesting) that can affect food security include a lack of harvest effort, resources being less available to harvest, changes in household composition, among others (Ahmasuk, Trigg, Magdanz, & Robbins 2008; Fall & Kostick 2018).

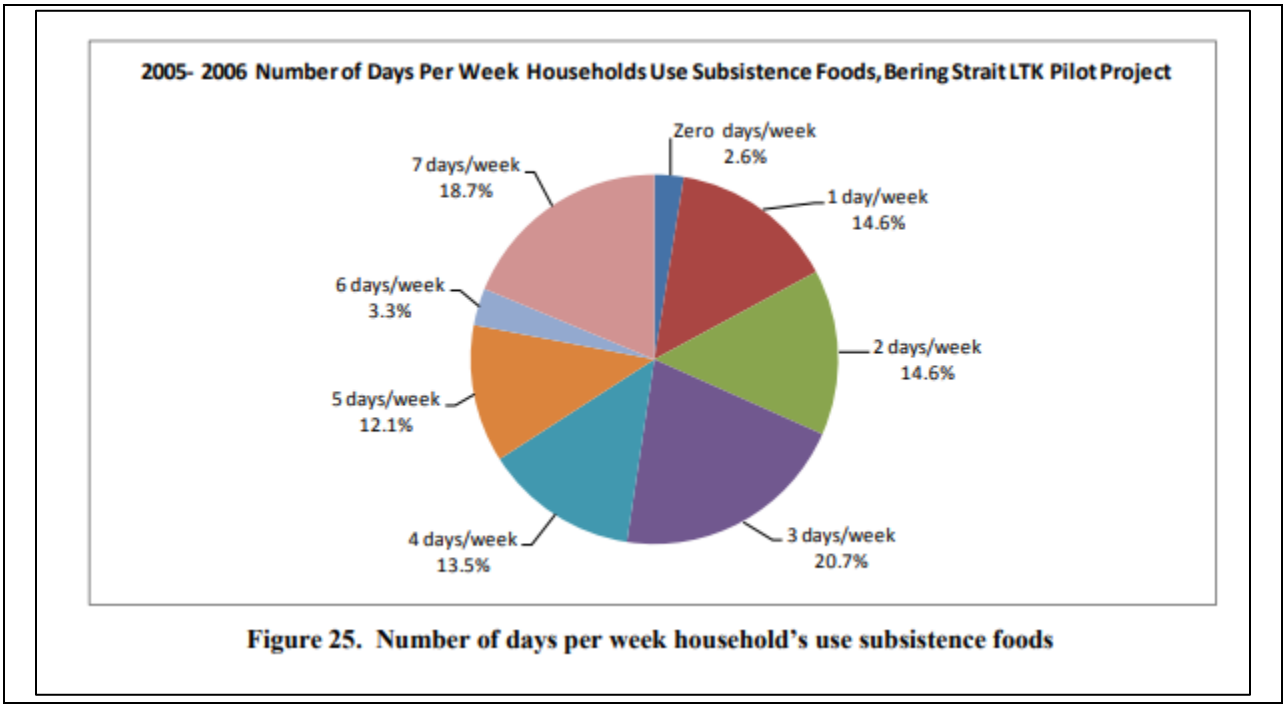


Figure 4-43 Number of days per week household's use of subsistence foods
Source: Ahmasuk, Trigg, Magdanz, and Robbins (2008: 45).

Wolfe et al.'s (2012) research in Yukon River communities found five factors to be significantly related to household salmon production: fishing fuel (gallons); whether the household had the necessary gear; number of harvesters; number of households eating salmon; and the number of people eating salmon. The amount of fuel expended by households while fishing was the factor most strongly associated with household subsistence salmon productivity in that study. The relationship between fuel expenditures and salmon output is consistent with concerns about the rising monetary costs of subsistence fishing. To be successful fishing, a household has to expend money in boat fuel to reach fishing sites, to check setnets, to drift gillnets, and to transport fish. The (sometimes) prohibitively high cost of fuel associated with fishing identified in Wolfe et al.'s (2012) work is not unique to the Yukon region. Raymond-Yakoubian and Raymond-Yakoubian's (2015) work with LK and TK holders across the Bering Strait region captures a multitude of factors causing shifts in subsistence practices. Related to the cost of fuel, however, some participants shared:

> *"We just barely do subsistence. It's too expensive to go out and go fish right now, we can't even pay for the gas to go up and do the fishing…" – Karl Ashenfelter, White Mountain, as quoted in Raymond-Yakoubian and Raymond-Yakoubian (2015: 171)*

Since 2005, the Division of Community and Regional Affairs has tracked unleaded fuel prices in 100 selected Alaskan communities via a telephone survey conducted in January and July every year. The average retail price of unleaded gasoline in the 100 surveyed communities in Winter 2023 was $6.70 per gallon, which is less than one percent lower than the reported Summer 2022 prices of $6.73 per gallon. To put these figures into perspective, the national average in January 2023 was $3.23 per gallon.[67] The rising cost of fuel is also important when considered in light of restricted commercial Chinook and chum salmon fishing opportunities which have historically been important sources of cash income for residents across Western and Interior Alaska (see also Section 4.4).

Beyond contributing to food security in terms of quantity (i.e., having a sufficient amount of food), Alaska Natives' traditional foods provide essential dietary nutrients, vitamins, and minerals. Fish, land and marine mammals, birds and eggs, plants, and berries are nutritious and rich in protein, iron, vitamins A, B12, C, and D, polyunsaturated fats, monounsaturated fats, and omega-3 fatty acids (Fall & Kostick 2018; ANHB 2004). As a part of a traditional diet, fish and seafood (including salmon) especially contribute to energy, protein, mono- and polyunsaturated fatty acids, selenium, magnesium, and vitamins D and E. A decrease in traditional foods has important health implications. For example, higher intakes of omega-3 fatty acids may afford a greater degree of protection against coronary heart disease, and insufficient vitamin D in childbearing mothers and children in the Yukon-Kuskokwim Delta is linked to regional tooth decay in young children (Singleton et al. 2019).

In Western and Interior Alaska, salmon are one of the primary wild foods that meet the nutritional needs of Alaska Native and rural communities. Through traditional and contemporary barter and trade systems, salmon also provide these nutrients to communities throughout the state. Simply put, without salmon, there is increased risk of food insecurity, which has been linked to (and may compound) a range of chronic diet related diseases (Gundersen & Ziliak 2015; Laraia 2013; Seligman et al. 2017). The rates of diabetes, cardiovascular disease, kidney disease, and other diseases induced by poor nutrition and connected with poverty and food insecurity are particularly high in rural Western and Interior Indigenous communities, and the mortality rate of Alaska Native people—often linked to diseases such as these—is among the highest in the country ANTHC 2021a; ANTHC 2021b).

Alaska Natives have long used traditional foods as medicine. For example, Fienup-Riordan (2020: 135) captures the guidance of an Elder who explained:

> *"Native foods do not cause sickness. They do not contain anything harmful… one who eats our Native foods will add one more days to his life. Some of our foods are medicinal. We didn't have razors to scrape off mold, so we ate [dried fish] with mold. That was medicine. Nowadays, our grandchildren throw them away, not knowing they have medicinal qualities." – Nick Andrew, Marshall, as quoted in Fienup-Riordan (2020: 135).*

At the same time, the acts of hunting, gathering, harvesting, and preserving traditional foods are energy intensive, requiring activity that keeps people physically and mentally healthy. While physical activity is important to minimize the consequences of chronic diet related diseases, its support for mental wellness is also important as depression, substance abuse, and other mental health diseases are increasingly prevalent in Indigenous communities (ANTHC 2021b). Alaska Native youth interviewed by Skewes et al. (2020) connect suicide in rural communities with a loss of culture, including a separation between youth and Elders, and they identify reconnecting with traditional culture, spirituality, and Elders through subsistence activities as a primary suicide prevention technique. As a Kuskokwim fisher reflected:

> *"Without my subsistence life, I don't know how I'd get through it. It's my therapy, being outdoors on the land and on the water." — Jacqueline Cleveland, Quinhagak, as quoted in KRITFC (2021:12).*

[67] Information on retail fuel costs are available from the Division of Community and Regional Affairs here.

Summer fish camps have long been a primary gathering place for Western and Interior Alaska Native families, facilitating intergenerational cultural exchanges, particularly through Elders instructing youth about culture, language, and proper ways of being. However, regional residents increasingly express concern as fish camp culture and its support for fostering cultural connections and knowledge sharing across generations have been impacted by declines in salmon abundance and restricted fishing opportunities (see more on this point in Section 4.3.5.3).

Recently, there has been a trend towards a greater dependency on store-bought foods and less on traditional foods (Johnson et al. 2009). This shift to increased reliance on imported store-bought foods is referred to as "food acculturation" (Fall & Kostick 2018) or "dietary westernization" defined as "the diffusion and adoption of western food culture" (Bersamin et al. 2007). However, Magdanz et al. (2016) provides a comprehensive analysis of wild food harvests in rural Alaska from 1983 to 2013 which highlights the persistence of subsistence practices despite changing environmental and social conditions. Synthesizing over 18,000 household surveys in 179 Alaska communities, the authors found that subsistence harvests continued to be critical to rural Alaska communities, particularly those deemed as being highly remote (i.e., those communities located off the Alaska road system an only accessible by boat or plane) (Magdanz et al. 2016).

While people might fish less today than in the past or eat less fish (and other traditional foods) today than in the past, salmon remain a culturally important food source (Raymond-Yakoubian and Raymond-Yakoubian 2015).

> *"It's like how you have to have maybe milk every day, or sugar. That's how dried fish is. It's something you have to have." Fisher from Tuntutuliak, as quoted in Ikuta et al. (2013:14).*

Moncrieff's (2017) work in Yukon River communities contains insight across generations of fishers and residents, many of which remark on a need for Chinook salmon. Chinook salmon are valued for their high oil content and historically large size – one fish can be shared and feed many people. Chum salmon are an important resource in their own right for many reasons and across regions are consistently named as a primary food source in Alaska Native communities (ANHB 2004), but sometimes these fish play a unique dietary role because they are less oily and fatty (Mocrieff, Brown & Sill 2009). Chum salmon are also a unique source of traditional foods, such as *eggamarrlluk* (half-dried, half-smoked salmon), and for feeding Elders or other family members that cannot digest oil rich species like Chinook salmon (KRITFC 2021).

That chum salmon is less oily and fatty makes them a preferred food choice for some, but research also describes how this characteristic makes chum salmon an easier resource for processing and drying (Raymond-Yakoubian and Raymond-Yakoubian 2015). Historically, processing techniques differed for Chum:

> *"Back then, they never made strips. They made fancy fish. They were like flat fish. They cut it so the meat is hanging over, and then they take it off the backbone. Then from the middle of the fins, they cut it so the other side will be hanging down, and then they take a stick to stretch it. It's hanging on the pole from the middle fin on the belly. I still cut them like that, and I take the backbone out." – Edna Deacon, Grayling, as quoted in Moncrieff (2009:37).*

In Fienup-Riordan's (2020: 141) work, an Elder from the lower Yukon River conveys a similar point:

> *"Farther toward us [south along the coast] in the area of Black River, the first arrivals do not dry. They are too rich in fat. But our ancestors took them to brine or to eat a bit, or they gave them to those who had no one to fish or hunt for them so that they could have a bit of food from those first kings… My wife and I have tried [to dry them]. They are too fat. The plants underneath the drying rack couldn't grow anymore because of the oil. We would wait*

for the second run [pulse of king salmon]. Those are much better."[68] *– Francis Thompson, St. Mary's, as quoted in Fienup-Riordan (2020:141).*

4.3.5.3 Salmon Availability and the Traditional Use of Dog Sled Teams

In many rural Alaska communities across the Arctic, Yukon, and Kuskokwim regions, sled dogs have played an important role for transportation, hauling goods, subsistence hunting and fishing, subsistence trapping, and racing (Andersen 1992). Chum salmon has long been a primary food source for dogs (Duffy et al. 2013), but other nonsalmon species like Dolly Varden, coho, and blackfish have also been harvested for dog food before freeze-up along the Kuskokwim (Lavine 2010). "Transportation" is a means listed as a subsistence use in federal and state statues, and as such, harvesting salmon for dog food is managed under subsistence fishing regulations as a subsistence use (Wolfe & Spaeder 2009).

Historically, dogs have consumed large quantities of chum salmon from Western Alaska stocks in the Yukon River drainage and to a lesser extent in the Kuskokwim River and Bay and Norton Sound Areas (Anderson 1992; Wolfe 2001). Fishing for a dog team was a large portion of the annual subsistence harvest for many households and communities until the late 1960s and early 1970s when snow machines became more commonly used (Ikuta et al. 2013). Elders in the middle Kuskokwim region recall their families harvesting, cutting, and pressing thousands of pounds of chum salmon into bales to bring to winter trapline camps to feed dog teams:

"Yeah, that was one of my favoritest things to do was bale…make the bales of dog food. And then my dad used to get, oh, my word, they used to cut thousands and thousands of dog salmon for dog fish. Thousand[s], and I remember long time ago when we used to get like 3,000 dog fish a day, my mom and dad would cut them all." Judy Vanderpool, McGrath, as quoted in Native Village of Georgetown (2021:57).

The number of sled dogs in rural Alaska communities has declined, particularly with the use of snow machines. Individuals that have access to wage employment may prefer the speed and convenience of snow machines which allow them to work cash income jobs and engage in more efficient hunting and fishing activities to meet their subsistence needs (Andersen 1992). Since the late 1960s, ADF&G has conducted annual postseason salmon harvest surveys in all Yukon River salmon fishing communities which provide estimates of the total number of dogs in each surveyed community. Of the 4,512 dogs owned by Yukon Area households in 2020, upper Yukon River households in districts 4 and 5 owned 2,053 dogs (46% of the total number of dogs in all Yukon River districts); of the estimated 1,548 households in the Yukon Area that owned dogs, only 175 households (11%) reported feeding whole salmon to their dogs in 2020. In 2020, the Division of Commercial Fisheries collected information in surveyed communities on the number of salmon that fishers retained for dog food from subsistence harvests. An estimated 3,972 summer chum salmon, 1,181 fall chum salmon, and 353 coho salmon were used for dog food from subsistence salmon harvests (Brown et al. 2023).

In the Kuskokwim region, the number of households harvesting salmon specifically for dog food has declined due to decreased use of dog teams for transportation. In 2020, respondents in 1,427 households reported owning dogs (3,126 dogs in 2020), and 56 households (1% of Kuskokwim Area households) reported feeding salmon to dogs. An estimated number of 4,712 salmon were fed to dogs in 2020, a 47% decrease from the 2019 estimate of 10,210 fish and an 81% decrease from the 2016 estimate of 24,697 fish. About 69% of the salmon reported as fed to dogs were coho salmon (3,261 fish); 20% were chum salmon (922 fish); 8% were sockeye salmon (379 fish); and 2% were pink salmon (93 fish). Households do not target Chinook salmon for dog food. However, about 57 Chinook salmon (1%), likely unfit for human consumption, were reported to have been fed to dogs in an effort to avoid wasting these fish (Brown et al. 2023). Recent chum salmon declines are impacting the number of fish people can put away

[68] While not addressed in detail in this SIA, as this quote suggests, Alaska Native languages may hold many names for the same species of fish (see Fienup-Riordan 2020).

for their dog teams. One fisher and musher from the lower Kuskokwim said of the 2021 fishing season, the first with a noticeable disappearance of chum salmon:

> *"We only had 2 chums in my fish rack all summer. That's unreal. I usually put up 2,000 chums for dogs." — Mike Williams Sr., Akiak, as quoted in KRITFC (2021:7).*

In responding to years of low salmon runs, research by Andersen and Scott (2010) with dog mushers in several Yukon River communities outlines several strategies mushers and households use to feed and care for their teams in times of low salmon abundance. Households may supplement fish with purchased foods and non-fish food sources including rice and other bulk grains; commercially manufactured dry dog food; dog-grade chicken, beef, and lamb meat products; furbearer carcasses and wild game cutting scraps; and various fat, vitamin, and nutrient supplements. Increasing the use of other fish species (e.g., whitefish and Northern pike), as well as fishing longer and harder to obtain appropriate salmon quantities, was also a common compensation strategy. Mushers were reluctant to decrease the number of dogs owned as they already maintain the minimum number of dogs needed for the ways in which in the dogs are used (Andersen & Scott 2010).

Perhaps some caution is warranted when interpreting this information. On one hand, it is widely recognized that the number of sled dogs in communities used for subsistence work and other activities has declined as has recreational and sport mushing (Andersen 1992; Ikuta et al. 2013; Moncrieff 2007). On the other hand, sled dogs, the caretaking that they require, and mushing are activities that occurred in the past and are still occurring today (i.e., on a continuum of change) and connect people to their culture and history (LaVine 2010). There have been efforts to provide young people with hands-on experience working with sled dogs. One such example is through the Frank Attla Youth & Dog Sled Care-Mushing Program in Huslia which works to teach youths about caretaking for sled dogs, veterinary science, and cultural values under the guidance of Elders and mushers (Newman et al. 2023). As Newman et al. (2023: 16) write "sled dogs are a culturally significant common ground that adults and Elders can utilize to establish relationships with youth and vice versa." In this way, much like the act of fishing for salmon, sled dogs provide a means for intergenerational relationships to form and for knowledge about one's culture and environment to be shared.

4.3.5.4 The Cultural and Spiritual Importance of Subsistence

> *"Subsistence is about existence itself. It is about the meaning of life. It is about pain, sorrow, and happiness. It is about satisfaction, renewal, and hardship. It is about humor. It is about discipline, knowledge, and wisdom, to name a few." –Statement on subsistence by Merle Apassingok, Gambell, (1998: 81) as cited in Thornton (2001).*

The importance of subsistence, and the role of salmon goes beyond the economies and sustenance. Salmon is food, fishing is a means of practicing cultural values, a source for building and maintaining relationships, all of which shape and form identity (Raymond-Yakoubian 2019). In this way, salmon may be considered as a "cultural keystone species:" a "culturally salient species that shape in a major way the cultural identity of a people, as reflected in the fundamental roles these species have in diet, materials, medicine and/or spiritual practices" (Garibaldi & Turner 2004). As this definition suggests, cultural keystone species deeply influence the health, well-being, and cultural structure of communities (Haggan et al. 2006; West 2013).

The fundamental importance of social relationships in subsistence has been passed down for generations within communities and is well documented in the existing literature (Fienup-Riordan 1983; Nelson 1983; Fienup-Riordan 1995; Langdon 2021; Fienup-Riordan 1985; Magdanz et al., 2016; Fall 2016). It is common practice for family and friends to pool their resources (i.e., labor, time, equipment, among others) to harvest and process salmon (Ikuta et al. 2013). According to Wolfe (2007), across Western and Interior Alaska, "salmon is harvested primarily within family groups…commonly men harvest, and women process salmon for subsistence food, consumed within extended families and shared with others

in the community." Much of the fishing that took place throughout the year would occur in the summer months at fish camps—seasonal camps with various structural facilities for families to sleep, dry fish, and smoke and cure salmon (Brown et al. 2010).

Salmon harvests usually occur June through October, and often revolves around the summer fish camp. Extended families move from winter residences to summer camps located along tributaries, sloughs, and rivers (Lipka et al. 2019). While fish camps are places to procure food, they are also important spaces where people make connections with their family (and ancestors), the resource, and the land (Wolfe et al. 2010). As people work together to harvest and process salmon, they form and strengthen social relationships that connect people within and between families (Trainor et al. 2021). Moncrieff (2017: 20) reiterates this point in their work in communities across the Yukon River.

> *"[at fish camp] …during fishing activities, everyone has a role to play from the young children to the oldest Elder. Salmon fishing [in Russian Mission] is a group effort with family groups establishing fish camps along the banks of the river in the community or nearby. Often a child's first jobs are to haul fish and water, wash and hang the fish, gather wood for the smokehouse, and, when old enough handling a knife…"*

Here, the essence of fishing culture is vividly described in relation to fish camps which are a central space where families converge to pass down cultural traditions to younger generations. Children actively participate in fishing activities from a young age by learning to make fish wheels, cutting and drying salmon, and maintaining the fish camp. The familial nature of fishing is emphasized, with multiple generations working together, fostering a sense of continuity and community. As Trainor et al. (2021) aptly describe, when people work together to harvest, cut, and process fish (drying, smoking, canning, pickling, among others), they are connected to each other in that moment. They are also connected through memories with the people in the past who taught them how to do these things.

However, in recent years fewer people have engaged in returning to and maintaining summer fish camps along the Yukon and Kuskokwim rivers, influenced by declines in salmon abundance and fishing opportunities, as well as by increasing fuel prices and ties to full-time, year-round work. It is increasingly common that people live in their main community during the fishing season, and though fish camps still provide seasonal bases of operation for many people, they may not reside or smoke fish there (Brown et al. 2017). Some families on the Kuskokwim, weighing the amount of time, fuel money, and effort it takes to harvest sufficient fish amidst short fishing windows and prolonged closures with staying at or traveling to and from fish camp to monitor salmon, have started constructing drying racks and smokehouses in their backyards. Others have stopped going to fish camp altogether, as one Kuskokwim Elder observes:

> *"I'm one of the fish campers...but I don't go to fish camp because of the fish closures. There's only maybe 5 in Tunt [who use their] fish camp right now. No, that's not that many." — Adolph Lupie, Tuntutuliak, as quoted in KRITFC (2021:7).*

Fish camp, and other acts of fishing, also provide opportunities for people to maintain their relationships with salmon (Berkes 1999; Fienup-Riordan 1983, 1994, 2020; Ingold 2000; Nadasdy 2007; Gadamus and Raymond-Yakoubian 2015). Many Indigenous peoples across Western and Interior Alaska (and more broadly the Arctic) believe that humans and animals are equals, that fish and animals are attributed personhood, and that non-human beings have agency (Raymond-Yakoubian and Angnaboogok 2017; Raymond-Yakoubian 2019). Additionally, Ann Fienup-Riordan, who has worked extensively with Yup'ik Elders to understand traditional values and cosmologies, writes "salmon are not only a resource on the lower Yukon, but they are considered sentient creatures possessing intelligence and memory. Like all animals, they are aware of what people think and say about them" (Fienup-Riordan 2020: 11). As this quote suggests, fish are not seen as mere resources but as beings with whom humans hold reciprocal relationships with.

Schiefer (2019) explores human-fish relations along the Kuskokwim River and provides insight into the intricate connections between fish and people in the region. Embedded within these Indigenous worldviews are the beliefs that the personhood and agency of non-human beings place humans in reciprocal relationship with them – there are protocols for the proper behavior and treatment of fish and other animals. In this way, when a fisherman catches salmon, it is not an accidental occurrence but rather the result of proper relationships – fish are caught only if and when they give themselves to fishermen (Voinot-Baron 2021). Fienup-Riordan (2020: 25) describes the traditionally held Yup'ik belief that:

> *"If animals are treated with respect, they return; if they are abused, they do not. According to the Yup'ik view, the world is inhabited by humans and animals in constant communication. Crashes in animal populations are never biological processes separable from these fundamentally social relations. This positive reciprocity is the defining feature of Yup'ik life, as it is for many arctic peoples, as well as hunters and gatherers worldwide."*

While there have been changes to Indigenous cosmologies (or beliefs) (see for example Raymond-Yakoubian and Anganaboogok 2017), respect has long been – and remains—a central element to the relationships humans hold among one another and with non-human entities. These personal and reciprocal relationships are important to understanding why people share their food and value not wasting.

4.3.5.4.1 Sharing

Sharing resources is a hallmark of subsistence communities—playing a role in mixed economies and supporting core cultural values— and these exchanges are complex. As an example, writing on the Yupiit of the lower Yukon River, Wolfe (1981:211-220) discussed several categories of sharing, including *chigiq*: giving food as unsolicited gifts; *navolhotuq*: the exchange of one economic good for another, or "barter;" and finally *tungyiaq*: the trade of goods involving some form of currency, or "customary trade." Local definitions of sharing, barter, and trade are more fluid than legal definitions because they are based on complex social norms and cultural practices (Brown et al. 2017; Trainor et al. 2021).

Prior studies have shown that, in most communities across rural Alaska, a relatively small population of households (about 30%) is responsible for producing the majority of a community's subsistence harvest (about 70% of the community's total), which they share with other households (Wolfe et al. 1987). A more recent and comprehensive study of 3,265 households in 66 rural Alaska communities found that approximately 33% of households accounted for 76% of subsistence harvests (Wolfe et al. 2010). This pattern of harvest specialization where a small number of "super households" (Wolfe et al. 1987) are responsible for the majority of subsistence harvests has been demonstrated throughout more recent and localized studies as well (see Magdanz et al. 2009 related to the Norton Sound; Ikuta et al. 2016 related to Bering Sea, lower Yukon, and lower Kuskokwim River communities; Keating et al. 2022 related to Unalaska; Coleman et al. 2023 related to Chevak and Hooper Bay). This phenomenon is often referred to as "harvest specialization," and it highlights the variations in the distribution of subsistence resources (sharing, barter, and customary trade) among households (Trainor et al. 2021).

Sharing networks build strong connections between households within and across communities (Ikuta et al. 2016), and provide many benefits to individuals, households, and communities across the state including increased wellbeing, food security, food diversity, heritage, and cultural identity (Langdon 2021). These high harvesting households are extremely influential within subsistence networks in that they fulfill a key role in providing access to wild foods to others. However, there are several factors that have been associated with higher levels of subsistence harvests including larger households with a pool of adult male labor, higher wage income, involvement in commercial fishing, and community location (Ahmasuk et al. 2008; Moncrieff 2007; Wolfe et al. 2010). Conversely, Wolfe et al. (2010) found that lower harvesting households tended to have single-person, female, or non-Native heads of household, or advanced aged Elders as household members. A household's productivity and demographic characteristics are thus factors that influence sharing patterns and networks.

Disruption for these key households with a high degree of harvest specialization can affect the wellbeing and food security of the entire community (Baggio et al. 2016). Building from this premise, research by Scaggs, Gerkey, and McLaughlin (2021: 14) looked at subsistence harvest diversity across sharing networks in the context of ongoing environmental change and found that:

> *"[The] cultural dimensions of subsistence, along with the practical strategies underlying subsistence harvests and social networks, have helped Alaska Native people survive and thrive in environments with high levels of change and uncertainty for many generations, and they have also persisted despite sustained exposure to colonization, market expansion, globalization, and other forces that continue to impact Alaska Native communities."*

This speaks to the importance of understanding subsistence more broadly: while chum salmon represent only one part of the subsistence harvest, the low salmon returns for multiple species and across regions in recent years compounds the negative trends in food security and wellbeing within and between communities.

Sharing and customary trade have forged economic and social relationships within (i.e., internal to a community) and among communities (i.e., networks across communities) through which resources like chum salmon are exchanged (Brown et al. 2017; Magdanz et al. 2007; Moncrieff 2007). For example, a family in an interior community may trade with a family that lives on the coast (e.g., exchanging seal oil and meat for dried fish) (Ikuta et al. 2013: 61). Thus, the networks built for sharing, barter, or customary trade of resources like chum salmon complicate the relationship between individual communities and their use of chum salmon. These dynamics complicate the relationship between quantitative indicators of subsistence harvest in a community and residents' relative dependence on the resource.

Additionally, through the sharing of subsistence resources to those who may be unable to participate in the harvest themselves (Wheeler 1998), the practice upholds the social responsibility of providing for individuals (Brown et a., 2017). Salmon may be given or shared with other persons without the expectation that something specific will be given in exchange. Fish may be shared with family members or friends, in the region or outside of it. An example from Tanana:

> *"…salmon is given to individual elders, elders' residences, and people who do not have access or ability to fish. Almost all the fishermen interviewed stated that the first salmon caught were given away to share the taste of the first fish and bring luck to the fishermen" (Moncrieff, 2007).*

The importance of sharing is culturally ingrained, passed down across generations. Traditional beliefs highlight the interconnectedness of sharing with resource abundance, reinforcing the idea that sharing ensures continued provision. Ikuta et al. (2013) and Moncrieff (2017) emphasize the role of sharing in subsistence economies. The distribution of salmon involves various forms of reciprocity, from generalized reciprocity (giving without immediate return) to balanced reciprocity (calculated exchange). Sharing extends beyond the resource to include cooperation in harvesting, processing, and sharing of equipment and knowledge.

While there are many reasons households maintain sharing practices, there are also stressors to sharing systems. These include decreasing numbers of subsistence producers (harvesters) compared to consumers, the cost of transportation, and changing values (Keating et al. 2022). Studies have also shown that decreasing resource abundance is also directly linked with households making different choices with respect to sharing (Brown and Godduhn 2015; Ikuta et al. 2016).

4.3.5.4.2 Respecting Salmon by Avoiding Waste

Subsistence catches of salmon (and harvests of other resources) are directed primarily to meeting the food needs of local residents and dogs. Harvests tend to be self-limiting meaning families typically cease fishing when their family's food requirements or other social obligations (e.g., those to Elders and

widows) are met (Raymond Yakoubian 2009:12). Because of this, subsistence harvest has displayed considerably more stability over time, while commercial participation and catches can be more affected by run sizes, external markets, variable costs of operation, and income potential (Wolfe & Spaeder 2009).

Ikuta et al.'s (2013) research in communities along the Kuskokwim River describes how a long history of self-management is deeply entrenched in the processes, rules and beliefs surrounding the harvest and preservation of salmon along the Kuskokwim. Respect for the fish themselves is a key component to the rules of fishing, promoting safe and sustainable practices that result in healthy conditions, high quality food, and abundant fish. Respondents in that study frequently described the importance of taking proper care of fish. TK directs the ways in which people interact with their environment. Along the Kuskokwim, self-regulating practices of taking care of fish informed by TK include not wasting, preparing properly for the season, and keeping fish camps clean.

Avoiding waste can be carried out through a variety of traditions and practices including not catching more fish than can be processed in a timely manner (i.e., before spoilage), avoiding cutting during the hottest parts of the day, fishing during ideal weather, and proper cutting (Ikuta et al. 2013; Moncrieff 2017). For many across Western and Interior Alaska, being taught not to waste includes using all parts of the fish. Elders from communities along the Yukon River shared the following statements in Fienup-Riordan's (2020: 132) work:

> *"All parts of the king salmon were used in the past. People would brine or dry the heads as well as the cartilage and roe. Salmon were also processed as egamaarrluk (half-dried fish boiled before eating) …everything would be eaten except the guts."—Paul Beans, Mouintain Village, as quoted in Fienup-Riordan (2020:132).*
>
> *"… Some even hung the salty guts and igyamcuut (dried esophagus), which were delicious: They dried these kings without leaving anything out. The only thing they threw away were their gills. At times they didn't even throw them away but would stick them on a piece of wood to dry and give them to the dogs…"—Francis Thompson, St. Mary's, as quoted in Fienup-Riordan (2020:132).*

The knowledge of how to cut and dry salmon has been passed down through many generations. It is generally done in the same way today as in the past, although a wider variety of methods may be employed today in some areas. Salmon harvested for subsistence use along the lower Kuskokwim River were traditionally prepared by a variety of techniques including drying, smoking, freezing, salting, canning, and fermenting in the ground (Coffing 1991: 114), and they still are today. One thing that has not changed is the level of attention people must pay to the fish. A fisherman and resident of Tuntutuliak described the level of care put into tending to fish:

> *I guess the biggest thing was that they watched their fish carefully, that they don't waste any of it, and once the men bring it home, they have to watch it very carefully, constantly almost and on daily basis. Once they hung that fish up to dry, they would constantly watch it, you know keep it open and one of the things, the stomach part, the fattest part, when it dries up, it likes to shrivel, crimple, shrivel. The women on a daily, regular basis fix up the fish to make sure that it dries properly. They'd hang it a certain way and then the next day they turn it over to expose both -every part of that fish to dry. and then to make sure it doesn't touch any, it doesn't get wet, to make sure that it doesn't get wet once it is hung to dry, the women would weave grass mats that when it rained, they used to cover up the fish" (Ikuta et al. 2013: 26).*

Encapsulated within TK systems is an understanding that human behavior affects abundance and fishing successes. If a fisher does not behave in the proper way towards fish, fish camps, the wider environment, or each other, salmon may not return to their net. Similarly, if salmon are not used properly at the proper time—harvested when they appear in the river and hung, handled, and shared in a caring and respectful way—they stop coming back (Fienup-Riordan 2020; Voinot Baron 2021). People feel a personal

responsibility to follow traditions and, in doing so, protect salmon. These are complicated knowledge systems, beliefs, and relationships that cannot be easily distilled for the purposes of this analysis and much of the nuance may be lost and characterized insufficiently. A key point, however, is the role of subsistence within these relationships.

Subsistence practices and TK systems are inseparable – TK informs where, when, how, and why people practice subsistence activities that are central to sharing as well as food and water security. In turn, the continuation, and the applicability of TK systems for subsistence, depends on ongoing opportunities for people and their communities to practice their traditions (NPFMC 2023). Maintaining the cultural connections between humans, and humans and fish or other animals, depends on the ability of humans to maintain these reciprocal relationships.

4.3.5.5 Species Substitutions and Changes in Subsistence Dependence

Salmon is part of a culturally important mix of wild foods that support communities across rural Alaska including the Western and Interior regions (Fall 2018). Writing about the subsistence economy of the Yukon-Kuskokwim Delta in 1966, Klein (1966, 323) stated, "by far the most important single item in the subsistence economy is salmon." Preceding sections have discussed how changes in salmon abundance and subsistence harvest opportunities have social effects within and across communities. However, there may also be broader ecosystem effects because low harvests of one type of salmon species might be replaced by a higher harvest of other types of fish or wildlife; although the analysts would note the magnitude of these changes cannot be fully captured in either a qualitative or quantitative way with the available information.

Nonetheless, recent ethnographic work in Kotlik and Chevak (communities in the lower Yukon River Basin) describes how household shifts in subsistence harvests are linked with declines in the population of a species. For example, in Kotlik and Chevak, chum and Chinook salmon were described by interview participants as declining in abundance over the past three to four years. Seal populations were reported by interview participants as less abundant, and more people were turning to moose as an alternative big game source of subsistence (Wells, Herman & Mercer 2021).

Within this context, it is important to consider changes in Chinook abundance and how these declines have altered some communities' dependence on chum salmon. For example, Godduhn et al. (2020) describe how reduced Chinook salmon fishing opportunities have resulted in more fishermen along the middle of portion of the Kuskokwim River harvesting other salmon species in recent years (including chum). This shift in the salmon species harvested for subsistence also affects the way households preserve their salmon. A fisher from Aniak explained:

> *"In 2012, we put away more reds [sockeye salmon] and chum than we ever did, and we were making strips with chum and red salmon. And pretty much trying to freeze our kings." Aniak fisher, as quoted in Godduhn et al. (2020: 57).*

As another fisher in the same region of the Kuskokwim reflects after the 2021 fishing season, conserving chum salmon species in low abundance by targeting another fish may have cascading effects throughout the ecosystem:

> *"I like to get chums for dryfish and for my half-dried. There just weren't any [in 2021]. I was having to harvest a lot more reds [sockeye salmon] than I normally would for all of that other stuff…I think a lot more people were just getting a lot more reds. So, then that makes me concerned about the red numbers. If we have to keep doing this and hitting them hard, then maybe, is that going to negatively impact what's spawning, what comes back…? And that was the talk, too, a couple of years ago. I remember as we were having to harvest more chum [after Chinook salmon declined], people were like, 'Well, you guys are going to have to start watching the chum numbers.' Same with the whitefish, people were bringing that up. If we're*

> *having to harvest more whitefish, we're going to have to start thinking about those species. I guess it all has a ripple effect." — Megan Leary, Napaimut, as quoted in KRITFC (2021:7).*

Similar shifts in dependence have been observed in Russian Mission (a village on the lower Yukon River). To adapt to the decline in available of Chinook salmon, Russian Mission fishermen are targeting other subsistence resources, relying on friends and family for supplemental wild foods, pooling resources, purchasing more food from local stores, traveling to other regions to hunt and fish, and sharing less than they may have in the past. Households in this community are setting more nets under the ice to access fresh fish, nonsalmon species, for people and to feed their dogs through the winter. Others have targeted more chum salmon, whitefish, sheefish, and pike while at fish camp in the summer (Moncrieff 2017: 21).

Work by Coleman et al. (2023) in Hooper Bay (a community in the lower Yukon River Basin) provides recent and comprehensive baseline information on subsistence harvests in the community. Although residents in Hooper Bay have noticed a decline in salmon numbers in recent years, 2021 was the first time that directed subsistence and commercial harvests of Chinook and summer chum was prohibited. However, some subsistence fishing opportunities were available as fishermen were allowed to target nonsalmon fish with 4-inch mesh gillnets and dipnets, and pink salmon were allowed to be retained (Jallen 2021). In 2021, species replacement was obvious among Hooper Bay residents as they harvested nearly twice as much nonsalmon fish as salmon (23,852 lb. versus 12,175 lb. respectively). On a per capita basis, Hooper Bay residents harvested 22 lb. of nonsalmon fish. Reflecting harvest specialization discussions above (see also Wolfe et al. 1987; Wolfe et al. 2010), just over half of Hooper Bay households harvested nonsalmon fish, while a majority of the households (83%) reported using nonsalmon fish, a pattern which indicates many households receive nonsalmon fish through sharing networks in the community. The most commonly used species were Bering cisco (42%) and Alaska black fish (35%) which were harvested by 25% and 15% of households respectively (Coleman et al. 2023: 45).

Although some households may be able to adapt to declines in species availability (in some years), shifts in species use may not be sufficient or culturally preferred. Coleman et al.'s (2023) work addresses this point in relation to Hooper Bay residents who have not been able to harvest enough salmon to last through the winter during recent years when Chinook and chum closures are in effect:

> *"And that's all we get now, but its—unless I still have to share that with my family, with my extended family. This year was very – this year I with the six fish I had, I had to really stretch those, because I really wanted them, and they're all gone now. I haven't had salmon in a long time, only the fish that those other, uh, those people they share with us, you know, in other places, I see that difference between their fish our fish. Our fish are nice and oily, and their fish are dry." – Fisher, Hooper Bay, as quoted in Coleman et al. (2023: 40)*

As this quote suggests, some communities have relied on food donation programs to buffer against declines in salmon. This respondent was referring to the donated fish from outside of the coastal district. The CVRF provided each household with a 45-lb box of salmon. The Hooper Bay tribal council also reached out to Bristol Bay processing companies who then donated as well. While some respondents in this study were glad to have salmon, a few also commented that the donated fish did not taste like they fish they were used to (Coleman et al. 2023: 40-41). Recipients of similar salmon donation boxes elsewhere in the region, including the upper Kuskokwim community of McGrath, reported the frozen salmon within donated boxes was sometimes freezer burned or rotten, at times making the fish unfit for human or dog food. While donations of salmon may provide a food source to communities, the provided fish is not equivalent to the act of fishing; depending on how donated fish is processed (e.g., head and gutted), these fish cannot be used to teach youth and other new fish-cutters how to fully process salmon.[69]

When considering the level of subsistence salmon harvests of Western and Interior Alaska communities, it is possible that other wild foods may not compensate for low subsistence harvests during a poor year.

[69] Personal communication, T. Vincente.

For example, of the 33 households in Hooper Bay that reported reasons for less household use of salmon resources in recent years, 21 (63.6%) reported regulations and 15 (45.5%) reported because less of the resource is available (Coleman et al. 2023: 79; Table 2-22). When respondents were asked whether their household harvested enough salmon to meet their needs, 25 (61.0%) reported they did not; of these households, 3 (12.0%) reported this had a minor impact, 8 (32.0%) reported a major impact, and 10 (40.0%) reported a severe impact on their household (Coleman et al. 2023: 81; Table 2-24).

Furthermore, and more broadly beyond the community of Hooper Bay, LKTK holders in the Kuskokwim region are observing increased predation on and decreased abundance of nonsalmon wild foods that would otherwise be harvested to fill gaps in food security left by poor salmon abundance. For instance, since 2020, residents of the middle and upper Kuskokwim region have reported seeing black bears, hungry for the lack of (chum) salmon, targeting moose calves that would otherwise be hunted to help meet subsistence needs.[70]

Some households in the Yukon-Kuskokwim Delta have turned to purchasing more food at stores to compensate for low harvests of salmon during poor years, if they have the income, while others may leave the village in search of alternative employment because of the challenging economic circumstances and broader changes to a way of life (Wolfe &Spaeder 2009). Other communities, like Alakanuk (a community in the lower Yukon River drainage) and Stevens Village (upper Yukon River drainage), low harvests may not be made up by increased harvests of other types of wild resources.

Comparing subsistence harvest information from 1980 with 2007, food production was lower across all major species groups in Alakanuk, including marine mammals (-48.8%) and fish (-81.4%). There was no evidence of increased production in other wild foods to make up for low subsistence salmon catches. Comparing 1985 with 2007 in Stevens Village, harvests were up for land mammals (+45.2%), but down for fish (-71.4%). The depressed local economy at Stevens Village has resulted in a significant out-migration of families from the community and a loss of population. In general, harvests of other wild food species in 2007 had not increased in order to compensate for the greater costs of catching salmon in any village (Wolfe et al. 2010:14-15). Because these comparisons include just two study years for each community, they should be applied with caution as indicators of trends.

There is, however, no appropriate substitution that can be made in the relationships humans hold with particular resources. Based on extensive ethnographic work in Akiak (a community along the Kuskokwim River) with oversight and input from the Akiak Native Community Council, Voinot-Baron (2021) describes human relationships with Chinook salmon.[71] Silver (coho) salmon might resemble those held with Chinook, they do not replicate or replace them. In this way, harvests of silver salmon may provide a means for food security. but they do not constitute a substitute for Chinook salmon. Chinook (and chum) salmon hold their own relationships with humans, compelling care and action in their own time and ways.

4.3.5.6 Changes in Migration

In contemporary society, people often move or decide to change their place of residents (referred to in this section as migration) to improve their employment opportunities. For example, Huskey et al.'s (2004) work in communities across Alaska's North Slope and into the Canadian Northwest Territories were often related to improved job opportunities. A study by Martin et al. (2008) with the Institute of Social and Economic Research also found the pursuit of economic and educational opportunities to be the predominant cause of inter-community movement.[72] In Alaska, conventional economic opportunities (employment, growth, education) are generally concentrated in non-rural areas (e.g., Anchorage, Fairbanks, or Juneau). Many rural Alaskans have moved to cities to take advantage of these opportunities.

[70] Personal communication, T. Vincente.
[71] While this research is not specific to chum salmon, the general principles are transferable as it is a commentary on Indigenous worldviews that place humans and animals in reciprocal relationships with one another.
[72] While somewhat dated, the analysts are not aware of any more recent work at the time of writing.

Place amenities, including environmental or public goods and resources, are also known to affect migration. The subsistence economies operating within and across rural and Alaska Native communities illustrates this point, namely the interaction of culturally defined preferences and the characteristics of place amenities can shape people's willingness or decision to migrate (Huskey et al. 2004; Huskey 2009).

Migration between village and town (dual residencies) and seasonal moves for employment and subsistence fishing has become a well-established pattern for some villages along the Yukon River. Poor prospects for local employment cause families to move away from a village, while traditional pursuits like subsistence fishing tend to pull them back. Low salmon runs and restricted subsistence fishing time are contributing factors to increased mobility and migration in order to be more economically productive (Wolfe et al. 2010).

Changes in opportunities for subsistence and commercial fishing as part of mixed economies can affect households' decisions to remain in their current community, as can the relative resilience of social and sharing networks and the significant financial investments households may make into gear and equipment (see Howe 2009:72, 78). People who are heavily invested into subsistence economies through their capital investments into equipment, cultural heritage and identity, and regular practices of fishing (e.g., the anticipation of preparing to fish, the act of pulling in a net, or preserving fish), are faced with difficult decisions on where to live and raise their families (Trainor et al. 2021). For those who stay in rural Alaska, these investments provide significant non-cash returns that improve the quality of their lives. For those who move to unfamiliar urban environments, these local investments provide little to no return and will gradually atrophy, making it increasingly difficult to return home (see Huskey et al. 2004).

4.4 Commercial Harvest of Salmon

This section provides information on the commercial chum salmon fisheries in the western Alaska river systems and bay areas, presented by ADF&G management area. This includes commercial chum salmon fisheries in Arctic and Kotzebue, Norton Sound and Port Clarence, the Yukon River, Kuskokwim River and Bay, and Bristol Bay management areas (see Figure 4-43). These commercial fisheries are the focus of this section because the Council's Purpose and Need statement is specific to Western and Interior Alaska, and these regions broadly align with the WAK chum salmon genetic stock reporting group (i.e., the combined Coastal WAK and Upper/Middle Yukon reporting groups).[73]

[73] Note that this is a slightly different scope than highlighted for the descriptions of subsistence harvest of salmon (Section 4.3) which focused on the Yukon, Kuskokwim, and Norton Sound-Port Clarence management areas in light of the action timeline and data availability. This commercial section was able to include a broader scope primarily due to the availability and consistency of commercial data, which made the addition of the Kotzebue management area and the Bristol Bay management area more readily accessibility to analysts.

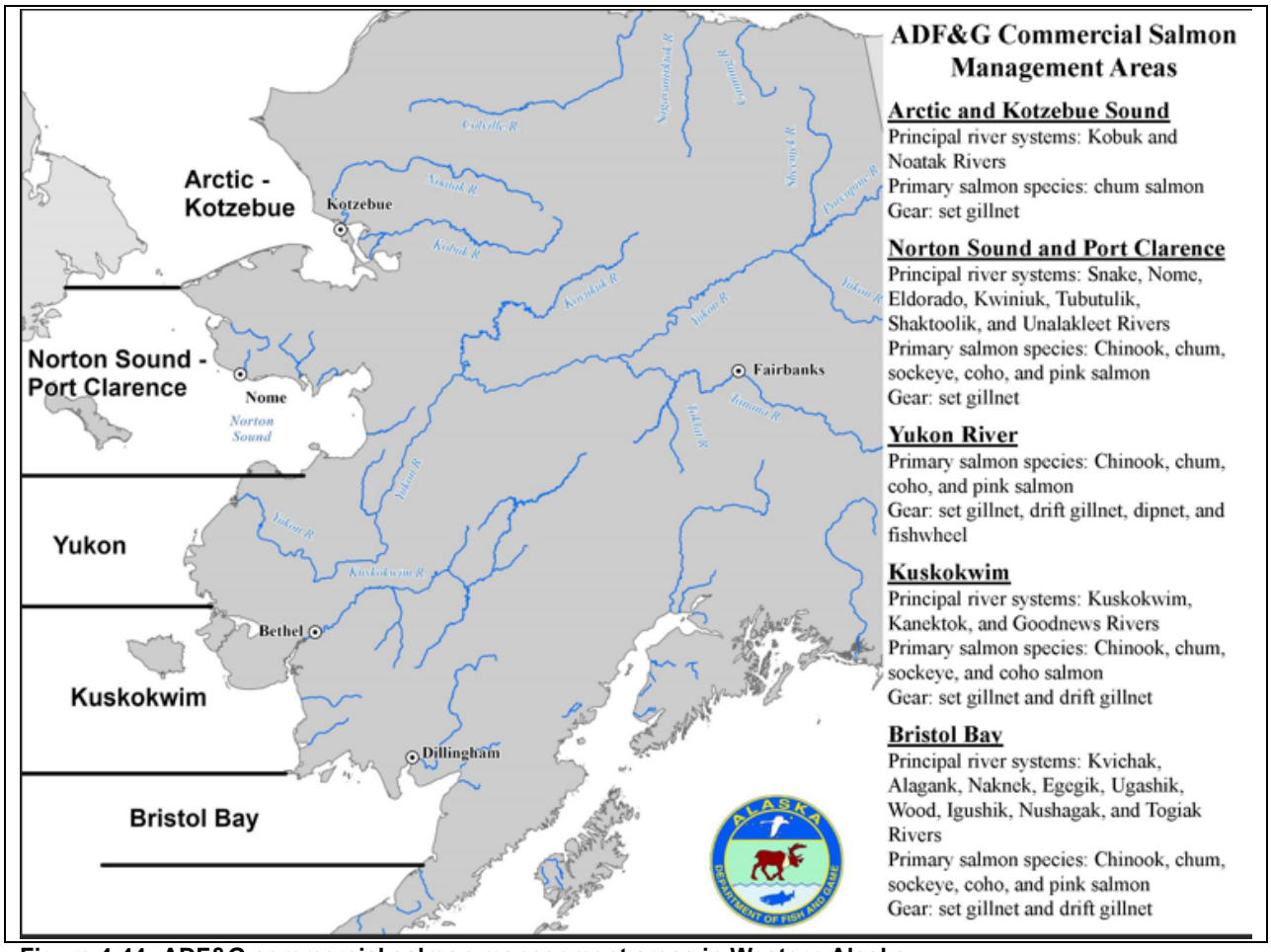


Figure 4-44 ADF&G commercial salmon management areas in Western Alaska
Source: ADF&G personal communication, 1.25.24

4.4.1 Summary of Trends in Commercial Chum Fisheries

Table 4-55 provides a snapshot of trends in the commercial chum fisheries associated with each ADF&G management region and Figure 4-45 provides a visual representation of more recent (2011-2023) commercial catch including the declines since 2018. Section 4.4.2 includes figures depicting a longer timeseries of commercial salmon catch information for each management area in order to provide a broader scope on regional commercial salmon fishing trends.[74]

Table 4-55 and Figure 4-45 below highlight recent closures in commercial chum salmon fishing in the Yukon and Kuskokwim management areas. Commercial chum closures have been in place for Yukon River summer chum since 2021 and for the fall run since 2022. This is in addition to the closure of the commercial Chinook fishery on the Yukon, which has been in place since 2008. Commercial chum salmon fisheries on the Kuskokwim River and in the Kuskokwim Bay have not been open since 2020 and 2021, respectively; however, prior to the closures, Kuskokwim River commercial fisheries had been substantially reduced due to the absence of processors, as further described in Section 4.4.2 below.

With the exception of the commercial chum fishery in Kotzebue in 2022, WAK commercial chum fisheries that have remained open (i.e., Norton Sound and Bristol Bay) have all experienced substantially

[74] Note that the different time-series represented by area is based on the years of information that was readily accessible for the analysis in the ADF&G season summaries. Future versions of this analysis could include historical information consistently through time.

decreased catch since 2018. Although the Norton Sound commercial chum fishery has remained opened in this recent period, along with the commercial harvesters in the Yukon and the Kuskokwim, participants in these fisheries have been experiencing multi-species fishery disasters (as declared by the Secretary of Commerce)..[75]

In order to offer a clearer picture on current and historical commercial fisheries in WAK, this analysis uses several metrics and different timeframes to provide information on species diversification and harvest trends. The eight Commercial Fisheries Entry Commission (CFEC) permits that cover commercial fishing in these regions (discussed below) do not prescribe the type of salmon species that can be harvested. However, this is influenced by the species composition within each region, as well as additional management measures ADF&G may put in place to protect species of concern. Table 4-55 demonstrates chum salmon revenue dependence through the percent of total salmon value that is attributable to chum salmon relative to other salmon species in the most recent year the commercial fishery was open.

In recent years, when the commercial fisheries have been open, the Kotzebue and Yukon River fisheries have been highly dependent on chum salmon. Norton Sound commercial fisheries have also derived more than 50% of their value from chum, although coho has been harvested in recent years as well. The Kuskokwim Management Area commercial fisheries (both the Bay and in river), have relied on a mix of salmon species due to relative abundance and management restrictions. Historically, coho and chum have been commercially harvested in the largest numbers; however, when buyers are available sockeye has been a steady part of the mix as well. In recent years, management measures on the Kuskokwim River have sought to minimize the targeted harvest of Chinook salmon by delaying commercial openers of other species. For Bristol Bay, although the 10-year average catch of chum salmon was the highest of any management area, this area also covers a commercial sockeye salmon fishery of considerable magnitude; thus, chum salmon catch comprises a small (<1%) proportion of that total value.

[75] Disaster determinations were approved by the Secretary of Commerce for the 2019 through 2021 Norton Sound red king crab fisheries, 2020 and 2021 Norton Sound chum and coho salmon fisheries, the 2020 through 2022 Yukon River salmon fisheries, and the 2020 and 2021 Kuskokwim River Chinook, chum and coho salmon fisheries. A determination for the 2022 Kuskokwim area salmon fishery is pending. Positive determinations make these fisheries eligible for disaster assistance from NOAA if funds are appropriated by Congress. A declared fishery disaster must meet specific requirements under the Magnuson-Stevens Fishery Conservation and Management Act.

Table 4-55 Comparison of commercial chum salmon harvest and value with historic averages

Fisheries Management Area	Most recent year with directed commercial chum fishery	Chum catch in most recent year opened (number of fish)	Chum ex-vessel value in most recent year opened	% of total salmon value chum represents in most recent year opened	10-year average catch from most recent year opened (number of fish)	10-year average ex-vessel value beginning in from most recent year opened	Historic high catch (number of fish)
Kotzebue	2023	141,781	$733,061	100%	385,919	$1,426,326	695,153 (2018)
Norton Sound-Port Clarence[a]	2023	15,693	$62,606	54%	94,609	$430,303	319,437 (1983)
Yukon River Summer Run	2020	13,968	$51,067	99%	386,991	$1,378,825	1,616,682 (1988)
Yukon River Fall Run	2019	268,360	$1,073,146	76%	268,923	$1,304,167	489,702 (2017)
Kuskokwim River	2020[b]	*	*	*	51,194	$129,564	1,318,647 (1988)
Remainder of Kuskokwim Area[c]	2021	5,845	$6,453	1%	21,029	$115,686	133,524 (2010)
Bristol Bay	2023	342,905	$574,777	0%	822,485	$1,478,778	2,243,569 (2006)

Source: ADF&G Annual Management Reports and Season Summaries
* represents confidential data do to less than three individuals making landings.
a = Norton Sound ex-vessel values calculated as the product of total chum salmon lb harvested and the average ex-vessel price.
b = There have been no commercial processors operating on the Kuskokwim River since 2015 and no commercial catcher/sellers targeting chum since 2020. The commercial fishery on the river was closed for chum salmon fishing 2021-2023 due to low abundance. The small amount of commercial harvest between 2016-2020 is catcher/seller only and confidential due to limited participation. Thus, the 10-yr Kuskokwim River average is calculated from 2006-2015.
c = There were no commercial chum salmon fisheries in the Kuskokwim Bay area from 2016-2019 due to a lack of processors, There were no commercial fishery in 2022-2023 due to low abundance of chum salmon. The 10-yr average is calculated from 2012-2021.

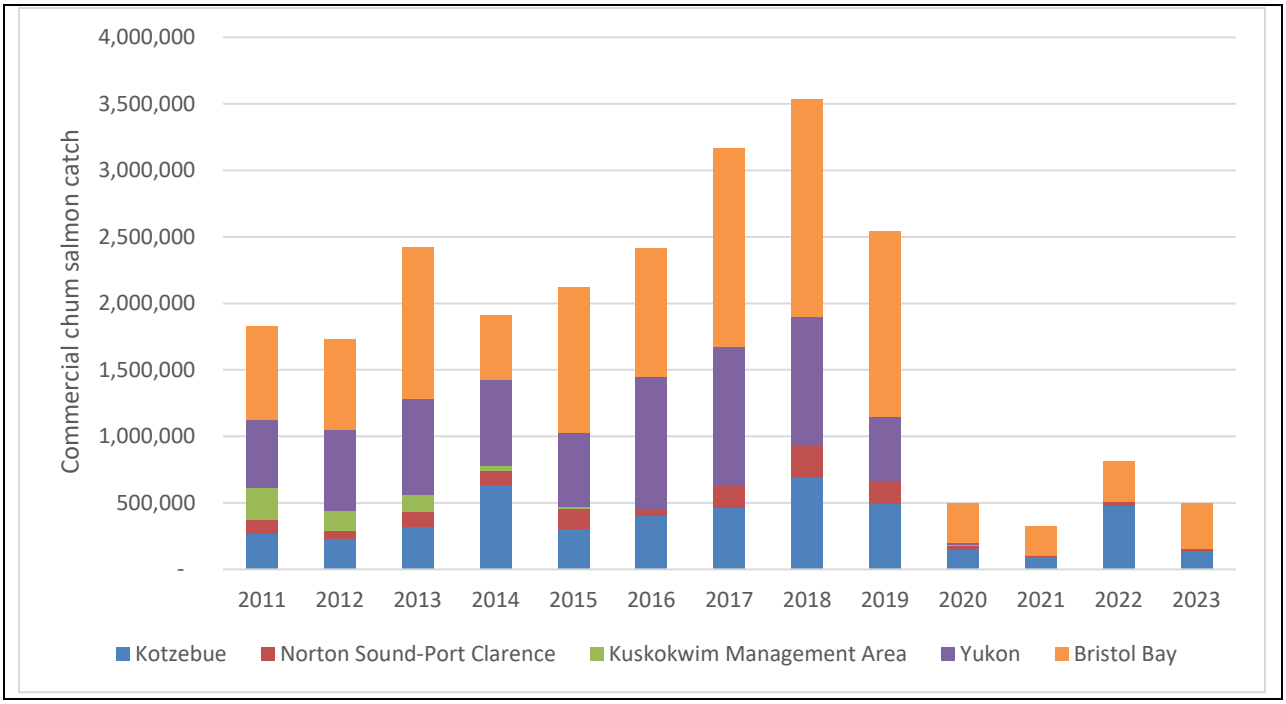


Figure 4-45 Trends in commercial chum harvest, 2011 – 2023
Source: ADF&G Annual Management Reports and Season Summaries

4.4.2 Summary of Commercial Chum Fisheries Management and Trends by Area

The following section provides additional background for the status quo commercial chum salmon fisheries in each ADF&G management area. This section was developed primarily from annual ADF&G Area Management Reports (i.e., Menard et al. 2022; Ransbury et al. 2022; Smith & Gray 2022; Tiernan et al. 2022) and season summaries[76] and personal communication with ADF&G staff. The reports provide substantially more information on regional operations and trends, including area maps and timeseries data on catch and escapement.

Kotzebue

The Kotzebue District encompasses all waters from Point Hope to Cape Prince of Wales, including those waters draining into the Chukchi Sea. Within the Kotzebue District, chum salmon are the most abundant anadromous fish and these salmon support the northernmost commercial salmon fishery in Alaska (Figure 4-46). Other salmon species are present in the region in lower abundance. A primary management objective for the commercial chum fishery is to provide adequate chum salmon escapement throughout the duration of the fishery. In the Kotzebue District, commercial salmon fishing gear is limited to set gillnets.

Processing capacity in the area has varied over time but at least two commercial chum salmon buyers have been active in the area since 2017. In 2023, the commercial chum salmon fishery opened July 10 and

[76] 2023 Kotzebue Season Summary: https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1547740382.pdf
2023 Norton Sound salmon season summary:
https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1547844985.pdf
2023 Preliminary Kuskokwim Management Area season summary:
https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1546786260.pdf
2023 Yukon Area fall season summary:
https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1554859263.pdf
2023 Bristol Bay salmon season summary:
https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1541607348.pdf

closed by regulation on August 31 with fishing generally open six days per week. Total chum harvest in 2023 was below the 1962-2022 average harvest of 232,662 chum salmon, although processor logistics and capacity likely limited harvest.

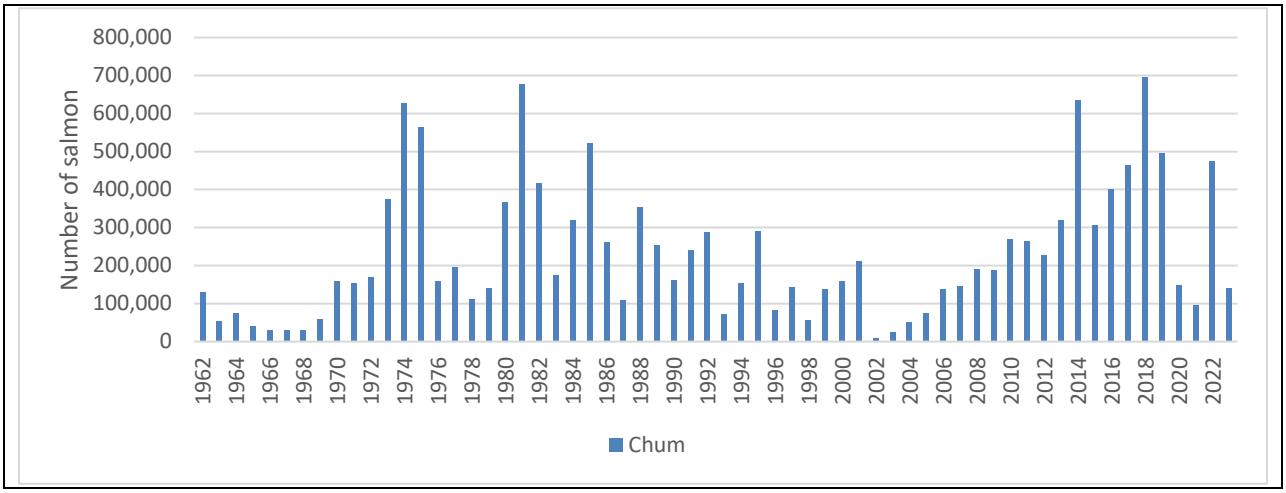


Figure 4-46 Kotzebue District Commercial Salmon Catch, 1962 - 2023
Source: 2023 Kotzebue Sound Salmon Season Summary, ADF&G

Norton Sound

The Norton Sound Salmon District consists of all waters between Point Romanof in the south and Cape Douglas in the north. Commercial salmon fisheries in the district occur in marine waters with effort generally near river mouths. The district is divided into six subdistricts with commercial fishing gear limited to gillnets in Subdistricts 1-4 and gillnets and beach seine in Subdistricts 5 and 6. Nearly all gillnets in the Norton Sound District are fished as set gillnets. Salmon fisheries in Norton Sound are managed in-season using a combination of information from escapement projects, test fisheries, aerial surveys, and commercial fishing catch per unit effort (CPUE). Management is focused on different salmon species and stocks throughout the season. Salmon species and stocks are targeted or avoided through a combination of management measures that include time, area, and net mesh size. Commercial chum salmon fisheries typically begin in July before management shifts to coho salmon in the fourth week of July.

Prior to the 2000s, commercial salmon fishing in the area was sporadic due to lack of commercial fish buyers in all subdistricts. Since 2008, markets have been generally stable with a single processor, Norton Sound Seafood Products, operating buying stations in villages across Norton Sound. In 2023, commercial salmon fisheries harvested 15,693 chum salmon (Figure 4-47). This is half of the 2022 harvest and well below the recent high in 2018 of 238,029 chum salmon. The Northern Norton Sound subdistricts generally met their escapement objectives for chum salmon in 2023, but the Southern Norton Sound subdistricts did not and Subdistricts 4, 5, and 6 did not open for commercial fisheries directed at chum salmon.

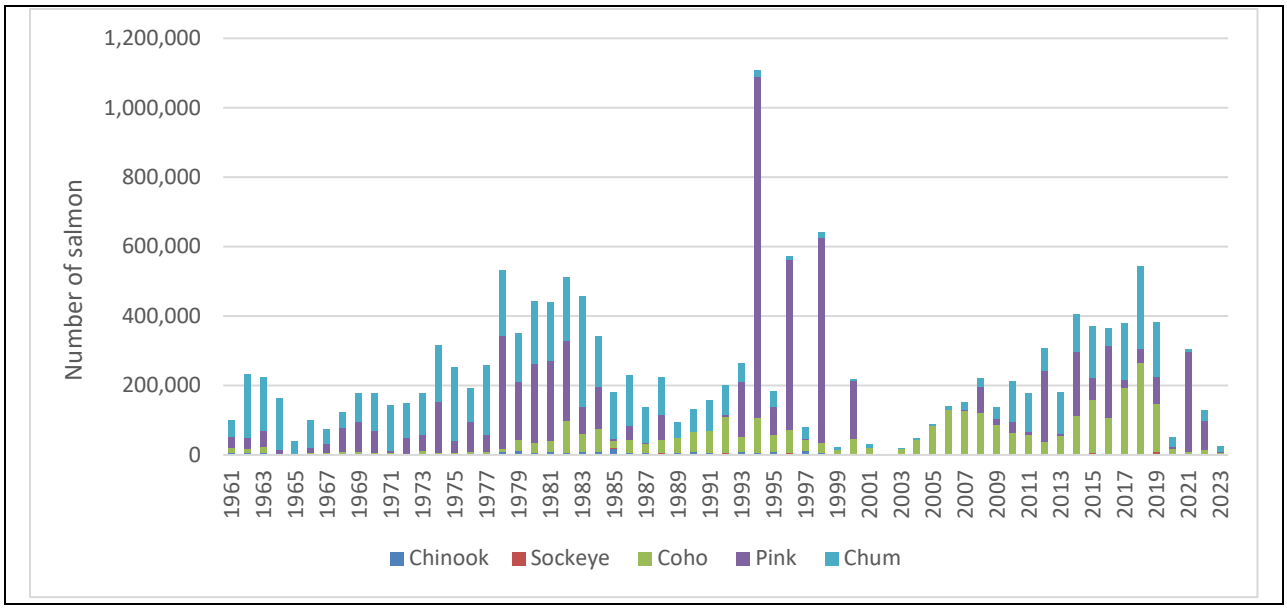


Figure 4-47 Norton Sound Commercial Salmon Catch, 1961 - 2023
Source: 2023 Norton Sound Salmon Season Summary, ADF&G

Yukon River

The Yukon Area includes all U.S, waters of the Yukon River and coastal waters from Point Romanof south to the Naskonat Peninsula. Commercial salmon fisheries can occur along all 1,200 miles of the mainstem of the Yukon River in Alaska, the lower 225 miles of the Tanana River, and the lower 12 miles of the Anvik River. Due to the large area and multiple salmon species, commercial salmon management in the Yukon Area is complex and fisheries are managed inseason to meet escapement goals and prioritize subsistence use (consistent with state and federal law, see also Chapter 3 of the preliminary DEIS). For management purposes, the Yukon Area is divided into seven districts and ten subdistricts. Commercial salmon fishing gear is limited to set gillnets and drift gillnets in the lower river and set gillnets and fish wheels in the upper river. Selective gear to avoid Chinook salmon including beach seines and dip nets are also used.

There are two distinct runs of chum salmon on the Yukon River, the summer and fall chum runs. Summer chum salmon primarily spawn in the runoff streams in the lower 700 miles of the Yukon drainage, while fall run chum salmon primarily spawn in the spring fed upper reaches of the drainage. Chum salmon management in the lower river typically transitions from summer chum salmon management to fall chum salmon management on July 16. Chinook salmon timing overlaps with summer run chum salmon and poor Chinook salmon abundance for over a decade has led to reduced commercial fishing opportunities for summer chum salmon to avoid Chinook salmon. In 2020, the last year directed commercial chum salmon fishing occurred for summer run fish, only selective gear types (dip nets, beach seines, and fish wheels) were allowed.

Due to low abundance of chum salmon, 2023 was the third consecutive year commercial fisheries did not open for summer run chum salmon and the fourth consecutive year they did not open for fall run chum salmon. The lack of commercial harvest in recent years is a stark contrast to the recent high commercial harvests of 577,000 summer chum salmon in 2018 and 490,000 fall chum salmon in 2017 (Figure 4-48).

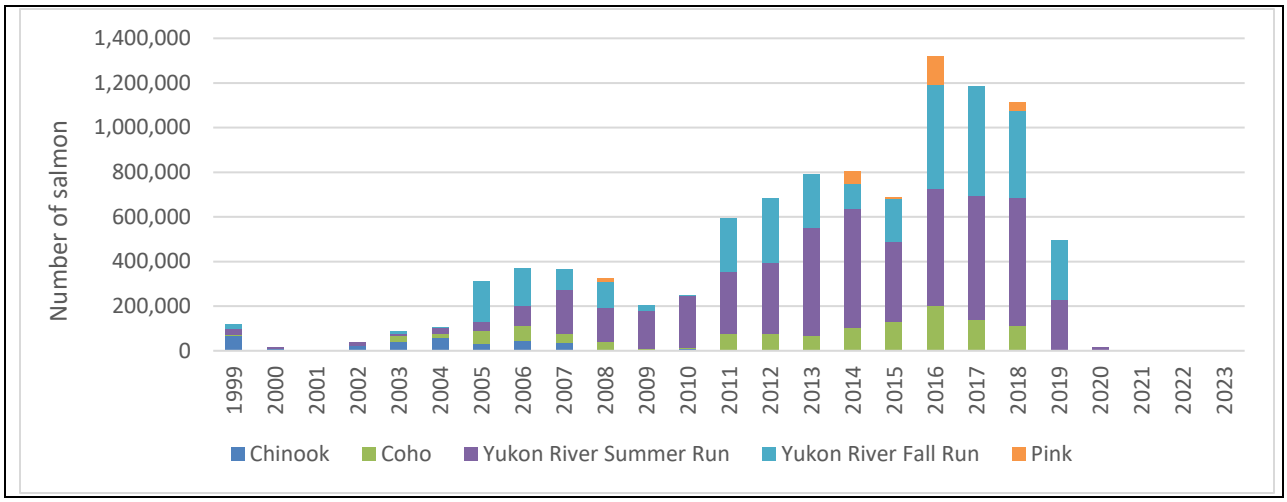


Figure 4-48 Yukon River Commercial Salmon Catch, 1999- 2023
Source: Ransbury et al. (2022); updated through 2023, ADF&G personal communications

Kuskokwim

The Kuskokwim Management Area (KMA) consists of all waters of Alaska between Cape Newenham in the south and the Naskonat Peninsula in the north, including Nunivak and St. Matthew Island. There are four commercial salmon management districts in the KMA; Districts 1 and 2 are in the Kuskokwim River and Districts 4 and 5 are in Kuskokwim Bay. In the KMA, commercial salmon fishing gear is limited to set gillnets and drift gillnets, except in 2021, when an experimental commercial dipnet fishery was opened for registered catcher–seller permit holders.[77]

Processing capacity in the KMA is limited and the last large-scale salmon processor in the area closed following the 2015 season. Between 2016 and 2019, commercial fishing within the KMA was limited to individuals registered with ADF&G as catcher–sellers. Because few individuals registered as catcher–sellers, and those individuals were primarily interested in coho salmon, there were no directed chum salmon commercial harvests between 2016 and 2019. Confidentiality requirements prohibits the release of the salmon harvest data during this time. In 2020 and 2021, a single salmon processor operated within Kuskokwim Bay and a small number of chum salmon were caught during the commercial sockeye salmon directed fishery. Poor chum salmon abundance was observed in 2021-2023 in Kuskokwim River and 2022 and 2023 in Kuskokwim Bay and targeted commercial chum fisheries were not open. (Figure 4-49).

[77] In its 2021 management report, ADF&G notes that commercial dipnet fishery openings were delayed due to chum (and Chinook) salmon conservation; that fewer than 3 permit holders were registered and eligible for the fishery; and that no salmon were harvested in this experimental fishery. See Smith and Gray 2021, https://www.adfg.alaska.gov/FedAidPDFs/FMR22-26.pdf.

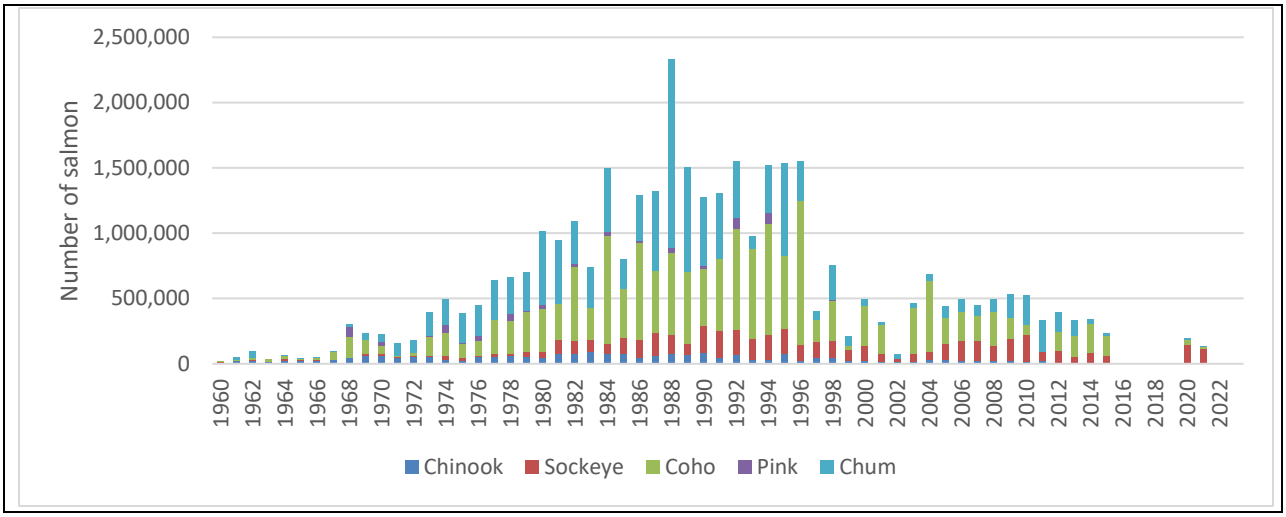


Figure 4-49 Kuskokwim Management Area Commercial Salmon Catch, 1960-2023
Source: Smith & Gray (2022); updated through 2023, ADF&G personal communications.

Bristol Bay

The Bristol Bay management area includes all coastal and inland waters east of a line from Cape Newenham in the north to Cape Menshikof in the south. Commercial salmon fisheries in Bristol Bay primarily target sockeye salmon and gear is limited to drift gillnets and set gillnets. The Bristol Bay sockeye salmon fishery is the largest sockeye salmon fishery in the world and in 2023, 41 million sockeye salmon were harvested in the commercial fishery (Figure 4-50). By contrast, in 2023, 343,000 chum salmon were harvested in the Bristol Bay commercial salmon fishery. This chum salmon harvest is well below the recent 20-year average of 1.1 million fish.

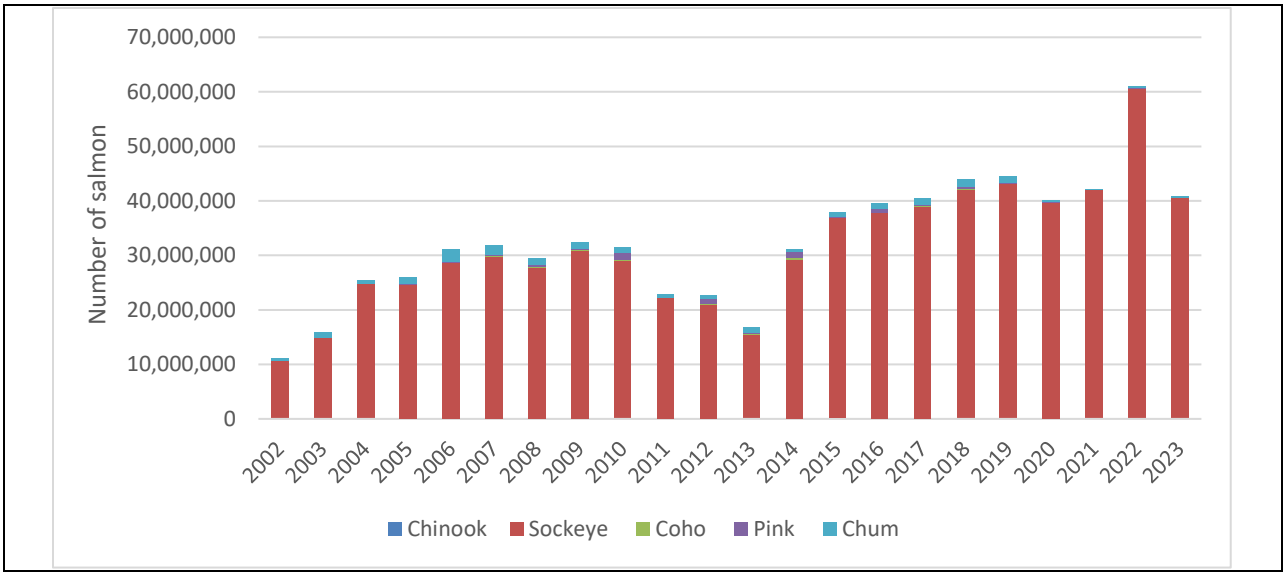


Figure 4-50 Bristol Bay Commercial Salmon Catch, 2002- 2023
Source: Tiernan et al. (2022), updated with catch from 2023 from season summary

4.4.3 Salmon Limited Entry Permit Holders and Communities Engagement in or Dependence on Chum Salmon

The economic importance of chum salmon commercial fisheries varies by the region of Western and Interior Alaska due to the salmon species available for commercial harvest (e.g., permit holders residing

or harvesting in the Kotzebue Management Area are comparatively more economically dependent on commercial chum fisheries from that region than those fishermen harvesting chum in Bristol Bay), in addition to the other non-fishing economic opportunities in the permit-holders' community of residence. Table 4-56 provides a historical view of the relative economic importance of chum salmon to CFEC commercial salmon permit holders within WAK commercial fisheries compared to other salmon species from 1976 -2021. As shown in Table 4-56, there are 8 types of commercial salmon permits represented in this section, and this table demonstrates the percent of total ex-vessel value for permit holders in the region for each permit type relative to the five salmon species.

The commercial permits in these management areas are not species-specific, and often multiple species are harvested together. However, growing conservation concerns for some species (e.g., Chinook and chum salmon) has led to the use of management measures that aim to avoid the incidental catch of these species of concern (e.g., live release, closed periods during Chinook runs, shifting a legal gear, etc.), which has in some cases shifted relative dependency in some regions throughout this timeseries.

The longer time-series in Table 4-56 provides a slightly different perspective than the revenue dependence values for the most recent year (Table 4-55). Table 4-56 still demonstrates the Kotzebue commercial gillnet fishery's near total dependence on chum. While the magnitude of chum caught in the Bristol Bay commercial fishery can be high (e.g., 2.2 Mlb in 2006; Table 4-55), the relative harvest of chum in this fishery is dwarfed by the magnitude of the commercial sockeye salmon fishery. However, for some commercial fisheries (i.e., Norton Sound, Yukon, Kuskokwim), chum salmon has become relatively more important to total ex-vessel revenue as Chinook is less available. The Yukon River commercial gillnet fisheries have historically focused on both Chinook and chum salmon, while Norton Sound and the Kuskokwim area have historically been more diversified across several species. These longer-term trends in species diversification can also be seen in the figures above.

Table 4-56 Percent of total ex-vessel value of Arctic, Yukon, Kuskokwim, and Bristol Bay salmon fisheries by species, 1976 - 2021

Species	Upper Yukon Fish Wheel (S08P)	Upper Yukon Gillnet (S04P)	Lower Yukon Gillnet (S04Y)	Kuskokwim Gillnet (S04W)	Norton Sound (304Z)	Kotzebue Gillnet (S04X)	Bristol Bay Drift Gillnet (S03T)	Bristol Bay Set Gillnet (S04T)
Chinook	11.8%	32.0%	62.5%	17.5%	12.9%	0.1%	1.3%	1.0%
Sockeye	0.0%	0.0%	0.0%	16.0%	0.4%	0.0%	95.7%	95.9%
Coho	3.1%	0.1%	3.6%	46.1%	43.1%	0.0%	0.6%	1.5%
Pink	0.0%	0.0%	0.0%	0.3%	8.0%	0.0%	0.5%	0.6%
Chum	85.0%	67.9%	33.8%	20.1%	35.6%	99.7%	1.8%	1.1%

Source: CFEC Report 22-05N and CFEC Report 22-03N
Notes: CFEC permits including S08P, S04P, S04Y, S04W, S04Z, S04X, S03T, and S04T

In addition to the ADF&G management area for which a CFEC permit grants commercial fishing access, another regional dimension that is highlighted in this section is the community associated with CFEC salmon permit holders for the eight permits identified in Table 4-56. The recent declines in chum salmon that has occurred in many of these river systems have had permit holder and community-level impacts. As such, this section of the analysis provides a series of tables based on existing quantitative fishery information to **identify patterns of engagement (or participation)** in the commercial chum salmon fisheries across Western and Interior Alaska communities, and a series of tables used to **identify patterns of economic dependence** on revenue from commercial chum salmon relative to other fisheries revenue. The broader economic impacts of commercial fishing opportunities within the mixed economies and support networks in these select regions are further discussed in Section 4.4.4 below.

The distribution and relative magnitude of community engagement in these fisheries was measured by permit holder's residence. These tables categorize communities associated with permit holders as "local" versus "non-local" relative the ADF&G management areas.[78] This determination is based on the distinctions made in the CFEC census file as highlighted in recent CFEC reports (CFEC Report 22-05N and CFEC Report 22-03N). Limited alternative economic opportunities exist in some Western and Interior Alaska communities compared to what may be available in major population centers. This local versus non-local distinction highlights management areas in which these commercial fisheries can contribute a valuable economic opportunity, given the proximity to the resource. **There are three sets of tables for each management area (with the Upper and Lower Yukon River gillnet and fishwheel permit combined: S08P, S04P, and S04W; and the Bristol Bay gillnet permits combined: S03T and S04T).**

The first two sets of tables (Table 4-57 through Table 4-66) demonstrate patterns of community and regional (i.e., local versus non-local) engagement. This includes trends in the number of active permits holders and value for each of the eight commercial permit types and for each community where permit holders reside, from 2011-2022. As shown in these tables, **Kotzebue, Norton Sound, the Yukon River, and the Kuskokwim area commercial fisheries are prosecuted by primarily local harvesters, with over 95% of the permit holders residing in local communities for each of these fishery management areas.** In contrast, 75.4% of CFEC gillnet permit holders for Bristol Bay are held by non-local residents.

For the **Kotzebue gillnet permit (S04X)**, an average of 91.5% of active permit holders reside in Kotzebue with consistent representation from Noatak as well. The value of the fishery in 2022 was the fourth highest in the time series presented.

For the **Norton Sound gillnet permit (304Z)**, most of the active permit holders reside in Unalakleet, Shaktoolik, and Elim; with consistent participation from Koyuk, Nome, and Golovin as well. Value generated from this chum salmon in this management area has been highly variable for communities, with a peak in 2018 of $1.5 million in ex-vessel revenue across permits holders, to a low in 2021 of $35,164 across permit holders.

The **Yukon permits combined (S08P, S04P, and S04Y)** had included an average of 458 local active permit holders harvesting chum salmon each year between 2011-2019, prior to commercial fishery closures. The largest numbers of active permit holders are from Emmonak, Kotlik, St Mary's, Mountain Village, Alakanuk, Pilot Station, and Marshall. The peak chum salmon ex-vessel value in the timeseries was generated in 2016 at $4.8 million.

For the **Kuskokwim gillnet permit (S04W)**, as described previously, the opportunity for permit holder to participate in these salmon fisheries have been severely limited due to a lack of processors in the region. Between 2011-2015, there had been an average of 459 active local permit holders. These active permit holders reside in many local communities as diplayed in Table 4-63, with the largest number of active permit holders from Quinhagak, Bethel, Akiachak, and Tuntutuliak. The number of active permit holder as well as the total ex-vessel chum salmon value had been declining during the period 2011-2015.

The **Bristol Bay gillnet permits (S03T and S04T)** are held by permit holders that reside in many local and non-local communities, including outside of Alaska. Among the local communities, the greatest numbers of active Bristol Bay gillnet permit holders reside in Dillingham, Togiak, and Naknek. Chum salmon ex-vessel value peaked in 2016 at $4.7 million but peaked for local permit holders at $965,095 in 2013.

Using the same local versus non-local distinction, the second set of tables (Table 4-67 through Table 4-71) display commercial fisheries revenue from chum salmon specifically, at the community level aggregated over 2011-2022. These tables similar dependency trends that have been highlighted in

[78] In the categories for this document "non-local" includes CFEC permit holder that reside outside of Alaska. In the CFEC reports these statistics are further disaggregated to include a category for non-Alaska resident.

previous tables in this section, but at the community level. For instance, communities associated with Kotzebue are highly dependent on chum salmon (99% for local communities). Norton Sound communities have lower ex-vessel revenue dependence on chum salmon exclusively, as community permit holders also earn revenue from other salmon species and Norton Sound red king crab. In the Yukon permit fisheries, community dependency on chum salmon varies, but it is generally high for local communities. Communities local to the Kuskokwim have lower dependence on chum salmon revenue specifically (12% of average across communities), but this would also be impacted by the minimal harvest between 2016-2022. The Bristol Bay gillnet fisheries are heavily focused on sockeye salmon, thus the communities associated with permit holders are also not highly dependent on chum salmon specifically.

Table 4-57 Kotzebue Gillnet: Commercial chum salmon CFEC active permit holder count by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Persons 2011-2022 (number)
Ambler	0	1	0	1	0	0	1	0	0	0	0	0	0.3	0.3%	1
Buckland	1	0	0	0	0	1	1	0	0	0	0	0	0.3	0.3%	1
Kiana	0	0	0	0	1	0	0	0	1	1	0	0	0.3	0.3%	2
Kivalina	2	1	1	1	0	0	0	0	0	0	0	0	0.4	0.5%	2
Kotzebue	78	74	64	84	98	80	94	92	86	64	47	62	76.9	91.5%	191
Noatak	6	3	3	4	5	2	2	2	3	2	3	2	3.1	3.7%	11
Noorvik	1	1	0	1	1	1	2	1	2	0	0	0	0.8	1.0%	2
Selawik	2	2	0	1	1	0	0	0	0	0	0	0	0.5	0.6%	5
Local Total	90	82	68	92	106	84	100	95	92	67	50	64	82.5	98.1%	208
Anchorage	0	0	0	2	1	2	1	0	1	0	1	0	0.7	0.8%	5
Kenai	0	0	0	0	0	0	0	0	0	1	0	0	0.1	0.1%	1
Klamath Falls	0	0	0	0	0	0	0	0	0	0	1	1	0.2	0.2%	1
Wasilla	1	0	0	0	1	0	0	1	1	1	0	0	0.4	0.5%	2
Willow	0	1	0	1	1	0	0	0	0	0	0	0	0.3	0.3%	1
Non-Local Total	1	1	0	3	3	2	1	1	2	2	2	1	1.6	1.9%	10
Grand Total	91	83	68	95	109	86	101	96	94	69	52	65	84.1	100.0%	211

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.

Table 4-58 Kotzebue Gillnet: Commercial chum salmon value (2022 real dollars) by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (dollars)	Annual Average 2011-2022 (percent)
Kotzebue	$955,467	$637,237	$788,900	$3,110,629	$919,787	$1,527,049	$1,903,547	$2,483,674	$1,628,868	$523,777	$344,256	$1,850,496	$1,389,474	91.8%
Noatak	$93,233	$41,806	*	$148,507	$36,748	*	*	*	$72,485	*	$11,938	*	$54,573	3.6%
Other	*	*	*	$156,300	$32,002	*	*	*	*	*	($0)	$0	$40,624	2.7%
Local Total	*	*	$849,421	$3,415,436	$988,538	*	*	*	*	*	*	*	$1,484,670	98.1%
Non-Local Total	*	*	$0	$117,436	$7,642	*	*	*	*	*	*	*	$28,375	1.9%
Grand Total	$1,121,963	$721,733	$849,421	$3,532,872	$996,180	$1,587,736	$1,994,112	$2,615,435	$1,824,593	$569,691	$369,911	$1,972,896	$1,513,045	100.0%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.
Notes: Other Local (Ambler, Buckland, Kiana, Kivalina, Noonvik and Selawik); Data are confidential (denoted by *) when less than 3 ex-vessel values are aggregated from a community. Aggregation of more than 2 permit holders can be necessary if a value is not associated with a permit holder's landings (i.e., homepack).

Table 4-59 Norton Sound Gillnet: Commercial chum salmon CFEC active permit holder count by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Persons 2011-2022 (number)
Elim	24	25	21	22	22	22	21	23	21	19	17	14	20.9	15.9%	43
Golovin	11	12	10	7	9	9	7	9	9	9	9	7	9.0	6.9%	17
Koyuk	7	11	11	11	13	13	12	14	11	8	8	8	10.6	8.1%	21
Nome	1	3	3	5	7	7	8	9	9	11	7	7	6.4	4.9%	23
Shaktoolik	24	21	22	23	23	27	25	26	23	23	23	22	23.5	17.9%	49
Unalakleet	56	53	55	57	57	60	63	68	73	53	62	47	58.7	44.7%	127
White Mountain	0	0	0	0	0	0	0	1		0	0	0	0.1	0.1%	1
Local Total	123	125	122	125	131	138	136	150	146	123	126	105	129.2	98.4%	271
Anchorage	0	1	2	1	0	1	2	2	1	0	0	0	0.8	0.6%	5
Bethel	0	0	0	0	0	0	0	0	0	0	0	1	0.1	0.1%	1
Fairbanks	1	0	0	0	0	1	0	0	0	0	1	0	0.3	0.2%	3
Kotzebue	1	0	0	0	0	1	0	0	0	0	0	0	0.2	0.1%	1
Newberg	0	1	1	0	0	0	0	0	0	0	0	0	0.2	0.1%	1
Palmer	0	0	0	0	1	0	0	0	0	0	0	0	0.1	0.1%	1
Prarie Farm	0	0	0	1	0	0	0	0	0	0	0	0	0.1	0.1%	1
Soldotna	0	0	0	0	0	0	1	0	1	0	0	0	0.2	0.1%	1
Wasilla	0	0	0	0	0	1	0	0	0	0	0	2	0.3	0.2%	3
Non-Local Total	2	2	3	2	1	4	3	2	2	0	1	3	2.3	1.7%	15
Grand Total	125	127	125	127	132	142	139	152	148	123	127	108	131.3	100.0%	273

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.

Table 4-60 Norton Sound Gillnet: Commercial chum salmon value (2022 real dollars) by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (dollars)	Annual Average 2011-2022 (percent)
Elim	$144,645	$13,448	$43,524	$76,298	$121,717	$32,697	$106,736	$210,506	$54,971	$7,776	$2,274	$24,306	$69,908	13.0%
Golovin	$110,296	$11,788	$8,874	$58,083	$63,792	$21,512	$38,397	$106,044	$82,936	$42,568	$18,100	$46,350	$50,728	9.4%
Koyuk	$47,330	$33,420	$136,070	$61,328	$99,306	$50,359	$183,636	$113,050	$16,536	$1,658	$269	$20,278	$63,603	11.8%
Shaktoolik	$149,359	$94,737	$103,857	$151,313	$111,036	$49,727	$277,244	$294,060	$153,925	$14,619	$7,284	$41,771	$120,744	22.4%
Unalakleet	$208,645	$120,715	$247,821	$168,626	$177,677	$47,032	$430,263	$741,218	$222,376	$11,023	$5,006	$19,721	$200,010	37.1%
Nome/White Mountain	*	$3,842	$5,745	$19,824	$42,426	$2,888	$50,341	$92,341	$62,307	$28,796	$2,109	$25,048	$29,267	5.4%
Local Total	*	*	$545,891	*	*	$204,215	$1,086,618	*	*	$106,440	*	$177,472	$534,261	99.0%
Non-Local Total	*	*	$13,719	*	*	$3,081	$4,663	*	*	$0	*	$3,810	$5,546	1.0%
Grand Total	$689,100	$284,495	$559,611	$541,383	$616,246	$207,296	$1,091,281	$1,563,483	$601,907	$106,440	$35,164	$181,282	$539,807	100.0%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.
Data are confidential (denoted by *) when less than 3 ex-vessel values are aggregated from a community. Aggregation of more than 2 permit holders can be necessary if a value is not associated with a permit holder's landings (i.e., homepack).

Table 4-61 Upper and Lower Yukon Gillnet and Fishwheel: Commercial chum salmon CFEC active permit holder count by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Persons 2011-2022 (number)
Alakanuk	54	58	61	58	57	53	59	54	45	26	0	0	43.8	11.7%	94
Chevak	0	0	0	1	0	0	0	0	0	0	0	0	0.1	0.0%	1
Emmonak	87	93	87	80	84	83	85	86	85	45	0	0	67.9	18.2%	162
Fairbanks	2	3	2	0	0	1	2	2	2	0	0	0	1.2	0.3%	7
Fortuna Ledge	2	2	2	1	1	0	0	0	0	0	0	0	0.7	0.2%	2
Galena	0	1	0	1	0	0	1	0	0	0	0	0	0.3	0.1%	1
Hooper Bay	1	0	1	0	1	1	2	1	1	0	0	0	0.7	0.2%	2
Kaltag	0	6	5	5	0	0	5	3	0	0	0	0	2.0	0.5%	11
Kotlik	61	62	60	65	65	63	62	71	74	35	0	0	51.5	13.8%	108
Koyukuk	0	0	0	1	0	0	0	1	0	0	0	0	0.2	0.0%	2
Manley Hot Springs	0	0	0	1	1	1	1	1	0	0	0	0	0.4	0.1%	1
Marshall	30	31	29	32	31	35	26	30	20	8	0	0	22.7	6.1%	59
Minto	0	1	0	0	0	0	0	0	0	0	0	0	0.1	0.0%	1
Mountain Village	65	66	55	65	63	66	59	59	57	19	0	0	47.8	12.8%	108
Nenana	5	4	2	1	2	3	3	1	2	0	0	0	1.9	0.5%	7
North Pole	0	0	0	0	1	1	1	1	1	0	0	0	0.4	0.1%	1
Nulato	0	3	3	2	0	0	2	3	0	0	0	0	1.1	0.3%	5
Nunam Iqua	6	7	5	11	13	15	13	16	14	9	0	0	9.1	2.4%	24
Pilot Station	49	51	47	50	50	50	43	50	35	10	0	0	36.3	9.7%	79
Russian Mission	7	11	11	13	14	12	2	10	4	1	0	0	7.1	1.9%	22
Saint Marys	60	69	62	62	64	66	64	69	54	26	0	0	49.7	13.3%	116
Scammon Bay	2	4	12	15	26	23	24	23	21	3	0	0	12.8	3.4%	42
Tanana	2	3	2	2	1	3	3	1	2	0	0	0	1.6	0.4%	4
Local Total	433	474	447	466	474	476	457	482	417	182	0	0	359.0	96.1%	847
Non-Local Total	14	27	21	21	16	19	22	20	13	1	0	0	14.5	1.3%	70
Grand Total	447	501	468	487	490	495	479	502	430	183	0	0	373.5	0.4%	1,002

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.
Note: 13 communities represented in the 'non-local' category.

Table 4-62 Upper and Lower Yukon Gillnet and Fishwheel: Commercial chum salmon value (2022 real dollars) by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (dollars)	Annual Average 2011-2022 (percent)
Alakanuk	$457,641	$461,867	$504,720	$332,008	$265,832	$448,403	$557,202	$296,069	$129,699	$6,962	$0	$0	$288,367	12.0%
Emmonak	$698,505	$564,029	$704,805	$389,633	$306,937	$798,130	$788,796	$587,880	$250,738	$12,334	$0	$0	$425,149	17.7%
Fairbanks	*	$24,158	*	$0	$0	*	*	*	*	$0	$0	$0	$6,586	0.3%
Fortuna Ledge	$0	$94,757	$115,237	$113,080	$0	$0	$136,568	$83,576	$0	$0	$0	$0	$45,268	1.9%
Kaltag	$758,657	$346,953	$364,822	$240,898	$314,249	$550,617	$785,509	$709,804	$712,948	$7,605	$0	$0	$399,339	16.7%
Kotlik	$289,241	$217,531	$272,673	$287,031	$253,407	$446,627	$177,346	$366,126	$98,449	$5,989	$0	$0	$201,202	8.4%
Marshall	$483,055	$402,299	$449,314	$387,082	$273,184	$637,132	$483,515	$603,361	$271,567	$6,344	$0	$0	$333,071	13.9%
Mountain Village	$26,969	$57,327	*	*	*	$19,417	$29,870	*	*	$0	$0	$0	$20,619	0.9%
Nenana	$0	$52,046	$30,766	*	$0	$0	*	$94,176	$0	$0	$0	$0	$23,234	1.0%
Nulato	$21,058	$70,519	$41,645	$32,602	$82,610	$130,696	$133,455	$81,552	$33,961	$1,196	$0	$0	$52,441	2.2%
Nunam Iqua	$464,791	$338,816	$350,845	$331,844	$318,176	$493,234	$251,097	$536,602	$207,158	$3,519	$0	$0	$274,674	11.5%
Pilot Station	$44,362	$52,469	$105,463	$109,686	$64,567	$100,150	*	$41,591	$25,033	*	$0	$0	$46,974	2.0%
Russian Mission	$478,221	$424,594	$625,486	$494,403	$389,351	$906,484	$624,807	$819,218	$295,900	$11,875	$0	$0	$422,528	17.6%
Saint Marys	*	$28,426	$39,858	$88,648	$115,963	$162,285	$150,926	$138,422	$45,745	*	$0	$0	$64,970	2.7%
Scammon Bay	*	$7,975	*	*	*	*	$3,072	*	*	$0	$0	$0	$2,728	0.1%
Tanana	*	*	*	$24,232	$10,626	$7,703	$76,910	$28,960	$4,982	$0	$0	$0	$16,002	0.7%
Other Local	$3,764,046	$3,198,347	$3,695,004	$2,894,171	$2,420,170	$4,711,290	$4,333,025	$4,424,848	$2,094,183	*	$0	$0	$2,327,252	97.1%
Local	$67,994	$85,140	$133,705	$92,031	$65,874	$127,258	$175,051	$186,659	$54,133	*	$0	$0	$70,658	2.9%
Non-Local	$3,832,039	$3,283,487	$3,828,709	$2,986,202	$2,486,043	$4,838,548	$4,508,076	$4,611,507	$2,148,315	$57,099	$0	$0	$2,397,909	100.0%
Total	$457,641	$461,867	$504,720	$332,008	$265,832	$448,403	$557,202	$296,069	$129,699	$6,962	$0	$0	$288,367	12.0%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.
Table note: Other Local (Chevak, Galena, Hooper Bay, Koyokuk, Manley Hot Springs, Minto, North Pole). 13 communities represented in the 'non-local' category.
Data are confidential (denoted by *) when less than 3 ex-vessel values are aggregated from a community. Aggregation of more than 2 permit holders can be necessary if a value is not associated with a permit holder's landings (i.e., homepack).

Table 4-63 Kuskokwim Gillnet: Commercial chum salmon CFEC active permit holder count by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Persons 2011-2022 (number)
Akiachak	70	68	61	60	52	0	0	0	0	0	0	0	25.9	12.5%	86
Akiak	15	13	8	6	8	0	0	0	0	0	0	0	4.2	2.0%	17
Aniak	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1.9%	1
Atmautluak	12	10	12	11	3	0	0	0	0	0	0	0	4.0	14.7%	18
Bethel	86	77	72	67	60	1	1	1	1	1	1	0	30.7	7.2%	131
Eek	37	33	35	30	25	0	0	0	0	9	10	0	14.9	4.9%	43
Goodnews Bay	20	21	24	24	20	0	0	0	0	6	8	0	10.3	3.4%	34
Kasigluk	20	21	15	15	14	0	0	0	0	0	0	0	7.1	0.4%	31
Kipnuk	3	0	2	3	2	0	0	0	0	0	0	0	0.8	2.8%	3
Kongiganak	10	12	16	17	15	0	0	0	0	0	0	0	5.8	5.0%	23
Kwethluk	38	30	19	25	14	0	0	0	0	0	0	0	10.5	0.8%	49
Kwigillingok	4	4	5	4	4	0	0	0	0	0	0	0	1.8	4.3%	8
Napakiak	23	20	27	23	14	0	0	0	0	0	0	0	8.9	3.2%	35
Napaskiak	17	13	22	16	13	0	0	0	0	0	0	0	6.8	5.4%	27
Nunapitchuk	24	27	27	28	29	0	0	0	0	0	0	0	11.3	1.3%	41
Platinum	6	4	5	3	4	0	0	0	0	5	5	0	2.7	18.4%	11
Quinhagak	71	66	64	70	68	0	0	0	0	57	64	0	38.3	1.1%	112
Tuluksak	8	7	6	5	1	0	0	0	0	1	0	0	2.3	9.3%	12
Tuntutuliak	41	43	50	49	48	0	0	0	0	0	0	0	19.3	98.8%	65
Local Total	505	469	471	456	394	1	1	1	1	79	88	0	205.5	0.0%	715
Alhambra	0	1	0	0	0	0	0	0	0	0	0	0	0.1	0.6%	1
Anchorage	3	5	2	2	3	0	0	0	0	0	0	0	1.3	0.2%	8
Berea	1	1	1	1	1	0	0	0	0	0	0	0	0.4	0.0%	1
Palmer	0	0	1	0	0	0	0	0	0	0	0	0	0.1	0.0%	1
Pownal	1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.0%	1
Sitka	1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3%	1
Twin Hills	2	2	1	1	0	0	1	1	0	0	0	0	0.7	1.2%	2
Non-Local Total	8	9	5	4	4	0	0	0	0	0	0	0	2.5	100.0%	15
Grand Total	513	478	476	460	398	1	1	1	1	79	88	0	208.0	12.5%	725

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.

Table 4-64 Kuskokwim Gillnet: Commercial chum salmon value (2022 real dollars) by community of permit ownership address, 2011 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (dollars)	Annual Average 2011-2022 (percent)
Akiachak	$220,979	$160,291	$117,951	$21,178	$4,844	$0	$0	$0	$0	$0	$0	$0	$43,770	13.8%
Akiak	$23,082	$13,469	$4,510	$1,045	$1,412	$0	$0	$0	$0	$0	$0	$0	$3,627	1.1%
Atmautluak	$14,132	$5,924	$9,930	$3,547	$694	$0	$0	$0	$0	$0	$0	$0	$2,852	0.9%
Bethel	$161,703	$114,604	$124,886	$18,335	$3,376	*	*	*	*	*	*	$0	$35,422	11.1%
Eek	$114,315	$116,702	$113,663	$14,581	$5,693	$0	$0	$0	$0	*	*	$0	$30,490	9.6%
Goodnews Bay	$65,577	$108,912	$50,751	$10,089	$6,456	$0	$0	$0	$0	$1,483	$249	$0	$20,293	6.4%
Kasigluk	$25,310	$23,962	$13,634	$4,131	$16	$0	$0	$0	$0	$0	$0	$0	$5,588	1.8%
Kipnuk	$1,615	$0	*	$1,119	*	$0	$0	$0	$0	$0	$0	$0	$265	0.1%
Kongiganak	$19,553	$35,414	$43,700	$9,875	$4,085	$0	$0	$0	$0	$0	$0	$0	$9,386	2.9%
Kwethluk	$52,078	$27,333	$22,933	$5,270	$113	$0	$0	$0	$0	$0	$0	$0	$8,977	2.8%
Kwigillingok	$7,076	$10,034	$10,417	$1,295	$545	$0	$0	$0	$0	$0	$0	$0	$2,447	0.8%
Napakiak	$29,250	$27,297	$54,696	$8,263	$1,146	$0	$0	$0	$0	$0	$0	$0	$10,054	3.2%
Napaskiak	$22,939	$15,575	$42,965	$4,330	$1,803	$0	$0	$0	$0	$0	$0	$0	$7,301	2.3%
Nunapitchuk	$31,925	$48,597	$62,585	$11,814	$1,024	$0	$0	$0	$0	$0	$0	$0	$12,995	4.1%
Platinum	$3,511	$11,584	$16,075	$1,080	$1,065	$0	$0	$0	$0	$1,769	$311	$0	$2,949	0.9%
Quinhagak	$434,895	$267,941	$263,346	$41,879	$40,773	$0	$0	$0	$0	$9,252	$6,024	$0	$88,676	27.9%
Tuluksak	$8,423	$5,970	*	$981	*	$0	$0	$0	$0	$0	$0	$0	$2,120	0.7%
Tuntutuliak	$91,539	$111,863	$86,900	$19,908	$8,240	$0	$0	$0	$0	$0	$0	$0	$26,538	8.3%
Local Total	$1,327,899	$1,105,473	$1,049,338	$178,719	$81,405	*	*	*	*	$13,122	$6,927	$0	$313,750	98.6%
Non-Local Total	$20,258	$14,868	$16,161	$2,277	$448	$0	$0	$0	$0	$0	$0	$0	$4,501	1.4%
Grand Total	$1,348,157	$1,120,341	$1,065,498	$180,996	$81,852	*	*	*	*	$13,122	$6,927	$0	$318,251	100.0%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.
Data are confidential (denoted by *) when less than 3 ex-vessel values are aggregated from a community. Aggregation of more than 2 permit holders can be necessary if a value is not associated with a permit holder's landings (i.e., homepack).

Table 4-65 Bristol Bay Gillnet: Commercial chum salmon CFEC active permit holder count by community of permit ownership address, 2008 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (number)	Annual Average 2011-2022 (percent)	Unique Persons 2011-2022 (number)
Aleknagik	17	19	14	12	13	12	14	14	14	15	15	13	14.3	0.60%	33
Clarks Point	11	7	9	8	8	8	8	6	5	4	4	5	6.9	0.29%	20
Dillingham	177	172	180	182	175	182	190	196	202	173	173	184	182.2	7.56%	425
Egegik	15	15	13	11	12	12	10	10	9	8	7	3	10.4	0.43%	27
Ekwok	3	2	2	2	1	2	1	2	2		1		1.8	0.07%	5
Igiugig	2	2	2	3	2	2	2	2	3	3	4	3	2.5	0.10%	7
Iliamna	12	10	10	10	11	11	11	10	12	8	8	8	10.1	0.42%	26
King Salmon	31	32	34	33	37	34	31	33	30	23	18	21	29.8	1.24%	74
Kokhanok	8	9	10	8	8	9	9	7	7	6	7	7	7.9	0.33%	16
Koliganek	14	13	15	16	10	14	11	11	13	9	10	14	12.5	0.52%	30
Levelock	8	5	4	4	5	5	6	4	3	3	4	3	4.5	0.19%	14
Manokotak	54	57	57	57	63	60	57	58	54	47	45	44	54.4	2.26%	111
Naknek	85	87	94	101	95	95	87	89	89	79	81	77	88.3	3.66%	201
New Stuyahok	14	14	14	18	15	12	16	13	11	12	10	12	13.4	0.56%	34
Newhalen	9	8	9	8	7	7	7	4	3	4	6	6	6.5	0.27%	21
Nondalton	1	1	1	1	2	2	5	5	7	5	4	4	3.2	0.13%	9
Pedro Bay	3	2	2	3	2	1	1	1	0	0	2	1	1.5	0.06%	4
Pilot Point	9	8	9	8	9	5	9	10	10	9	9	7	8.5	0.35%	22
Port Alsworth	3	3	2	2	2	3	3	1	2	2	0	0	1.9	0.08%	7
Port Heiden	9	8	8	9	8	7	7	8	7	7	6	8	7.7	0.32%	16
South Naknek	19	16	15	16	19	19	19	20	20	19	16	12	17.5	0.73%	37
Togiak	116	125	127	123	127	114	114	112	111	108	102	100	114.9	4.77%	234
Twin Hills	3	3	2	2	2	3	3	4	6	7	4	4	3.6	0.15%	11
Ugashik	3	3	2	3	3	4	3	3	3	3	2	1	2.8	0.11%	7
Local Total	626	621	635	640	636	623	624	623	623	554	538	537	607	25.19%	1,329
Non-Local Total	1,711	1,690	1,721	1,797	1,817	1,797	1,814	1,792	1,892	1,819	1,858	1,922	1,803	74.84%	4,150
Grand Total	2,336	2,310	2,355	2,436	2,452	2,419	2,437	2,413	2,515	2,373	2,396	2,459	2,408	100.00%	5,270

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.
Table note: 1,166 communities represented in the 'non-local' category.

Table 4-66 Bristol Bay Gillnet: Commercial chum salmon value (2022 real dollars) by community of permit ownership address, 2008 – 2022

Community	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Annual Average 2011-2022 (dollars)	Annual Average 2011-2022 (percent)
Aleknagik	$16,098	$28,530	$23,428	$13,587	$22,775	$11,710	$19,582	$18,997	$14,990	$3,383	$2,236	$2,447	$14,814	0.6%
Clarks Point	$8,332	$4,836	$14,992	$15,752	$9,638	$6,450	$6,593	$15,969	$7,889	$671	$683	$2,033	$7,820	0.3%
Dillingham	$205,989	$241,034	$324,651	$153,274	$241,880	$152,845	$291,674	$272,812	$294,199	$50,360	$41,796	$62,968	$194,457	7.4%
Egegik	$3,281	$2,412	$7,378	$1,934	$2,214	$3,316	$4,328	$6,947	$4,121	$714	$709	$2,005	$3,280	0.1%
Ekwok	$1,678	*	*	*	*	*	*	*	*	$0	$71	$0	$1,060	0.0%
Igiugig	*	*	*	$286	*	*	*	*	$926	$311	$186	$319	$1,480	0.1%
Iliamna	$1,490	$594	$1,675	$857	$983	$1,061	$1,340	$1,738	$1,864	$188	$276	$468	$1,045	0.0%
King Salmon	$14,659	$8,770	$13,192	$10,361	$22,559	$10,131	$24,720	$22,548	$10,002	$1,992	$1,715	$2,459	$11,926	0.5%
Kokhanok	$2,396	$2,526	$3,408	$366	$2,114	$1,056	$594	$1,380	$206	*	*	*	$1,178	0.0%
Koliganek	$9,844	$15,638	$28,708	$11,357	$13,665	$18,381	$19,964	$17,702	$26,639	$1,719	$2,495	$4,155	$14,189	0.5%
Levelock	$3,813	$500	$1,786	$616	$3,620	$1,059	$1,033	$1,827	$987	$40	$154	$117	$1,296	0.0%
Manokotak	$52,524	$38,962	$40,650	$25,421	$41,603	$26,103	$40,955	$38,530	$32,799	$6,006	$5,016	$5,700	$29,522	1.1%
Naknek	$48,592	$21,474	$62,668	$21,297	$71,478	$26,138	$51,774	$70,139	$29,639	$3,832	$4,138	$6,167	$34,778	1.3%
New Stuyahok	$10,752	$31,438	$33,629	$17,716	$22,344	$12,610	$21,396	$16,659	$16,479	$1,881	$1,300	$3,445	$15,804	0.6%
Newhalen	$1,371	$482	$1,185	$243	$1,255	$485	$625	$2,313	$1,046	$41	$83	$320	$787	0.0%
Nondalton	*	*	*	*	*	$0	$1,799	$2,871	$2,634	$790	$444	$492	$832	0.0%
Pedro Bay	$1,279	*	*	$1,661	*	$0	*	*	$0	$0	*	*	$614	0.0%
Pilot Point	$3,334	$1,316	$2,475	$1,526	$636	$384	$458	$1,670	$1,192	$257	$746	$300	$1,191	0.0%
Port Alsworth	$1,150	$395	*	*	*	$429	$437	$0	*	*	$0	$0	$399	0.0%
Port Heiden	$2,563	$1,242	$1,750	$3,296	$7,519	$2,529	$6,549	$11,516	$3,848	$1,122	$634	$1,342	$3,659	0.1%
South Naknek	$8,343	$2,610	$2,642	$2,628	$2,864	$3,128	$4,931	$9,651	$1,712	$248	$473	$162	$3,283	0.1%
Togiak	$261,745	$433,569	$391,057	$288,486	$204,516	$380,158	$417,513	$416,272	$452,254	$105,583	$53,782	$114,056	$293,249	11.1%
Twin Hills	$1,556	$4,380	*	*	*	$7,208	$11,062	$14,003	$22,760	$4,410	$1,470	$3,062	$6,465	0.2%
Ugashik	$466	$595	*	$1,015	$624	$440	$442	$0	$0	$0	$0	$0	$374	0.0%
Local Total	$662,160	$844,664	$965,095	$577,234	$681,775	$668,255	$931,863	$947,861	$927,038	$183,569	$118,859	$212,572	$643,412	24.4%
Non-Local Total	$1,482,608	$1,032,124	$1,691,239	$935,697	$1,621,062	$1,404,904	$2,297,495	$3,237,310	$2,163,885	$406,241	$330,118	$464,920	$1,422,300	54.0%
Grand Total	$2,144,769	$1,876,788	$2,656,334	$1,512,930	$2,302,837	$2,073,159	$3,229,357	$4,185,170	$3,090,922	$589,810	$448,978	$677,492	$2,065,712	78.5%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT; Local and non-local communities defined at CFEC Report 22-05N.
Data are confidential (denoted by *) when less than 3 ex-vessel values are aggregated from a community. Aggregation of more than 2 permit holders can be necessary if a value is not associated with a permit holder's landings (i.e., homepack).

Table 4-67 Kotzebue Gillnet: Revenue Diversification for Communities with Permits, 2011-2022 (2022 real dollars)

Community	Annual Average Number of Kotzebue Salmon Permit Holders	Annual Average Number of All CFEC Permit Holders in those Same Communities	Annual Average Chum Salmon Ex-Vessel Revenues from Kotzebue Permits	Annual Average Total Ex-Vessel Revenues from All CFEC Permits for the Community	Kotzebue Chum Salmon Ex-Vessel Revenue as a Percentage of Total Community Ex-Vessel Revenue Annual Average
Kotzebue	76.9	77.2	$1,389,473.8	$1,405,802.9	98.8%
Noatak	3.1	3.1	$54,572.7	$54,572.7	100.0%
Other*	2.5	2.5	$40,624.0	$40,624.0	100.0%
Local	82.5	82.8	$1,484,670.4	$1,500,999.5	98.9%
Non-Local	1.6	253.8	$28,374.8	$24,145,157.6	0.1%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT
Notes: Other Local (Ambler, Buckland, Kiana, Kivalina, Noonvik and Selawik)

Table 4-68 Norton Sound Gillnet: Revenue Diversification for Communities with Permits, 2011-2022 (2022 real dollars)

Community	Annual Average Number of Norton Sound Salmon Permit Holders	Annual Average Number of All CFEC Permit Holders in those Same Communities	Annual Average Chum Salmon Ex-Vessel Revenues from Norton Sound Permits	Annual Average Total Ex-Vessel Revenues from All CFEC Permits for the Community	Norton Sound Chum Salmon Ex-Vessel Revenue as a Percentage of Total Community Ex-Vessel Revenue Annual Average
Elim	20.9	20.9	$69,908.2	$212,409.6	32.9%
Golovin	9.0	9.0	$50,728.3	$97,946.9	51.8%
Koyuk	10.6	10.6	$63,603.3	$131,865.5	48.2%
Shaktoolik	23.5	23.6	$120,744.3	$401,050.9	30.1%
Unalakleet	58.7	58.8	$200,010.3	$898,610.1	22.3%
Nome/White Mountain	6.5	6.5	$29,266.9	$73,039.7	40.1%
Local	129.2	129.4	$534,261.4	$1,814,922.7	29.4%
Non-Local	2.3	412.3	$5,545.9	$30,891,739.5	0.0%
Grand Total	131.3	541.7	$539,807.3	$32,706,662.2	1.7%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 4-69 Upper and Lower Yukon Gillnet and Fishwheel: Revenue Diversification for Communities with Permits, 2011-2022 (2022 real dollars)

Community	Annual Average Number of Yukon Salmon Permit Holders	Annual Average Number of All CFEC Permit Holders in those Same Communities	Annual Average Chum Salmon Ex-Vessel Revenues from Yukon Permits	Annual Average Total Ex-Vessel Revenues from All CFEC Permits for the Community	Yukon Chum Salmon Ex-Vessel Revenue as a Percentage of Total Community Ex-Vessel Revenue Annual Average
Alakanuk	43.8	43.9	$288,367	$351,767	82.0%
Emmonak	67.9	67.9	$425,149	$508,292	83.6%
Fairbanks	1.2	16.2	$6,586	$1,406,971	0.5%
Kaltag	2.0	2.0	$45,268	$45,268	100.0%
Kotlik	51.5	51.5	$399,339	$539,608	74.0%
Marshall	22.7	22.7	$201,202	$233,942	86.0%
Mountain Village	47.8	47.9	$333,071	$429,964	77.5%
Nenana	1.9	1.9	$20,619	$25,175	81.9%
Nulato	1.1	1.1	$23,234	$23,353	99.5%
Nunam Iqua	9.1	9.1	$52,441	$67,510	77.7%
Pilot Station	36.3	36.3	$274,674	$329,282	83.4%
Russian Mission	7.1	7.1	$46,974	$54,890	85.6%
Saint Marys	49.7	49.7	$422,528	$516,238	81.8%
Scammon Bay	12.8	12.8	$64,970	$79,792	81.4%
Tanana	1.6	1.6	$2,728	$2,848	95.8%
Other Local	2.7	6.1	$16,002	$476,178	3.4%
Local	358.9	377.7	$2,327,252	$5,091,079	45.7%
Non-Local	14.5	352.8	$70,658	$29,661,048	0.2%
Grand Total	373.5	730.4	$2,397,909	$34,752,127	6.9%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT
Other Local (Chevak, Fortuna Lodge Galena, Hooper Bay, Koyokuk, Manley Hot Springs, Minto, North Pole)

Table 4-70 Kuskokwim Gillnet: Revenue Diversification for Communities with Permits, 2011-2022 (2022 real dollars)

Community	Annual Average Number of Kuskokwim Salmon Permit Holders	Annual Average Number of All CFEC Permit Holders in those Same Communities	Annual Average Chum Salmon Ex-Vessel Revenues from Kuskokwim Permits	Annual Average Total Ex-Vessel Revenues from All CFEC Permits for the Community	Kuskokwim Chum Salmon Ex-Vessel Revenue as a Percentage of Total Community Ex-Vessel Revenue Annual Average
Akiachak	25.9	26.4	$43,770.2	$144,740.7	30.2%
Akiak	4.2	4.8	$3,626.5	$48,364.5	7.5%
Atmautluak	4.0	4.1	$2,852.2	$11,486.0	24.8%
Bethel	30.7	37.3	$35,421.6	$534,762.0	6.6%
Eek	14.9	15.9	$30,490.2	$140,693.6	21.7%
Goodnews Bay	10.3	11.4	$20,293.0	$180,743.4	11.2%
Kasigluk	7.1	7.5	$5,587.7	$22,233.7	25.1%
Kipnuk	0.8	5.9	$264.8	$286,980.6	0.1%
Kongiganak	5.8	7.0	$9,385.6	$158,090.1	5.9%
Kwethluk	10.5	11.8	$8,977.3	$97,419.6	9.2%
Kwigillingok	1.8	3.7	$2,447.2	$137,479.6	1.8%
Napakiak	8.9	9.0	$10,054.3	$34,539.0	29.1%
Napaskiak	6.8	6.8	$7,301.0	$20,267.1	36.0%
Nunapitchuk	11.3	13.3	$12,995.4	$180,908.9	7.2%
Platinum	2.7	3.4	$2,949.4	$64,328.5	4.6%
Quinhagak	38.3	39.2	$88,675.8	$398,113.3	22.3%
Tuluksak	2.3	2.8	$2,120.4	$14,756.4	14.4%
Tuntutuliak	19.3	19.4	$26,537.5	$119,072.2	22.3%
Local	205.5	229.6	$313,750.4	$2,595,013.7	12.1%
Non-Local	2.5	212.7	$4,501.0	$19,299,560.1	0.0%
Grand Total	208.0	442.3	$318,251.4	$21,894,573.8	1.5%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 4-71 Bristol Bay Gillnet: Revenue Diversification for Communities with Permits, 2011-2022 (2022 real dollars)

Community	Annual Average Number of Bristol Bay Salmon Permit Holders	Annual Average Number of All CFEC Permit Holders in those Same Communities	Annual Average Chum Salmon Ex-Vessel Revenues from Bristol Bay Permits	Annual Average Total Ex-Vessel Revenues from All CFEC Permits for the Community	Bristol Bay Chum Salmon Ex-Vessel Revenue as a Percentage of Total Community Ex-Vessel Revenue Annual Average
Aleknagik	14.3	14.3	$14,813.5	$1,000,638.4	1.5%
Clarks Point	6.9	6.9	$7,819.9	$465,586.8	1.7%
Dillingham	182.2	182.2	$194,456.9	$15,207,550.1	1.3%
Egegik	10.4	10.4	$3,280.0	$1,023,307.7	0.3%
Ekwok	1.5	1.5	$1,165.5	$44,414.0	2.6%
Igiugig	2.5	2.5	$1,480.2	$297,828.3	0.5%
Iliamna	10.1	10.1	$1,044.5	$624,729.4	0.2%
King Salmon	29.8	29.8	$11,925.7	$2,538,258.0	0.5%
Kokhanok	7.9	7.9	$1,177.7	$392,883.4	0.3%
Koliganek	12.5	12.5	$14,188.9	$902,551.8	1.6%
Levelock	4.5	4.5	$1,295.9	$274,500.8	0.5%
Manokotak	54.4	54.4	$29,522.3	$2,923,821.6	1.0%
Naknek	88.3	88.3	$34,778.0	$7,136,096.2	0.5%
New Stuyahok	13.4	13.4	$15,804.1	$801,934.4	2.0%
Newhalen	6.5	7.3	$787.4	$342,597.5	0.2%
Nondalton	3.2	3.2	$907.4	$162,907.9	0.6%
Pedro Bay	1.5	1.5	$818.6	$51,984.8	1.6%
Pilot Point	8.5	8.5	$1,191.2	$585,661.9	0.2%
Port Alsworth	1.9	1.9	$531.4	$176,513.6	0.3%
Port Heiden	7.7	7.7	$3,659.2	$962,399.6	0.4%
South Naknek	17.5	17.5	$3,282.7	$832,813.2	0.4%
Togiak	114.9	114.9	$293,249.3	$5,519,705.7	5.3%
Twin Hills	3.6	4.1	$6,464.7	$169,759.5	3.8%
Ugashik	2.8	2.8	$641.9	$199,049.2	0.3%
Local	606.7	607.9	$643,412.1	$42,637,493.9	1.5%
Non-Local	1,802.5	2,303.4	$1,422,300.2	$246,089,601.2	0.6%
Grand Total	2,408.4	2,911.3	$2,632,660.3	$288,727,095.2	0.9%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

4.4.4 Regional Economics of Commercial Chum Salmon Fishing

In addition to direct revenue for the CFEC commercial permit holders, the economic impacts from declines in commercial chum salmon fisheries fit into a larger regional economic and social framework that can have broad and long-term implications for permit holders, households, and communities within the regions. Communities dispersed throughout the ADF&G Management Areas analyzed here are considered remote and rural communities by almost all standards—they are generally off the road system, and many are off the marine highway system (Goldsmith 2007). Employment opportunities are extremely limited in most of these fishing communities within Western and Interior Alaska, although the CDQ groups have invested into their regions and communities by providing seasonal, full-time, and internship employment opportunities for some residents (see Section 4.2.7).

However, for communities engaged in mixed economies (i.e., which includes both a subsistence food production component as well as a cash component from employment) commercial fishing and subsistence activities are often interconnected in many ways. The SIA discusses the role of mixed and subsistence economies at length in section 4.3.5.1 which is not repeated here. In economic terms, this includes induced expenditures with the revenue earned in commercial salmon fishing providing household income for investment into resources that allow for subsistence harvests, as described in section 4.3.5.1. Moreover, depending on the area management, commercial salmon fishing resources (e.g., boats, fishwheels, nets) may be used to subsistence fish as well, or subsistence fishing may occur simultaneously with commercial fishing.

As cited by literature in Section 4.3.5.1, participation in commercial fisheries has been one factor associated with higher subsistence harvest rates, which means that those with access to commercial boats and equipment may also be supporting others in the community as a "super household" (i.e., where a small number of harvesters are responsible for the majority of subsistence harvests). It was noted by residents in the Norton Sound/ Bering Strait region, that jobs can represent a unique challenge in that they provide income that can aid subsistence harvests, but that time required for these jobs can keep people from participating in subsistence (Raymond-Yakoubian & Raymond-Yakoubian 2015). As a seasonal employment opportunity, commercial fishing can provide valuable flexibility for following a year-round subsistence calendar (or the "seasonal round" within a community).

Revenue earned in commercial salmon fishing can also provide for basic necessities that require income. As described in Section 4.3.5 the cost of living is high in rural Western and Interior Alaska. In particular, goods or services that require transportation are expensive or in some cases unavailable. Poverty rates are high in Western and Interior Alaskan communities (as demonstrated specifically for CDQ communities in Section 4.1.6, many of which overlap with the local permit holder residences for commercial chum salmon fisheries throughout Norton Sound, the Yukon Area, KMA, and Bristol Bay). Therefore, joint restrictions for commercial and subsistence salmon harvesting can represent a "double-blow" to a household's access to food with both reductions in a primary source of protein, through subsistence salmon harvests, in addition to disposable income to purchase food at a store. Moreover, if or when a super household is doubly impacted by commercial and subsistence fishing closures, this may have important ripple effects throughout communities in terms of sharing networks, food security, and cultural practices (Wolfe et al. 1982).

Typically, regional economic impact analyses consider the sectors that support an industry of focus and the indirect effects associated with a change in expenditures within that industry resulting from the proposed action or change. For commercial fishing in many Alaskan communities, support sectors may include things like marine fueling stations, bookkeeping, businesses that offer fishing vessel services and repair, stores that sell marine fishing gear and supplies, and restaurants and lodging that accommodate out-of-town crew. Some support services like this exist in CDQ communities, through the groups' community-based ventures. For example, CVRF has developed Mechanic/Welding shops in 18 of their

communities, where residents can employ the services of certified mechanics (see section 4.2.7). Additionally, support sectors in Alaska communities can include temporary and ad hoc jobs such as income earned from assisting a longliner in baiting hooks or helping a seiner mending nets.

However, given the highly local nature of the commercial WAK salmon fisheries (with the exception of the Bristol Bay commercial fisheries), the limited number of businesses in many of these rural communities, and importantly the cultural practice of sharing which may include one's labor (Raymond-Yakoubian 2019), "support sectors" can look different in many of the rural Western and Interior communities. For instance, rather than disposable income exchanged for assistance in preparing fishing gear, in some instances there may be an expectation of a younger family member assisting an older family member.[79] In this way, skills and knowledge may be passed down as well. With limited businesses available to provide for-profit services, developing the skills and knowledge for commercial fishing, boat maintenance, equipment repair, etc. can be another type of value generated without necessarily involving monetary exchange.

Inter-generational commercial operations within fishing families in WAK can be seen through CFEC permit transfers (CFEC 2022a; CFEC 2022b). For six of the permits associated with the Arctic, Yukon, and Kuskokwim management areas listed in Section 4.4.3, more than 50% of the transfers between 1980 – 2021 for each permit type, were transferred to an immediate family member. The Kuskokwim salmon gillnet permit (S04W) had the greatest percent of total transfers to immediate family members at 72.4%, compared to the statewide level for all fishery permits of 33.6%. Additionally, these Arctic, Yukon, and Kuskokwim salmon permits are sometimes gifted rather than sold at rates ranging from 39.2% of transfers (Upper Yukon Fishwheel; S08P) to 61.2% of transfers (Kuskokwim salmon gillnet permit; S04W)) for all transfers between 1980- 2021. This is relative to 32.5% of all commercial fishery permit transfers statewide that were gifted during the same time period. Bristol Bay permits are transferred at a much higher rate, given the magnitude of the fishery, with 38.7% of all Bristol Bay salmon permits gifted and 35.4% going to immediate family members, during this same time period.

The presence of fish buyers or commercial fishing processors are another important component for commercial fishing opportunities. As described in Section 4.4.2 processors have not always been available to support commercial operations, including the Kotzebue region in the early 2000s, Norton Sound prior to the 2000s, and in the Kuskokwim region since 2016, and this can greatly limit the scope of commercial fishing operations. Declines in salmon can also contribute to declining processor interest, as it may not be economically feasible to maintain a plant without the necessary economies of scale. Some CDQ groups currently and have historically contributed to available processing capacity as highlighted in Section 4.2.7. Processing plants can also generate employment opportunities for the associated communities.

5 Analysis of Impacts

5.1 Alternative 1, No Action (Status Quo)

5.1.1 Communities Engaged in or Dependent on Harvests and Deliveries of Pollock (AFA and CDQ)

Under Alternative 1, the status quo regulations for salmon bycatch management at 50 CFR 679.21(f) would remain in place (see Section 4.1 of the preliminary DEIS). **The effect of these regulations on community participation and dependence on the B season pollock fishery is uncertain** (e.g., it is unclear the extent to which community participation in, or economic dependence on, the B season fishery is affected by the RHS system for chum salmon avoidance), but selection of Alternative 1 would be

[79] Personal communication, J. Raymond-Yakoubian.

expected to maintain this level of impact. The following paragraphs summarize some of the trends for community engagement in the B season pollock fishery under the status quo.

As discussed throughout Section 4.1, **the ownership of vessels engaged in the harvesting and at-sea processing of B season pollock was concentrated in Seattle** ("Seattle" refers to the City of Seattle and the Seattle MSA combined).

- 92.77% of CPs harvesting AFA and CDQ pollock during the B season pollock (see Table 4-1)
- 47.62% of mothership/floating processors (see Table 4-5)
- 80.20% of inshore CVs (see Table 4-10)
- 92.45% of mothership CVs (see Table 4-11)

It is not possible to show the revenue dependence of those CPs and floating processors/motherships on the B season fishery with an ownership address in Seattle due to confidentiality restrictions. However, on average, the B season pollock fishery accounted for 55.27% ($439.22 million) of CPs' gross first wholesale revenues and 58.49% ($107.96 million) of floating processor/motherships' gross first wholesale revenues (2011-2022). For CVs with a Seattle ownership address (both inshore and mothership CVs), the B season pollock fishery accounted for 51.45% ($137.60 million) of total gross ex-vessel revenues (2011-2022).

A central part of Seattle's identity has always been that of a fishing community. The Seattle-based fleet is large and diverse with participants in Alaska groundfish, Pacific Northwest groundfish, and crab fisheries (among others) (see Wise et al. 2023). Likewise, there are distinct areas within Seattle where concentrations of businesses and infrastructure are focused on the area's large and wide-ranging fleet (i.e., support services). From an outside perspective, the Seattle-based fleet(s) and related support operations might be considered as important components to the pollock fishery but not a place-based community. However, from a Seattle-based perspective, it has been and remains a North Pacific fishing community (NOAA 2014).

Kodiak and Newport were also communities identified as having a consistent level of participation in the B season fishery (2011-2022). These communities are affiliated with the CV fleets – from 2011 through 2022, six CVs with a registered ownership address in Kodiak participated in the B season pollock fishery; five of these CVs participated in the inshore sector and one vessel is dual qualified and participated in both the inshore and mothership sectors. During the same period, 10 CVs with a registered ownership address in Newport, Oregon participated in the B season pollock fishery. All Newport CVs were affiliated with the inshore sector. In 2022, three CVs with a registered ownership address in the Anchorage/Wasilla community grouping harvested AFA pollock during the B season and delivered to an inshore processor.

Under the status quo, participation in the shorebased processing component affiliated with the inshore sector was concentrated in Unalaska/Dutch Harbor where four of six physical facilities are located. As described in Section 4.1.4, AFA deliveries of B season pollock were also made in King Cove and Akutan which are each home to a single processing entity. As such, revenue information was aggregated across Unalaska/Dutch Harbor, King Cove, and Akutan for confidentiality. During the analyzed period (2011-2022), these shorebased processing facilities displayed a high degree of economic dependence on the B season pollock fishery. Table 4-17 shows shorebased processors within the community grouping of Unalaska/Akutan/King Cove earned $358.3 million in gross first wholesale revenues from B season pollock deliveries, which accounted for 43.72% of these entities' total revenues.

A relatively straight forward benefit to Alaska communities and the State of Alaska are the public revenues generated from direct fishery taxes levied on B season pollock. As shown in Figure 4-15, the total amount of State (FBT and FRLT) and local taxes levied on B season pollock during the analyzed period were estimated to range between $10.76 million (2017) and $13.20 million (2012). Figure 4-15 provides the estimated amount of State and local tax revenues generated from the B season pollock fishery that have accrued to the City of Unalaska, the City of King Cove, Akutan, and the Aleutians East

Borough as a group, and the State of Alaska. The City of Unalaska has received substantial revenues from the B season fishery which ranged between $5.70 million (2012) and $4.46 million (2017). The grouping of King Cove, Akutan, and the Aleutians East Borough also received substantial revenues from the B season pollock fishery which ranged between $2.03 million (2016) and $2.60 million (2019). These tax revenues have a direct effect on public welfare as they are deposited into the city, borough, or state's general fund revenues which are used to provide public goods and services.

As discussed previously in this SIA, shoreside processors and the communities in which they are located are undergoing transition. For example, the Peter Pan Fleet Cooperative did not file an inshore AFA cooperative permit for the 2024 Bering Sea pollock fishery. While some portion of AFA pollock may be delivered to Peter Pan Seafoods facility in the future, the community's continued participation and level of dependence on this fishery is uncertain. Additionally, Trident Seafoods has announced plans to build a "next generation processing plant" to replace its existing facility in Akutan on Unalaska's Captains Bay on property it recently acquired through its subsidiary LFS. The timing of this transition is uncertain but, if or when completed, would change the community footprint of the Bering Sea pollock fishery (including the B season fishery). This information is relevant to understanding the conditions under the status quo regulation and although these dynamics are outside of the scope of marginal impacts that may occur *due* to the proposed actions.

5.1.2 Communities Affiliated with the CDQ Program

Section 4.1.6 and the corresponding subsections provide information on the CDQ regional economies, select demographic and socioeconomic indicators for CDQ communities, and a summary of the programs the CDQ groups provide to their regions and communities. As described in Section 4.1.6, the SIA considers all 65 CDQ communities as indirectly engaged in the Bering Sea pollock fishery to some degree because each CDQ group receives a programmatic allocation of Bering Sea pollock and many have made investments into the AFA fishery (see Section 6.1.10.2 in preliminary DEIS). The CDQ groups use the revenues earned from Bering Sea pollock, as well as revenues earned from other fishery allocations and investments, to fund programs that support local economies, infrastructure, and wellbeing for their regions and communities (see Section 4.2.7). At the same time, and as discussed previously, many communities affiliated with the CDQ program are also engaged in subsistence and commercial chum salmon fisheries including the NSEDC, YDFDA, and CVRF regions. **The effect of the status quo on the CDQ regions and communities is uncertain, but selection of the No Action alternative would be expected to maintain this level of impact.**

5.1.3 Communities and Regions Engaged in and Dependent on Western Alaska Chum Fisheries

5.1.3.1 Subsistence Harvests of Chum Salmon

Under Alternative 1, the status quo regulations for salmon bycatch management at 50 CFR 679.21 would remain in place. **Alternative 1 would not have an effect on the management regulations for subsistence chum salmon fisheries in Western and Interior Alaska** (see Chapter 3 of the preliminary DEIS). This includes a priority for management to first and foremost meet spawning escapement goals in order to sustain salmon resources for future generations. After conservation (escapement), the highest priority use is for subsistence under both state and federal law. Salmon surplus above escapement needs and subsistence uses are made available for other consumptive uses of the stock, such as commercial fishing (see also Section 4.4).

As discussed in Section 6.1.4 of the preliminary DEIS, the average level of chum salmon bycatch occurring in the Bering Sea pollock fishery has been 280,707 (2011-2022). Chum salmon bycatch is one source of total removals and the estimated level of WAK chum salmon bycatch occurring under the status

quo regulations ranged between 4,701fish (2012) and 93,170 fish (2017). Under Alternative 1, the current operations of the Bering Sea pollock fishery would be expected to be maintained, noting fishing behavior could still change into the future under status quo regulations. Under Alternative 1 (and the proposed action alternatives), chum salmon would continue to be caught as bycatch and it is expected that some number of WAK chum would continue to be removed each year. These WAK chum removals may contribute to run size declines and the failure to attain escapement goals, as well as subsequent closures of subsistence (and commercial) fisheries.

The impact of the Bering Sea pollock fishery's chum salmon bycatch occurring under the status quo on adult chum salmon returns to Western and Interior Alaska river systems is uncertain and cannot be quantified with available information (see Section 6.1.4.5). Without the ability to precisely estimate the impact that chum salmon bycatch occurring in the Bering Sea pollock fishery has on adult chum salmon returns, the magnitude of impacts this bycatch may have on WAK chum abundance, and consequently, its impacts on subsistence fishing opportunities is unknown.

Although the impacts of bycatch to rural and Alaska Native communities dependent on chum salmon for subsistence are unable to be quantified, selection of Alternative 1 would be expected to continue this level of impact. It is not anticipated that selection of the No Action alternative would have inherent benefits to the overall health of the resource such that abundance would improve to a level that would allow for increased subsistence fishing opportunities. However, the outcomes for subsistence users under Alternative 1 are ultimately uncertain and affected by a variety of factors external to this marginal impact analysis focused on bycatch reduction measures including climate change, other commercial removals, hatchery releases affecting prey abundance, among others, many of which are addressed in the preliminary DEIS (see Section 6.1.3, Section 6.1.4, and Section 6.1.5).

The following paragraphs summarize some of the patterns of subsistence harvest captured throughout Chapter 4. Section 4.3.2.3 provides information on subsistence harvests of salmon relevant to the Yukon Area, Section 4.3.3.3 provides information for the Kuskokwim Area, and Section 4.3.4.3 includes information for the Norton Sound-Port Clarence Districts. This SIA used a longer time series of information on subsistence harvests of chum salmon in each region was provided to better contextualize subsistence harvests over time. **Subsistence harvests of chum salmon have declined across Western and Interior Alaska regions, but patterns of decline vary.**

Households' harvests of salmon vary from one year to the next for many reasons. However, subsistence harvests of chum salmon (and other species of salmon) have declined in light of changing conditions of abundance, particularly as managers implement restrictions on fishing opportunities; because of the patterned use of salmon among households and communities, restrictions on multiple species (i.e., Chinook) also have an effect on chum salmon harvests. Other factors that may influence patterns and trends in subsistence harvests include the fact that households have different abilities and needs for subsistence year-to-year (Magdanz et al. 2005), shifts in species distribution (Carothers et al. 2013), weather conditions combined with the timing of when subsistence fishing may be open (Ikuta et al. 2013), as well as the high prices of gas, equipment, or limitations imposed by wage employment (Raymond-Yakoubian & Raymond-Yakoubian 2015).

In the **Yukon Area**, subsistence harvests of summer chum have ranged between 229,838 (1988) and 1,234 (2021) fish. The most recent 10-year average level of subsistence harvest of summer chum was 77,448 fish (2012-2021). Subsistence harvests of fall chum have ranged between 211,303 (1989) and 705 (2021) fish. In the Yukon Area, subsistence harvests of each chum salmon stock make up a significant portion of households' total subsistence harvests of all species of salmon, although the relative contribution of chum salmon varies by management District across the river as does the stock. For example, in the lower region of the river, where there are generally more subsistence resources available, primarily because of marine mammals, chum salmon tends to contribute a relatively smaller proportion of total subsistence salmon harvests in terms of edible pounds. In the lower region of the Yukon River,

summer chum contributes the majority of the subsistence salmon harvest. Moving upriver, salmon, and chum salmon in particular, play an increasingly important role in the subsistence harvest composition of these communities.

In the **Kuskokwim Area**, subsistence harvests of chum salmon have ranged between 157,335 (1990) and 10,690 (2021) fish. The most recent 10-year average level of subsistence harvest of chum salmon was 35,332 fish (2012-2021). In the Kuskokwim Area, residents' dependence on chum salmon as a food source varies, and the relative contribution of chum salmon to total subsistence salmon harvests is influenced by the distribution of chum salmon along the river (see Figure 4-33). For example, chum salmon return to spawn at the headwaters of the Kuskokwim River whereas other species like sockeye do not. As a percent of total subsistence harvests, chum salmon harvests are highest in Stony River, Lime Village, Sleetmute, Red Devil, Crooked Creek at 14% of the total subsistence harvest (KRITFC Unit 2) and Chuathbaluk, Aniak, Upper Kalskag, and Lower Kalskag at 15% of the total subsistence harvest of all subsistence resources (i.e., fish, mammals, birds, among others) (KRITFC Unit 3).

In the **Norton Sound District**, subsistence harvests of chum salmon have ranged between 43,014 (1995) and 1,681 (2021) fish. The most recent 10-year average level of subsistence harvest of chum salmon in this district was 12,545 fish (2012-2021). The estimated 2021 subsistence harvest is the lowest on record followed by 2020 when subsistence harvests of chum were estimated to be 1,928. In the **Port Clarence District,** subsistence harvests of chum salmon have ranged between 6,886 (2017) and 1,275 (2000) fish. The estimated subsistence harvest of 1,719 chum salmon in 2021 was the second lowest harvest level on record. The most recent 10-year average level of subsistence harvest of chum salmon in this district was 4,774 fish (2012-2022).

Section 4.3.5 discusses the role that subsistence plays in the mixed economic and cultural lifeways of rural and Alaska Native communities. Chum salmon are an important source of cultural identity for many Alaska Native communities across Western and Interior Alaska as well as an important component to food security. Reduced opportunities for subsistence fishing have had a negative effect on the ability of households and communities to secure healthy and culturally preferred wild food sources (Ikuta et al. 2013; Moncrieff 2017). As people are able to fish for subsistence less, there are potentially cascading effects among households within and across communities as sharing networks may change over time (Wolfe et al. 1987; Wolfe et al. 2010; Brown and Godduhn 2015; Coleman et al. 2023). At present, families are gathering less to use fish camps as many weigh the costs and benefits of traveling (i.e., the fuel required to get to a fishing site, time away from wage employment, among other considerations) to fish during short windows when all of their needs may not be met (Trainor et al. 2021). Fish camps have long been important places to harvest food, create memories that form one's identity, and share culturally held values and TK across generations (Nadasdy 2007; Gadamus & Raymond-Yakoubian 2015; Brown et al. 2017: 36; Fienup-Riordan 2020).

5.1.3.2 Commercial Harvests of Chum Salmon

Under Alternative 1 (and the proposed action alternatives), no action, chum salmon would continue to be caught as bycatch and it is likely that some number of WAK chum would continue to be removed each year. These WAK chum removals may contribute to the failure to attain escapement goals and subsequent closures of subsistence (and commercial) fisheries. Alternative 1 would not have an effect on the management regulations for commercial chum salmon fisheries in Western and Interior Alaska. **As such, he commercial chum salmon fisheries described in this section would continue to be managed by the State of Alaska, under the responsibility of the ADF&G Division of Commercial Fisheries and the direction of the Alaska BOF.** This includes a priority for management to first and foremost meet spawning escapement goals in order to sustain salmon resources for future generations. After conservation, the highest priority use is for subsistence under both state and federal law. Salmon surplus above escapement needs and subsistence uses are made available for other consumptive uses of the stock, such as commercial fishing. Under status quo, area managers monitor the run inseason and management

measures can be taken to adjust commercial fishing opportunities inseason as more information becomes available.

Section 4.4 describes the reliance WAK commercial fisheries have had on chum salmon in recent and historical years, and the restriction resulting from the current stock status. With the exception of the 2022 commercial fishery in Kotzebue, these commercial fisheries all began experiencing lower chum salmon catch rates in 2019. Additional management restrictions and/or closed seasons for chum salmon went into place in 2020 on the Yukon River and 2021 in the Kuskokwim management area. These chum salmon declines under status quo have further exacerbated the economic impacts of Chinook and coho salmon declines that historically have been caught in regional commercial fisheries. These low commercial catch rates and fishery closures have widespread adverse economic implications for the permit holders and communities they are associated with, including adverse impacts to subsistence activities (e.g., financing nets, boats, gas, and other gear used for subsistence) because of the dynamics of mixed economies in this region. As demonstrated in Table 4-57 through Table 4-66 with the exception of Bristol Bay, these are highly local fisheries, and they operate within rural communities that have extremely limited alternative opportunities for generating income.

Without the ability to precisely estimate the impact that chum salmon bycatch occurring in the Bering Sea pollock fishery has on adult chum salmon returns to Western and Interior Alaska river systems, it is not clear the magnitude of impacts this bycatch may have on WAK chum abundance and consequently, its impact on the ability for a commercial fishery to open. **Although impacts under status quo are unable to be quantified, Alternative 1 would be expected to continue this level of impact.**

5.2 Under the Proposed Action Alternatives (2-4)

5.2.1 Communities Engaged in or Dependent on Harvests and Deliveries of AFA and CDQ Pollock

As discussed in Chapter 4 of the preliminary DEIS, the proposed action alternatives (Alternatives 2-4) would change the status quo regulations for salmon bycatch management during the B season pollock fishery (regulatory dates of June 10 – November 1). The following section of the SIA addresses some of the potential community-level effects of the proposed action alternatives as a group on those communities identified as being substantially engaged in or economically dependent on the B season pollock fishery.

Community engagement in the B season pollock fishery was measured by either a harvesting or at-sea processing vessel's registered ownership address or by the physical location of shorebased processing facilities that accepted deliveries of AFA pollock during the B season from 2011 through 2022. A **community's relative economic dependence** on the B season pollock fishery was measured in terms of the gross revenues earned from B season pollock compared to the gross revenues earned from all other area, species, and gear fisheries harvested or processed by those same entities (see Section 4.1). In this impact analysis, a community's **vulnerability** to the potential adverse effects of the proposed action alternatives is considered in terms of the degree of economic dependence on the directly impacted sector(s), and the community's **resilience** in terms of its economic diversity (e.g., alternative employment opportunities, income, business, public revenues, among others).

It is anticipated the proposed action alternatives could result in indirect and adverse effects on communities affiliated with the harvesting and processing of AFA and CDQ pollock during the B season fishery. From the Pacific Northwest region, it is anticipated the proposed action alternatives would primarily affect the communities of Seattle (WA) and Newport (OR). From Alaska, it is anticipated the proposed action alternatives would primarily affect the communities of Akutan, King Cove, Kodiak, and Unalaska/Dutch Harbor. However, the nature and relative magnitude of these impacts would vary by the option(s)/Alternative(s) under consideration; whether a community is affiliated with a sector harvesting pollock, receiving deliveries of pollock, or both; and the degree to which vessels

affiliated with a community change their behavior to avoid chum salmon PSC. In light of this, the discussion on potential community-level impacts has grouped communities (at times) based on some shared characteristics in participation in the fishery as opposed to grouping communities by geographic region.

Section 6.2.9 of the preliminary DEIS addresses the potential economic impacts of the proposed action alternatives on participants in the Bering Sea pollock fishery which are not repeated at length here. However, it is important to note the proposed action alternatives could result in different types of economic costs or impacts to the pollock sectors which could in turn impact pollock dependent communities. As 6.2.9.1 of the preliminary DEIS, if the overall chum salmon PSC limit recommended under Alternative 2 and 3 has the potential to constrain a sector during the B season, and pollock harvesters could not alter their fishing behavior to a degree that would avoid reaching the apportionment of the PSC limit, the limit could result in **potentially forgone gross revenue** for those vessels and companies because they would be required to stop fishing. "Potentially forgone gross revenue" is defined as the gross revenue associated with the portion of the B season that hypothetically would have been closed had a PSC limit been in place and no fishing behavior changes were made.

The proposed action alternatives could also result in **avoidance costs** because it is expected that pollock harvesters would modify their fishing behavior to avoid reaching their apportionment of the PSC limit and minimize losses associated with potentially forgone gross revenues. Primarily, these strategies include moving fishing effort to different areas when a certain level of salmon bycatch is encountered. The cooperative structure of the AFA pollock fleet, in addition to current IPAs, equip the fleet with data and communication tools to work towards this goal. With the risk of having a whole sector closed for the remainder of the B season after the apportionment of the PSC limit was reached, it is anticipated that the cooperative mangers and Sea State (the monitoring agent under the IPAs) would cautiously monitor the real-time rates of chum salmon bycatch and direct vessels to move fishing effort as necessary. In doing so, vessels and companies would incur costs associated with this avoidance regardless of whether the overall PSC limit was met.

The types of avoidance costs addressed in the analysis are centered on fleet movement as a primary strategy. Avoidance costs include increased fuel usage as vessels spend more time prospecting areas with low chum bycatch rates while balancing a need to find areas with high pollock CPUE or areas with the size and quality of pollock to meet the product types they intend to process. Vessels may also use increased test tows to identify these areas which could result in increased costs for fishing gear if damage occurs. Increased travel to pollock grounds and test tows may increase trip lengths (see also work by Murphy Jr. et al. (2021)).

The potential impacts to communities engaged in or dependent on the B season pollock fishery resulting from forgone revenue or avoidance costs are not straightforward. There are extremely limited empirical data on various cost categories, the degree to which these costs can be associated with or attributed to chum PSC avoidance, and the uncertainty of the magnitude of fishing behavior changes in response to new PSC constraints proposed in the alternatives on fishing sectors. Quantitatively linking these costs back to communities affiliated with these harvesting or processing sectors is not possible with the available information and the level of uncertainty. As such, this analysis includes a qualitative description of the impacts on communities affiliated with harvesting and processing B season pollock and the direction of those impacts.

5.2.1.1 Potential Impacts to Seattle

From 2011 through 2022, a high degree of AFA vessel ownership was concentrated in Seattle across all potentially affected harvesting and at-sea processing sectors.

- 92.77% of CPs harvesting AFA and CDQ pollock during the B season have a registered ownership address in Seattle.
- 47.62% of mothership/floating processors have a registered ownership address in Seattle.
- 80.20% of inshore CVs have a registered ownership address in Seattle.
- 92.45% of mothership CVs have a registered ownership address in Seattle.

As such, Seattle has a high degree of exposure to the potential adverse effects of a constraining overall chum salmon PSC limit under Alternative 2 and 3, particularly if a sector or cooperative were to close during the B season prior to the pollock TAC being harvested.

As discussed throughout Section 4.1, the B season pollock fishery accounted for a substantial portion of the gross first wholesale and ex-vessel revenues for vessels with a Seattle-based ownership address. Due to confidentiality restrictions, it is not possible to show the gross first wholesale revenues for CPs and floating processor/motherships with a Seattle-based address apart from their community groupings (Seattle/Anchorage and Seattle/Dutch Harbor, respectively). CPs that harvested AFA and CDQ pollock during the B season earned an annual average of $439.22 million in gross first wholesale revenues (see Table 4-2). The floating processor/motherships earned approximately $107.96 million in gross first wholesale revenues (on average, 2011-2022). CVs with a Seattle-based ownership address that harvested AFA pollock during the B season earned approximately $137.60 million in gross ex-vessel revenues (on average, 2011-2022). This information provides a sense of the relative magnitude of revenues that could be potentially forgone for Seattle-affiliated vessels if the overall chum PSC limit under Alternative 2 and 3 was constraining to a degree that harvesters could not avoid reaching the apportionment of the PSC limit.

The community of Seattle could also be adversely affected if the chum salmon PSC limit was sufficiently constraining under (an ultimately implemented) alternative, such that consolidation would occur within the sector(s). Consolidation could result as firms that are less efficient at addressing chum salmon bycatch incur costs and sell to firms that are more efficient. However, it is challenging to discern the degree to which Seattle would be impacted by potential consolidation because consolidation could occur within Seattle-based firms.

In a scenario where an AFA sector or cooperative reached its apportionment of the overall chum salmon PSC limit (Alternative 2 and 3) prior to the full harvest of its B season pollock allocation, an additional area of potential concern would be the loss of income opportunities for crew that work on these vessels. A fishery closure for a sector or cooperative would impact skipper and crew income. However, as mentioned in Section 6.2.9.1.2 of the DEIS, this is in addition to the ways skippers and crew may be impacted by increased chum PSC avoidance costs under all proposed action alternatives. Increased avoidance costs could result in lower compensation for share-based employees (unless companies specifically insult crew from these types of costs). Increased avoidance measures could result in longer fishing trips with crew members spending more time away from home. Longer fishing trips and overall time at sea can have a negative effect on crew morale and job satisfaction (Murphy et al. 2021). Although there are theoretically more alternative employment and income opportunities for workers in a large urban area like Seattle than other community settings, there may not be comparable employment in earning potential or general job satisfaction (Gatewood & McCay 1990).

There is no direct information on the location of AFA vessel purchases of support services, and there is also no readily available information for the community of long-term residences of AFA skippers, crew, and processing workers employed on the vessels affiliated with Seattle. However, Table 5-1 provides some cross-cutting information based on vessel ownership address and homeport information. A vessel's homeport is generally understood to be where the vessel spends a majority of its time throughout the year and generates some related level of economic activity. In this way, communities may be considered as engaged in the relevant Bering Sea pollock sectors in a variety of ways and not in isolation (i.e., a community may have multiple, cross-cutting ties to a fishery).

As shown, all CPs with a registered ownership address in Seattle also list the community as the homeport location. While Table 5-1 only provides a snapshot of information for 2022, this is a consistent trend across all years during the analyzed period. An exception to this trend is that one CP with a registered ownership address in Seattle listed Unalaska/Dutch Harbor as its homeport in 2013 and 2014. CVs (inshore and mothership combined) with a registered ownership address in Seattle show more diversity in their homeport locations, although the majority listed Seattle as their homeport community in 2022. Again, this is a consistent trend over the analyzed period (2011-2022).

Table 5-1 Correspondence of vessels harvesting AFA or CDQ B season pollock with a Seattle or Seattle MSA ownership address and the vessel's listed homeport, 2022

	Vessel Homeport							
Fleet	Anchorage	Unalaska/ Dutch Harbor	Juneau	Kodiak	Neah Bay	Newport	Seattle	Total
CP	-	-	-	-	-	-	12	12
CV	1	7	1	4	1	1	40	55

Source: AKFIN.

While Seattle is the community most substantially engaged in the harvesting and at-sea processing components of the B season pollock fishery, it may also be less economically dependent on the fishery when the revenues earned are compared to the scale, diversity, and general economic resilience of Seattle. Seattle is a large urban metropolitan area and its economic dependence on the B season pollock fishery is relatively small when compared to the scale of the community's economy. (This is not the same as the resiliency of the vessels or companies that are affiliated with Seattle via their ownership address where the potential adverse impacts would be more direct.) Regardless, as mentioned previously, a central part of Seattle's identity as a community has always been that of a fishing community, and there are still distinct areas within the Seattle where concentrations of businesses and infrastructure are focused on the area's large and wide-ranging fleet and the support of that fleet and of the fishing industry in general (NOAA 2014).

5.2.1.2 Potential Impacts to Newport and Kodiak

This portion of the analysis provides information on the potential impacts to Newport and Kodiak. As described above, the analysts grouped some communities because of some shared characteristics in terms of participation in the B season pollock fishery which are anticipated to have an effect on the impacts communities would be exposed to. Some specific considerations included that these two communities are affiliated with the CV fleets, are not affiliated with at-sea processing entities, and are not home to an AFA inshore processing facility (the last point being more relevant to Kodiak as an Alaska-based community). In this way, this choice was partially an attempt to minimize redundancy. This is not to suggest there are not important differences in the social and economic characteristics of these communities, which are discussed in the sketches provided for them (see Sections 4.1.5.3 and 4.1.5.4) and also discussed below.

From 2011-2022, six CVs with a registered ownership address in Kodiak (Kodiak City) participated in the B season pollock fishery. Of these six CVs, five participated in the inshore sector and one vessel is dual qualified and participated in both the inshore and mothership sectors. During the same period, 10 CVs with a registered ownership address in Newport, Oregon participated in the B season pollock fishery. All Newport CVs are affiliated with the inshore sector. Under Alternative 2 and 3, the communities of Kodiak and Newport could be adversely affected if the overall PSC limit was sufficiently constraining, such that a sector or cooperative closed during the B season prior to the pollock TAC being harvested.

On average, Kodiak CVs earned $3.75 million in gross ex-vessel revenues from the B season pollock fishery from 2011 through 2022, which accounted for 2.83% of the community fleet's total gross revenues during the same period (see Table 4-14). These data provide a sense of the relative magnitude of the revenues that could be forgone if the overall chum PSC limit under Alternative 2 and 3 was constraining to a degree that harvesters could not avoid reaching the apportionment of the limit. At the

same time, Kodiak is home to a large and diverse community fleet. The Kodiak-based community fleet participates in other groundfish fisheries in the Bering Sea and Gulf of Alaska, halibut IFQ, crab, salmon fisheries, among others. That the B season pollock fishery accounted for 2.83% of the community fleet's total revenues (on average) during the analyzed period might suggest Kodiak is not substantially economically dependent on the B season fishery and thus somewhat insulated from the potential adverse effects of a closure. However, Kodiak is a remote island community accessible by boat or plane. There are limited economic development opportunities and the community's economy has long been anchored in commercial fisheries and government activities (e.g., U.S. Coast Guard base) (McDowell Group 2021).

On average, CVs with based in Newport earned $5.86 million in gross ex-vessel revenues from the B season pollock fishery from 2011 through 2022, which accounted for 20.54% of the community fleet's total gross revenues from the same period (see Table 4-14). These data provide a sense of the relative magnitude of revenues that could be potentially forgone for Newport-based vessels if the overall chum PSC limit under Alternative 2 and 3 was constraining to a degree that harvesters could not avoid reaching the apportionment of the PSC limit. The gross ex-vessel revenues earned from the B season pollock fishery contributed to a large portion to the total revenues earned by the Newport community fleet, suggesting this community may have a higher degree of vulnerability to the adverse effects of a potential fishery closure. At the same time, like Seattle, Newport is a community located in the lower 48 and on the road system. There are more typical commercial development and wage-earning opportunities in Newport which may offset some of the potential adverse effects.

Relevant to both communities, it is possible that a very constraining overall chum salmon PSC limit could encourage these vessels to exit the fishery or lease their quota to other vessels in their cooperative. What constitutes a "very constraining" PSC limit that would result in these effects is uncertain. Should these vessels exit the B season pollock fishery, these operational choices would be anticipated to have adverse effects on crew employment and other community-related revenues associated with participation in the B season fishery. For Kodiak (and the State of Alaska), this likely includes revenues earned from fuel tax, sales tax, harbor fees, among others.

As mentioned above, there is no readily available information on the location of vessel purchases of support services, and there is also no readily available information for the community of long-term residences of skippers, crew, and processing workers participating in the harvesting or processing components of the B season pollock fishery. However, Table 5-2 provides some cross-cutting information based on vessel ownership address and homeport information. A vessel's homeport is generally understood to be where the vessel spends a majority of its time throughout the year and generates some related level of economic activity. In this way, communities may be considered as engaged in the relevant Bering Sea pollock sectors in a variety of ways and not in isolation (i.e., a community may have multiple, cross-cutting ties to a fishery).

As shown, all CVs with a registered ownership address in Kodiak also list the community as the homeport location. While Table 5-2 only provides a snapshot of information for 2022, this is a fairly consistent trend across all years during the analyzed period. However, from 2011 through 2017 one CV with a registered address in Kodiak listed Juneau as its homeport community. CVs with a registered ownership address in Newport show more diversity in their homeport locations which included Alaska and Pacific Northwest communities in 2022.

Table 5-2 Correspondence of vessels harvesting AFA or CDQ B season pollock with a Kodiak or Newport ownership address and the vessel's listed homeport, 2022

Community of Ownership Address	Vessel Homeport				
	Kodiak	Unalaska/ Dutch Harbor	Newport	Portland	Total
Kodiak	3	-	-	-	3
Newport	-	1	2	2	5

Source: AKFIN.

Both Kodiak and Newport are communities that hold a sense of place and identity developed around the commercial fishing industry (Himes-Cornell et al. 2013; Norman et al. 2007). In these communities, fishermen may enter the occupation as a means of making money, because their family or friends are fishermen, or it is a traditional means of employment in the community (Pollnac et al. 2007). Fishermen also find the work satisfying and to be a meaningful component to their wellbeing (Pollnac & Poggie 2006; Pollnac, Seara, & Colburn 2015).

5.2.1.3 Potential Impacts to Unalaska/Dutch Harbor

Compared to other Alaska communities, Unalaska/Dutch Harbor has a relatively high degree of vulnerability (which can also be understood as a high degree of dependence) under the proposed action alternatives because the community is the location of four shoreside processing facilities accepting deliveries of B season pollock from multiple cooperatives; the community is the primary location for CP and mothership product transfers; and is listed as the ownership address for two floating processor/motherships during the analyzed period (2011-2022).

In 2022, some 64% of the inshore sector's annual pollock quota was allocated to the cooperative's affiliated with shorebased processing plants in Unalaska/Dutch Harbor. Considering the majority of product transfers from CPs and the mothership sector have been made in Dutch Harbor, this Alaska community is substantially dependent on the Bering Sea pollock fishery. Because of these cross-sector connections, Unalaska/Dutch Harbor derives substantial public benefit from the FRLT, FBT and local raw seafood tax levied on B season pollock. Table 5-3 provides information on the estimated tax revenues the City of Unalaska has derived from the B season pollock fishery (using the methods previously discussed in Section 4.1.6). The information provided in Table 5-3 does not account for revenues derived from taxes and fees from activities in the community that are fishing related or may be paid by AFA vessels companies (e.g., property taxes paid by fisheries businesses, fuel transfer tax revenues, and harbor fees, among others).

The total estimated fishery-related tax revenue derived from the B season pollock fishery ranged between $5.70 million (2012) and $4.46 million (2017). On average, the City of Unalaska earned $5.12 million in revenues from the direct fishery-related tax revenues levied on B season pollock (2011-2022). To put these values into perspective, Table 5-3 also provides the City of Unalaska's General Fund revenues (FY 2011-2021). The total estimated direct fishery-related tax revenue derived from the B season pollock fishery accounted for 15.9% of the City's total general fund revenues, on average (2011-2021). General fund revenues are used to finance the basic operations of a community or borough (e.g., public safety, community development, among others) and thus have a direct effect on public welfare.

Table 5-3 City of Unalaska B season pollock fishery tax estimates compared to all general fund revenue, 2011 through 2022 (millions of real 2022 $)

Year	Estimated Revenues from City Raw Seafood Tax Levied on B Season Pollock	Estimated Revenues from FBT Levied on B Season Pollock	Estimated Revenues from FRLT Levied on B Season Pollock	Total Estimated Revenues from B Season Pollock	City of Unalaska General Fund Revenues	Total B Season Pollock Tax Revenues as % of Total General Fund Revenues
2011	$1,548,563	$1,161,423	$2,628,561	$5,338,547	$29,152,912	18.3%
2012	$1,684,833	$1,263,624	$2,751,920	$5,700,377	$31,634,417	18.0%
2013	$1,582,686	$1,187,014	$2,496,827	$5,266,527	$32,609,892	16.2%
2014	$1,580,252	$1,185,189	$2,563,711	$5,329,152	$34,376,971	15.5%
2015	$1,570,769	$1,178,076	$2,577,507	$5,326,352	$34,525,170	15.4%
2016	$1,386,133	$1,039,599	$2,396,413	$4,822,145	$30,723,626	15.7%
2017	$1,308,772	$981,579	$2,173,292	$4,463,642	$34,371,441	13.0%
2018	$1,767,079	$1,325,309	$2,391,355	$5,483,743	$30,300,957	18.1%
2019	$1,516,279	$1,137,209	$2,360,521	$5,014,009	$36,419,248	13.8%
2020	$1,547,073	$1,160,305	$2,124,581	$4,831,959	$36,478,643	13.2%
2021	$1,602,329	$1,201,747	$2,269,252	$5,073,327	$29,089,571	17.4%
2022	$1,514,463	$1,135,848	$2,187,538	$4,837,850	NA	NA
Avg.	$1,550,769	$1,163,077	$2,410,123	$5,123,969	$32,698,441	15.9%

Source: AKFIN. City of Unalaska, Alaska. Comprehensive Financial Audits, Fiscal Years 2011 through 2021. https://www.commerce.alaska.gov/dcra/admin/Financial Accessed December 18, 2023.
Notes: The Comprehensive City Financial Audits for FY 2022 were not available for the City of Unalaska at the time this analysis was being prepared.

The community of Unalaska/Dutch Harbor would be negatively impacted by Alternative 2 and 3 if the overall chum salmon PSC limits were constraining, such that a sector or a cooperative reached their apportionment and closed during the B season prior to the pollock TAC being harvested. In a scenario where one or more of the inshore cooperatives affiliated with the processing plants in Unalaska/Dutch Harbor, the CP sector, or the mothership sector were to reach their apportionment of the overall chum salmon PSC limit and pollock was left unharvested, the City of Unalaska and the State of Alaska would potentially forgo tax revenues generated by the fishery. These tax revenues are inclusive of, but not limited to, direct-fishery related taxes. The magnitude of these effects would depend on when the limit was reached relative to the amount of remaining B season pollock quota left unharvested and the number of entities that reached their apportionment of the limit.

As described in Section 6.1.10.3 of the preliminary DEIS, the pollock industry is currently facing market vulnerabilities, including an expected increase in Russian pollock production in 2024, driving down the prices for both surimi and block prices for fillets (Sackton 2024). Harvesters and processors are facing higher operating costs due to domestic inflation for labor/materials/shipping/storage, high interest rates, high fuel prices, and labor supply shortfalls. In addition, there are supply and demand imbalances that have devalued products, geopolitical actions that constraining global market opportunities and impacting competition, as well as the declines in other Alaska species (e.g., BSAI crab) that can decrease the resilience of a processing plant.

Given this multitude of challenging global and domestic factors in effect for Alaska seafood markets, including pollock, and the lack of processor operating cost data available to analysts, it is unclear what level of unharvested pollock resulting from potential B season closures could tip the sustainability of processing operations. However, repeated closures in the B season could exacerbate the current market

challenges for existing processors. It is possible that such that consolidation among shoreside processing entities could occur, depending on their ownership structures, market vulnerabilities, and the degree to which harvesting vessels delivering to the processor are able to adapt their fishing behavior under the PSC limit. It is not possible to say with any certainty if or when these transitions would occur and the degree to which a community (like Unalaska/Dutch Harbor) would be affected. These dynamics are not unique to processing facilities in Unalaska/Dutch Harbor but are addressed here first in the SIA.

An inshore processor or the community of Unalaska/Dutch Harbor may also experience negative effects resulting from the proposed action alternatives absent a fishery closure. For example, there is a possibility for there to be stranded pockets of pollock (particularly for the inshore sector where there are more cooperatives) should a cooperative reach their apportionment of the limit and chum PSC was not transferred to facilitate full utilization of the cooperative's B season pollock allocation. Inshore processors and the community may also experience negative impacts if the B season deliveries from harvesters are slower or lower in volume, such that sufficient quantities of raw fish may not be provided for plants to operate profitably. Many plants have been designed to use economies of scale in production and move an optimal volume of fish through the processing plant at the most efficient, and cost-effective rate, given the capacity of the facility and expectations of catch and delivery rates from the catcher-vessel fleet. If operated at rates that significantly deviate from those for which the plant was designed, these economies would be lost, and a plant could become unprofitable to operate. These dynamics are not unique to processing facilities in Unalaska/Dutch Harbor but are addressed here first in the SIA.

It is also worth noting the community's fishery-related tax revenues could be negatively affected under Alternative 2 and 3 even if a cooperative or sector (or multiple) were not required to cease fishing in a given year. Fishery-related tax amounts are affected by the shoreside prices paid for pollock. In a scenario where the harvesters are catching lower quality pollock, or are required to fish in areas that have chum salmon bycatch levels below a certain rate which also have poorer quality pollock that can only be processed into certain product forms (e.g., fishmeal), it is anticipated this would impact the shoreside price paid to harvesters and thus the estimated taxable revenue earned from the B season fishery. (It is also possible that shoreside prices are affected by global market dynamics referenced above, but those dynamics are important context for, yet external to, this marginal impact analysis.) Again, these dynamics are not unique to the processing facilities in Unalaska/Dutch Harbor but are addressed here first in the SIA.

Unalaska/Dutch Harbor plays a role as the major shipping port in the BSAI region. Depending on the degree to which the overall chum salmon PSC limit becomes constraining, it is possible albeit uncertain, there could be spillover effects into other fisheries. The community also has the most developed support service sector capacity in the broader BSAI region because it has multiple marine fueling and provisioning options, substantial cold storage capacity, administrative support services, and multiple electrical, hydraulics, welding, and mechanical service providers. For example, the SIA prepared for the BSAI Halibut ABM action noted that Unalaska/Dutch Harbor accounted for two-thirds of all Amendment 80 Alaska port calls from 2010-2019 (NPFMC 2021).

There could be negative impacts to processing workers as a result of the action alternatives in the form of reduced employment or income opportunities, depending on how the specific plants and the cooperatives delivering to them are able to respond to changing conditions as a result of Alternative 2 or 3. As discussed in Section 4.1.4, the B season pollock fishery contributes a substantial portion of the annual gross revenues for all shorebased processing facilities (those processors in Dutch Harbor cannot be shown apart from the facilities in King Cove and Akutan because the latter are home to one processing entity). Pollock is also an important component to the overall annual cycle of these plants – often times it is the high-volume fisheries like Bering Sea pollock that provide economies of scale helping to facilitate the processing smaller volume fisheries. Unalaska's local small boat fleet has generally participated in halibut and sablefish IFQ, fixed gear groundfish, and local crab fisheries on a relatively small scale (Downs &

Henry 2023). Deliveries from the local small boat fleet may not a major source of income for the plant, but these deliveries have been an important source of income for local fishermen.

Finally, it is also possible that Unalaska/Dutch Harbor could anticipate some positive indirect effects under the proposed action alternatives. If vessels take longer fishing trips, more fishing trips, or a cooperative issued a stand-down because chum salmon bycatch rates were unacceptably high (a scenario that may be more likely under a more constraining overall chum salmon PSC limit), vessels may spend more on fuel or more time in port. In turn, this could generate more fuel and sales tax revenues in addition to any other purchases of goods and services. It is not, however, possible to say whether these positive impacts from a longer season would offset possible adverse impacts for Unalaska (e.g., possible lower tax revenues from a lower value product, etc.) and a longer season may not be net beneficial for people and entities associated with Unalaska (e.g., individual processors, captains and crew).

5.2.1.4 Potential Impacts to Akutan and King Cove

Akutan and King Cove are Alaska communities directly engaged in the B season pollock fishery and grouped here in this analysis because the share some characteristics in terms of their participation in the B season pollock fishery. Some specific considerations included that each community is home to a single shorebased processing facility, is located within the Aleutians East Borough (affecting shared tax revenue amounts among other dynamics), and neither community is listed as the ownership address for a vessel that participated in the B season pollock fishery.

In 2022, some 34% of the inshore sector's annual pollock quota was allocated to the cooperative affiliated with Akutan. Behind Unalaska/Dutch Harbor, Akutan received the largest portions of landed pollock. In 2022, some 2.5% of the inshore sector's annual pollock quota was allocated to the cooperative affiliated with King Cove. In 2023, the amount of the inshore sector's annual pollock quota allocated to the cooperative affiliated with King Cove decreased and there is no cooperative affiliated with the Peter Pan Seafoods plant in 2024. Akutan, King Cove, and the Aleutians East Borough derive economic benefits from the local seafood taxes and FBT levied on deliveries of B season pollock to shoreside processors in these communities. As discussed in Section 4.1.6, the estimated revenue derived from direct fishery-related taxes levied on B season pollock ranged between $2.03 million (2016) and $2.60 million (2019) for Akutan, King Cove, and the Aleutians East Borough combined as a grouping for confidentiality (2011-2022).

Under Alternative 2 and 3, Akutan and King Cove could experience negative economic effects in terms of potentially forgone fishery related tax revenue if the inshore cooperative affiliated with each community/plant reached their apportionment of the overall chum salmon PSC limit prior to their pollock quota being harvested. The magnitude of these effects would depend on when the limit was reached relative to the remaining amount of B season pollock quota. However, as mentioned above, in a scenario where the harvesters are catching lower quality pollock (e.g., because vessels are required to fishing in areas that have chum salmon bycatch levels below a certain rate that also have poorer quality pollock that can only be processed into certain product forms such as fishmeal), it is anticipated this would impact the shoreside price paid to harvesters and thus the estimated taxable revenue earned from the B season fishery.

The Trident Seafoods (Akutan) and Peter Pan Seafoods (King Cove) facilities are multispecies plants like those in Unalaska/Dutch Harbor that have historically taken deliveries of B season pollock. These processors are also engaged in other commercially important fisheries including BSAI crab, other BSAI groundfish, and the commercial salmon fisheries are a significant contributor to the total revenues of the Peter Pan plant. Beyond fishery-related tax revenues, the pollock fishery can play a meaningful role in these communities by supporting the processor’s capacity to engage in other small-scale operations. As an example, the Akutan Trident plant has played a role in supporting the local small boat fleet in Akutan by processing halibut. Halibut deliveries from the local small boat fleet are not a major source of income for the plant, but these deliveries have been an important source of income for local fishermen. While local

fishermen are engaged in other means of employment beyond commercial fishing, they do depend to varying degrees on fishing as a part of an integrated, plural employment and income strategy in a community that has relatively limited employment and income opportunities (Downs & Henry 2023).

As mentioned above, the Peter Pan Fleet Cooperative did not apply for an AFA Inshore Cooperative Permit for the 2024 Bering Sea pollock fishery. Consequently, this cooperative will not be active in 2024 and potentially future years. King Cove and the Peter Pan Seafoods facility could receive small amounts of pollock from other cooperatives and thus be considered participants in the B season pollock fishery in the future to a smaller degree (less than 10% of a cooperative's pollock allocation as specified under the AFA). Additionally, and as mentioned previously, Trident Seafoods has announced plans to build a "next generation plant" in Dutch Harbor which would replace its existing facility in Akutan. The timing of this transition is uncertain. As such, there is a degree of uncertainty on the relative impacts these communities may incur as a result of changing the salmon bycatch management regulations as proposed under the action alternatives, and they could be affected by a variety of factors external to this marginal impact analysis focused on bycatch reduction measures.

5.2.2 CDQ Regions and Communities

The extent to which the proposed action alternatives would affect the 65 coastal WAK communities participating in the CDQ program are uncertain. However, CDQ groups and their constituent communities could be impacted by potential changes to regulations managing chum salmon bycatch in the Bering Sea pollock fishery in multiple ways, two of which are the most direct. First, all CDQ groups receive programmatic allocations of Bering Sea pollock and would be apportioned an amount of the overall chum salmon PSC limit (Alternative 2 and 3). Second, many CDQ groups have also made additional investments into the AFA sectors (see Section 6.1.10.2 in the preliminary DEIS). The CDQ groups vary in the number of communities and residents they represent, the composition of their CDQ and non-CDQ quota portfolios, and the relative scale of fishery and non-fishery portions of their local economies, among other attributes.

To the extent that the proposed action alternatives have the potential to reduce royalty and revenue payments by AFA entities to CDQ groups due to increased avoidance costs or closures, CDQ groups and their constituent communities would be at risk of the adverse impacts of the proposed action alternatives. How effectively these risks would be mitigated by adaptive fishing behaviors on part of CDQ partners is unknown and it is not possible to quantify these risks with available data. As discussed in Section 4.2.7, the CDQ groups have used the revenues earned from programmatic allocations of fishery resources such as Bering Sea pollock, as well as revenues earned from other investments, to provide social and economic benefits to their constituent communities.

For example, all CDQ groups have worked to provide various employment opportunities, sometimes these are administrative positions within the CDQ group or its subsidiaries, community liaison roles, or employment on fishing vessels (among other opportunities). The CDQ groups have also made direct investments through community grant programs to support community development and infrastructure. into communities to support infrastructure development. For example, BBEDC has supported the Community Block Grant Program that provides BBEDC communities an opportunity to fund projects that promote sustainable community and regional economic development. In 2021, the BBEDC Board of Directors allocated $500,000 per BBEDC community (BBEDC 2021). Through this lens of community development and support, all 65 CDQ communities are considered as being indirectly engaged in or economically dependent on the Bering Sea pollock fishery (noting the degree of dependence varies).

The CDQ communities could experience indirect adverse social and economic effects as a result of the proposed action alternatives, although the relative magnitude of these impacts is uncertain. In part, this is because of limitations with using existing data to determine the exact proportion of CDQ groups'

revenues and royalties that are derived from the B season pollock fishery.[80] Second, it is not possible to quantify the relative proportion of programmatic funding (compared to staff salaries, for example) that is derived from either the harvest of CDQ pollock or CDQ groups' investments into this fishery. Finally, because CDQ groups have historically leased their Bering Sea pollock allocations to harvesting partners in the AFA CP sector, it is anticipated the potential adverse effects on communities could be mitigated by changes in CDQ partner's fishing behavior. The relative magnitude of these behavioral changes is unknown.

At the same time, many communities affiliated with the CDQ program are also engaged in subsistence and commercial chum salmon fisheries. It is not possible to say, however, whether the potential benefits in terms of increased subsistence or commercial fishing opportunities (depending on conditions of abundance) would offset these impacts for some CDQ communities. The potential impacts of the proposed action alternatives on communities dependent on subsistence and commercial harvests of chum salmon for are discussed directly below.

5.2.3 Communities and Regions Engaged in or Dependent on Western Alaska Chum Salmon Fisheries

A potential positive and direct benefit of the proposed action alternatives that would modify the status quo regulations for salmon bycatch would be a reduction in the overall number of chum salmon caught as bycatch below levels occurring under the status quo regulations. The relative magnitude of chum salmon bycatch reduction that could be expected would depend on the option(s)/alternative(s) selected, the extent to which pollock harvesters modify their fishing behavior to avoid chum salmon bycatch, among other factors.

As stated previously, the analysts are unable to quantify the relative magnitude of the potential indirect and positive benefits a reduction in the overall chum salmon bycatch may have on WAK chum stocks for several reasons. **First, the absolute impact of chum salmon bycatch occurring in the Bering Sea pollock fishery under the status quo regulations on chum salmon returns or the overall run size cannot be determined with the available information.** The genetic component of WAK chum salmon in the overall bycatch includes stocks returning to rivers from a large area spanning from Kotzebue Sound in the north, down through Bristol Bay in the south. Run reconstructions that provide an estimation of total run size are more limited for chum salmon than Chinook salmon for Western Alaska river systems. A scientifically defensible run reconstruction includes thorough estimates of escapements (the number of fish that are not caught by fisheries and contribute to the spawning population) and harvests. Currently, run reconstructions are only available for the Yukon River summer and fall chum salmon as well as the Kwiniuk River chum salmon. This excludes large populations in the Bristol Bay, Kuskokwim, Norton Sound, and Kotzebue Areas.

The lack of run reconstructions for large portions of WAK chum salmon means an accurate approximation of the total WAK chum salmon abundance cannot be provided. Thus, an estimate of the impact of chum salmon bycatch removals on these total populations cannot be calculated. This reality limits the analysts' ability to infer the extent to which the current conditions for in-river subsistence fishing and communities are the result of chum salmon bycatch occurring in the Bering Sea pollock fishery. In turn, it is also not possible to precisely estimate the magnitude of the potential benefits of the proposed action alternatives (i.e., the extent to which any level of chum salmon bycatch reduction would

[80] Detailed revenue and royalty information was available for the CDQ groups until 2005, but this information is no longer available because the CDQ groups are no longer required to submit such reports to the State of Alaska or NMFS. As such, it is not possible to quantify CDQ groups' total revenues from fishery allocations and other investments, and it is not possible to determine the relative contribution of revenues earned from the Bering Sea pollock fishery (or the B season fishery) to the multiple social and economic programs the groups provide to their communities.

lead to improvements in escapement goals being met and subsistence opportunities being less restrictive from the status quo).

Second, the analysts are unable to break out the WAK genetic stock reporting group (which includes the Coastal Western Alaska + Upper/Middle Yukon reporting groups) into smaller river systems or areas because of the current understanding of genetic structure among WAK chum salmon. There is very little genetic differentiation among chum salmon returning to river systems across Western Alaska except for the Yukon River summer and fall chum salmon runs which are genetically distinct. The current hypotheses explaining such low observed genetic structure is colonization from a single glacial refugia into dynamic watersheds that were transiently interconnected over the last ~1200 generations. Among the large river systems (lower Yukon and Kuskokwim) chum salmon likely formed large metapopulations less affected by the diversifying effect of genetic drift. Despite numerous efforts to identify genetic markers to resolve subregional reporting groups within Western Alaska, geologic history combined with chum salmon life history may constrain population genetic structure in the region. Currently, it is not possible to confer the degree of positive impacts to specific management areas, river systems, or communities. This data limitation may be resolved through genome sequencing (project submitted to AYK Sustainable Salmon Initiative), but results from this work are not expected for at least 3-4 years, and it is still possible that the major river systems will not be able to be differentiated using new techniques.

Given these limitations, there is uncertainty in the absolute impact that modifying the status quo regulations under the proposed action alternatives would have on households, communities, and tribes that depend on chum salmon for subsistence or commercial fishing. Increased adult chum salmon returns to Western and Interior Alaska river systems achieved through a reduction in bycatch provides the potential for positive impacts on the chum salmon stocks and people across Western and Interior Alaska that depend on them. For stocks that have consistently failed to achieve escapement goals, increased adult returns could increase escapement, which may improve future run sizes over time. For stocks that have only supported limited harvestable surplus, increased adult returns may provide additional subsistence fishing opportunities that support cultural practices, identity, food security, and economic opportunities.

5.2.3.1 Communities and Regions Engaged in and Dependent on Subsistence Harvests of Chum Salmon

In light of the data limitations and uncertainties described above, what follows is a qualitative discussion on the positive and indirect impacts that may result from the proposed action alternatives for rural and Alaska Native communities that harvest chum salmon for subsistence. The degree to which the following positive social impacts would be realized depends on whether chum salmon run sizes improve and there are increased returns to a level of abundance that would allow inseason managers to provide less restricted opportunities to harvest chum salmon for subsistence. Less restrictive subsistence opportunities could take on many forms including longer fishing periods or fewer restrictions on eligible gear types. These changes could reduce some of the costs associated with subsistence fishing trips as not all households can afford to take multiple small trips to accommodate short openings when their subsistence needs will not be met. Additional flexibility in when opportunities for chum salmon harvests could be provided may also allow fishers to harvest chum salmon when they are in better condition. In the quote below, a fisher from Aniak describes how chum salmon are in better condition earlier in the season (Godduhn et al. 2020: 57).

> *"You can feed your family on an early run of dogs, just as well as kings. If you, if they would let us get them when they are nice and prime at the beginning."*

The weather across WAK turns wet and rainy as the summer months go on. Rainy weather later in the summer can spoil fish drying on racks and flies are more present (Ikuta et al. 2013). These are complicated dynamics, however, because restrictions on target opportunities for chum salmon in June and

July may be an effort to conserve Chinook salmon because there is overlap in the runs of these two species in the Kuskokwim River (and in other areas/river systems) (Godduhn et al. 2020). Managers will also aim to provide balanced harvest opportunities across runs temporally.

To the extent that chum salmon abundance improves such that there are more (or less restrictive) subsistence fishing opportunities in the future, it is possible the proposed action alternatives could have a positive indirect effect on the mixed economies in rural and Alaska Native communities. Subsistence "encompasses hunting and gathering activities which have a deep connection to history, culture, and tradition, and which are primarily understood to be separate from commercial activities" (Raymond-Yakoubian, Raymond-Yakoubian, and Moncrieff 2017). However, as discussed at length in this SIA, the cash economy often supports subsistence activities through the purchase of gear, supplies, or other tools forming mixed economies (Wolfe 1982; Reedy 2009). Within these mixed economies where subsistence plays a critical role, there are extensive non-market sharing and exchange networks. Through sharing, local communities' values are expressed and transmitted across generations. Salmon may be given or shared with other persons without the expectation that something specific will be given in exchange. Fish may be shared with family members or friends, in the region or outside of it. As an example, in the Tanana region "…salmon is given to individual elders, Elders' residences and people who do not have access or ability to fish. Almost all the fishermen interviewed stated that the first salmon caught were given away to share the taste of the first fish and bring luck to the fishermen" (Moncrieff 2007).

Improvements in chum salmon abundance resulting from the proposed action alternatives may have a positive and indirect effect on food security for rural and Alaska Native communities. Subsistence harvests across rural and Alaska Native communities in Western and Interior Alaska account for a significant portion of the foods consumed and fish is a primary food source. Traditional foods are also rich in protein, iron, vitamin B12, polyunsaturated fats, monounsaturated fats, and omega-3 fatty acids (e nutritional value of wild foods cannot be adequately replaced by purchases in stores (Fall 2018). As described in Section 4.3.5.2, however, subsistence harvests that contribute to food security are also affected by conditions beyond the scope of this action including fuel costs, work or personal conflicts, changes in household composition, and more (Ahmasuk et al. 2008; Wolfe et al. 2012).

The proposed action alternatives may also have a positive indirect effect on cultural identity and wellbeing. As described above, salmon and Alaska Natives have been intertwined in close relationships for thousands of years (Carothers et al. 2021; Fienup-Riordan 2020; Raymond-Yakoubian and Angnaboogok 2017). There are multiple dimensions of wellbeing (Donkersloot et al. 2021); specific to this action, communities' wellbeing may be improved as people are able to engage (more) in culturally meaningfully practices. Moncrieff (2017: 41) describes the fishing culture among communities along the Yukon River as:

> *"...Rooted in the activities of eating salmon, sharing salmon, going fishing, cutting fish, and going to fish camp. Fish camp is a place where families come together and teach younger generations their culture and traditions. Participants fished with their relatives – parents, grandparents, uncles, aunts, cousins, and children. It was and still is important to teach their youth how to make fish wheels, cut salmon, hang and dry salmon, run the smokehouse and the myriad of other fish camp activities."*

Retaining a sense of identity and culture based on the act of fishing are difficult to retain without the ability to go fishing. As described in Section 4.3.5.3, when people are working together to harvest, cut, and process fish, they are connected in that moment to each other and their ancestors (see Ikuta et al. 2013; Trainor et al. 2021).

5.2.3.2 Communities and Regions Engaged in and Dependent on Commercial Harvests of Chum Salmon

Although improvements in Western Alaska chum salmon abundance would first and foremost be prioritized for subsistence harvests, the degree of the retuning run size allows the State of Alaska to determine whether there is expected surplus above escapement needs and subsistence to allow for commercial harvesting. **To the extent chum salmon PSC limits proposed in Alternative 2 or 3 result in savings of Western Alaska chum to the river systems of origin, this could have a positive indirect effect on commercial fishing opportunities within these management areas.**

Section 4.4.4 emphasizes how cash income is often earned in the commercial harvesting portion of the salmon fishery and used to support subsistence activities. In some cases, especially with the high cost of fuel, subsistence activities may be reduced if commercial harvesting income is lacking. Even a few hundred fish that are made available to commercial harvesters in-river due to "chum salmon savings" under the alternatives in question may provide a family or multiple families with just enough cash income to afford more time at fish camp to meet their subsistence needs for the coming winter. Though it is not possible to quantify exactly what effect the chum salmon savings estimated under the alternatives would have on commercial harvesters in any particular river system it is important to recognize that even a few hundred fish, and a few hundred dollars from those fish, may be critically important in many villages throughout Western and Interior Alaska.

6 Preparers and Persons Consulted

This chapter of the SIA lists the authors, contributors, and persons consulted when preparing this SIA for the initial review draft prepared for the Council's April 2024 meeting. Council staff would like to recognize the many preparers and contributors who provided special expertise, data, and/or written contributions to assist Council and NMFS staff in preparing this document for initial review.

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