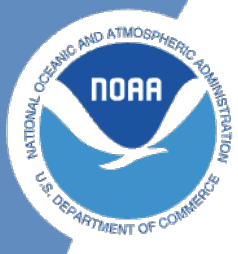


NOAA FISHERIES

Annual Community Engagement and Participation Overview

Sarah Wise, Stephen Kasperski, Anna Abelman, Angela Abolhassani, Russel Dame, Jean Lee, Melissa Parks, Marysia Szymkowiak

Table of contents

List of Figures

List of Tables

Preface

An annual report focusing on sustained participation of those fishing communities substantially dependent on or substantially engaged in the North Pacific groundfish and crab fisheries.

Alaska Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
7600 Sand Point Way N.E.
Seattle, Washington 98115-6349
November 2024

Part I.

Introduction, Broader Context, and Hot Topics

Fishing Communities in Alaska

Fishing in Alaska contributes to local and State economies, cultural cohesion, and food security within Alaska and beyond. The hundreds of communities in Alaska involved in commercial, recreational, and subsistence fishing contribute to community wellbeing and economic livelihoods, and support meaningful ways of life for Alaskans. The Annual Community Engagement and Participation Overview (ACEPO) presents social and economic information for those communities substantially engaged in the commercial Fishery Management Plan (FMP) groundfish and crab fisheries in Alaska. ACEPO is a community level analysis guided by The North Pacific Fishery Management Council (Council) management objectives and Magnuson–Stevens Fishery Conservation and Management Act (MSA) National Standard 2 and 8 (NS2; NS8).

This document provides information on the social and economic benefits of FMP groundfish and crab fisheries. This objective is in line with MSA-NS2, which states that fisheries management shall be based on the best scientific information available. MSA-NS8 calls for the sustained participation and the minimization of adverse economic impacts for fishing communities. Economic and social benefits to fishing communities are tied to economic stability and community wellbeing. In line with MSA-NS8, the Council has identified seven management objectives, one of which is maximizing the economic and social benefits of fisheries to the nation over time (Crab FMP 7.2.2). These benefits include, but are not limited to: profits, income, employment, benefits to consumers, and "less tangible or less quantifiable social benefits such as the economic stability of coastal communities." To support these management objectives and the MSA, the Alaska Fisheries Science Center (AFSC) developed ACEPO to provide an annual overview of community engagement in Alaska fisheries. ACEPO is updated annually, and can be expanded to include more detailed information as needed and upon request.

Alaska communities were examined within the context of their geographic place, as well as historical and current fishing involvement in Alaska's groundfish and crab fisheries. This analysis considers four performance metrics of overall participation in Alaska fisheries to understand the different ways that communities are involved. These metrics include: 1) commercial processing engagement, 2) commercial harvesting engagement, 3) the processing regional quotient which measures the percentage of all FMP groundfish and crab landings occurring in each community, and 4) the harvesting regional quotient that measures the percentage of all FMP groundfish and crab landings revenue attributable to vessels owned by residents of each community.

In addition to the engagement indices, this report considers communities' engagement and reliance on subsistence fisheries harvests, as well as the effects of certain climate driven ecological and social stressors on community wellbeing. Together, these indicators provide a quantitative measure of community participation in Alaska fisheries and how their participation has changed over time since 2008.

This document is divided into four sections to provide a multiscaled synopsis of groundfish and crab fisheries engagement. Section I addresses the definition of fishing communities as described in the MSA, and details some of the social and economic benefits associated with participation in the FMP groundfish and crab fisheries. It details the method and criteria used to develop the Community Fisheries Participation Indices for Alaska communities, and to identify substantially engaged communities, the critical importance of subsistence fishing, and the impacts of climate change on the food security of these communities. Sections II and III present an overview of both groundfish and crab fisheries in relation to associated community level benefit. These sections identify which

communities participate in FMP groundfish and crab fisheries, along with observable trends in participation. A general overview of crab and groundfish fisheries within Alaska is provided here in order to locate this analysis in historical and regulatory context. Section IV is dedicated to the individual Community Sketches created for each community identified as substantially engaged in the FMP groundfish and/or crab fisheries. The sketches offer a deep dive into community participation in fisheries and provide vital context to better understand possible social benefits. For the purpose of this annual report, to be consistent with Council management concerns, the existing database of community data was used including communities outside Alaska. The analysis focused only on commercial FMP groundfish and crab fisheries from 2008-2023, to maximize the best available data. It is worth noting that this report is not an exhaustive account of communities substantially engaged or dependent on fishing to support livelihoods and way of life; however, ACEPO provides an overview of select communities that are identified as highly engaged through quantifiable select criteria (see the methods section for further details).

The Importance of Human Communities

National Standard 8 of the Magnuson Stevens Act (MSA) states that management and conservation measures shall, "take into account the importance of fishery resources to fishing communities in order to: (1) Provide for the sustained participation of such communities; and (2) To the extent practicable, minimize adverse economic impacts on such communities." The term "fishing community," is defined as, "a community which 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 United States fish processors that are based in such community." While the MSA defines and mandates the consideration of fishing communities, what constitutes a fishing community in practice is complex and has long been debated.

Communities are diverse. For the sake of consistency, this overview follows NMFS' interpretation of the term fishing community to mean, "a social or economic group whose members reside in a specific location…" As community level analyses continue to develop further, it should be recognized that the concept of community may shift within differing contexts and perspectives. While geographic location may be relatively easy to determine, defining fishing communities solely on geography risks overlooking social processes that are valuable to understanding social complexity, including social networks valuable to the flow of people, information, goods, and services. In light of the variations in use in marine spaces across different social groups, it is vital that the parameters of what constitutes a fishing community are thoughtful and specific. Some managers have turned to, "multiple constructions of communities," to better understand fishing communities. Others expand the concept of, "community," to include those areas, resources, and social networks on which people depend. The move toward ecosystem-based management within Federal fisheries may suggest greater consideration of "community-level processes, practices, interactions and interdependencies as starting points for understanding the relationship between the rich and complex social practice of fishing and marine ecosystems." While the communities identified in ACEPO are defined by geographic location, we consider the level of participation in direct harvest, post-harvest processing, and associated community benefits in order to capture the linkages among people engaged in groundfish and crab fisheries, as well as the social and economic impacts on communities of place.

Scientific and Statistical Committee Comments

ACEPO was developed in response to requests from NPFMC for community-level information for the groundfish and crab fisheries. ACEPO provides specific fisheries data relevant to sustained

participation in specific fisheries as well as broader community engagement and wellbeing to facilitate contextualized decision making by the Council.

1. The Growing Alaskan Mariculture Industry

There has been aquatic farming in Alaska for at least the past 1,000 years, with documented clam garden beds thought to have been constructed in the holocene era.[1] Alaska Native communities have long engaged in mariculture practices to increase production and enhance food security.[2] More recently, aquaculture and mariculture has been identified as a key contributor to global and regional food security.[3][4] Since the passing of the Aquatic Farm Act in 1988, there has been broader interest in the aquatic farming of kelp and shellfish species in Alaska. The passing of this Act caused a rapid surge in aquatic farming permits. By the end of 1991, 56 farms were permitted to grow kelp and shellfish species with 37 of these farms reporting planted inventory.[5] Between 1991 and 2015, kelp and shellfish production has steadily increased, reaching 65 aquatic permits (57 active permits) in 2015, with a farm gate value of approximately $868 thousand.[6] During this time, the primary mariculture products were oysters and blue mussels. Few operations grew and sold kelp varieties. In 2016, the Alaska Mariculture Task Force was formed with the goal of expanding Alaskan mariculture by identifying strengths and developing a plan to overcome potential challenges. The Task Force created a plan to grow the Alaskan mariculture industry to $100 million annual revenue by 2040.[7] Soon after, in 2022, the Alaskan Mariculture Cluster (AMC), a group of 11 members from communities, the mariculture industry, Tribes, state agencies, and academia, led by the Southeast Conference successfully applied for the U.S. Economic Development Administration's Build Back Better Regional Challenge Grant ($49 million). The AMC will use the grant funds to accelerate the development of the mariculture industry including the research of innovative production and processing methods for kelp and oysters, addressing bottlenecks in hatchery/nursery capacity, training programs, and the creation of the Revolving Loan Fund to provide financial support for local Farms. [8] With the creation of the Task Force and the successful acquisition of funds from the Build Back Better grant, the number of aquatic farming permit applications began to increase rapidly. An average of 14 new applications were submitted each year between 2017 and 2022 with most new applications coming from Kodiak and Prince William

[1] Lepofsky, D., Toniello, G., Earnshaw, J., Roberts, C., Wilson, L., Rowell, K., & Holmes, K. (2021). Ancient anthropogenic clam gardens of the northwest coast expand clam habitat. Ecosystems, 24, 248-260.

[2] Groesbeck, A. S., Rowell, K., Lepofsky, D., & Salomon, A. K. (2014). Ancient clam gardens increased shellfish production: adaptive strategies from the past can inform food security today. PloS one, 9(3), e91235.

[3] Garlock, T., Asche, F., Anderson, J., Ceballos-Concha, A., Love, D. C., Osmundsen, T. C., & Pincinato, R. B. M. (2022). Aquaculture: The missing contributor in the food security agenda. Global Food Security, 32, 100620.

[4] Garza, F. A. (2024). Aquaculture and food security. In An Introduction to Sustainable Aquaculture (pp. 199-224). Routledge.

[5] Cochran, J. O. (1992). *Report on Aquatic Farming Activities in 1991.* Alaska Department of Fish and Game, Division of Fisheries, Rehabilitation, Enhancement and Development.

[6] Pring-Ham, C. & Politano, V. (2016). *2015 Annual Aquatic Farm Status Report.* Alaska Department of Fish and Game, Division of Sport Fish and Commercial Fisheries.

[7] Mariculture Task Force. (2018). *Alaska Mariculture Development Plan.* Available at https://www.adfg.alaska.gov/Static/fishing/pdfs/mariculture/ak_mariculture_devplan_06-29-18.pdf

[8] U.S. Economic Development Administration. (2022). *U.S. Department of Commerce Invests Approximately $49 Million to Boost Mariculture Industry in Alaska Through American Rescue Plan Regional Challenge.* Retrieved from https://www.eda.gov/news/press-release/2022/09/02/us-department-commerce-invests-approximately-49-million-boost

Sound, primarily seeking the cultivation of aquatic plants.[9] Since 2017, the quantity of harvested aquatic plants has increased to a peak of approximately 870 thousand wet pounds in 2022. The total number of oysters sold (farm gate and to other farmers) has fluctuated significantly in the past; however, due to additional issue of Alaskan hatchery permits, the number of oysters sold to other farms as seed has increased to 8.1 million oysters in 2023 (from approx. 3 million oysters in 2022).

In 2023, Alaska was named an Aquaculture Opportunity Area (AOA) by the National Oceanic and Atmospheric Administration due to the significant growth and interest in mariculture opportunities and outstanding support from government, Tribes, industry, and non-governmental organizations. AOAs are areas that are evaluated for their potential to support mariculture farms while considering environmental, economic, social, and cultural impacts. With the naming of Alaska as an AOA, the successful application of the Build Back Better grant, other public and private investments, and the support from government, tribes, and industry, Alaskan mariculture is well situated for continued growth and development. As of October 2024, there are 14 Alaskan hatcheries and 79 aquatic operation permits issued. Of the 79 issued permits, approximately 34% are aquatic plants only permits, 32% are shellfish only permits, and 34% are combination permits. Southeast Alaska has the greatest number of aquatic farm permits (38 permits; 670 acres) followed by Southcentral (28 permits; 294 acres) and Westward Alaska (13 permits; 364 acres).[10] Additional aquatic farm permits applications are currently under review with the number of active issued aquatic farm permits and acreage expected to increase to meet the 2040 annual revenue goal.

[9] Alaska Department of Fish and Game (2023). *Status of Alaska Department of Fish and Game Aquatic Farm Operation Permits 2015-2022.* Retrieved from https://www.adfg.alaska.gov/static/fishing/PDFs/aquaticfarming/adfg_aquaticfarm_op_permit_status_-2015-2022.pdf

[10] Alaska Department of Fish & Game. (2024). *Permit Summary Details.* Retrieved from https://www.adfg.alaska.gov/index.cfm?adfg=fishingaquaticfarming.aquaticfarminfo_op_permits_species_-region

2. Climate Change Effects on Fishing Communities

Climate change is affecting Alaskan communities in increasingly disruptive ways. Alaska air temperature is warming twice, and in some areas, three times as fast as the global average, and has already experienced more record high temperatures in the last decade than ever before.[1] Under a higher warming scenario, the average high temperature is predicted to increase by 4 to 8 degrees in the summer, and 10 degrees in the winter. Increased precipitation is also predicted to occur in all areas of the state. Declining and increasingly volatile fisheries, marine heatwaves, reduced sea ice, sea level rise and flooding, toxic algal blooms, extreme weather events, thawing permafrost and ocean acidification are some of the most significant consequences occurring due to these climatic changes and leading to conditions of increased uncertainty across the region.[2]

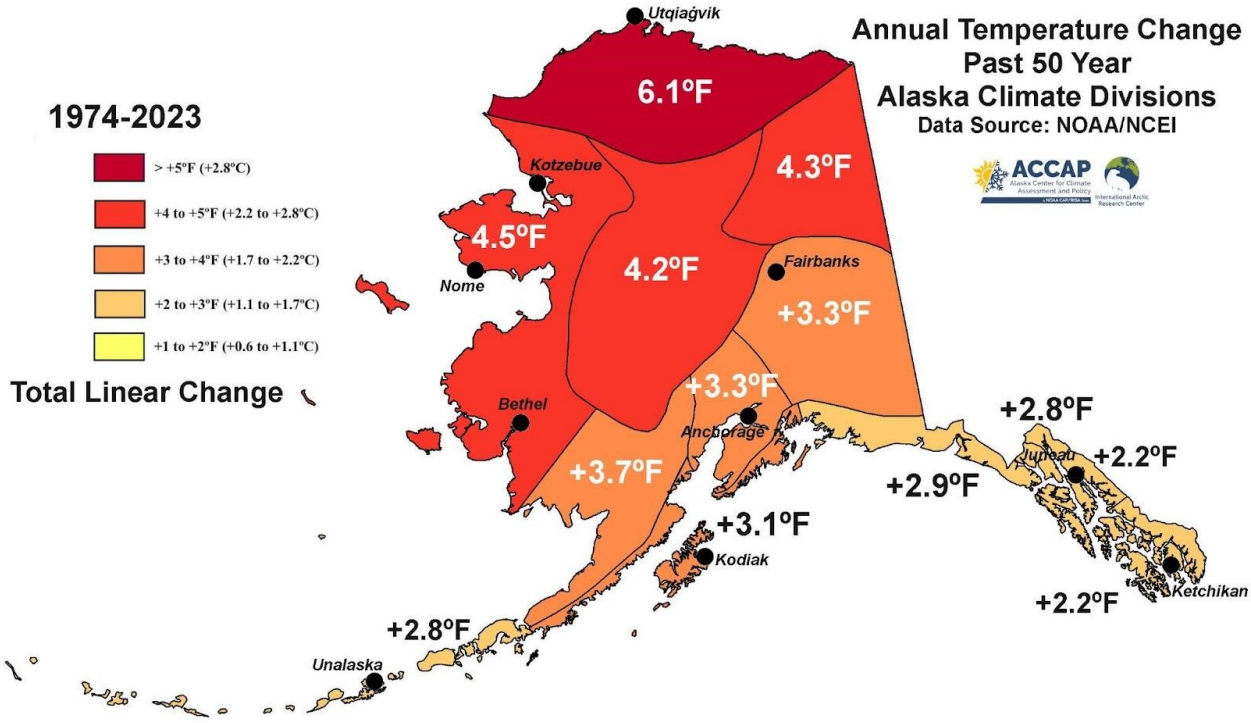


Figure 2.1.: Annual temperature change over the past 50 years. Credit Rick Thoman - ACCAP

[1]Ballinger, T. J., Bigalke, S., Walsh, J. E., Brettschneider, B., Thoman, R. L., Bhatt, U. S., et al. (2023). NOAA Arctic Report Card 2023: Surface Air Temperature.

[2]Markon, C., Gray, S., Berman, M., Eerkes-Medrano, L., Hennessy, T., Huntington, H. P., Littell, J., McCammon, M., Thoman, R., & Trainor, S. F. (2018). Chapter 26: Alaska. Impacts, Risks and Adaptation in the United States: The Fourth National Climate Assessment, Volume II. U.S. Global Change Research Program. https://doi.org/10.7930/NCA4.2018.CH26

These climate driven events are having profound effects on fisheries and the communities that rely on them.[3] Alaska fishing communities were deeply affected by climate-driven changes including increased food insecurity, risk of marine hazards, social and economic uncertainty, as well as decreased economic livelihood, marine safety, community wellbeing. In 2014-2016, an unprecedented warming event in the North Pacific Ocean (known as "The Blob") led to prolonged ecosystem impacts across trophic levels in the Gulf of Alaska, including drastic declines in Pacific cod and Pacific salmon, sea-bird and marine mammal die-offs[4], and harmful algal blooms.[5][6] Communities dependent on these fisheries resources incurred substantial losses in catch and revenue with little time to prepare.[7] In the Bering Sea, warming temperatures have led to a suite of ecological shifts including decreased sea ice extent, shifts in species distributions, and declines in key fisheries.[8] A marine heatwave in the Bering and Chukchi seas from 2018 to 2019 precipitated steep declines in important subsistence and commercial salmon runs and an unprecedented mass mortality event for Bering Sea snow crab that led to the closure of one of the most lucrative fisheries in Alaska.[9] In turn, this closure led the Indigenous island community of St. Paul, which relies heavily on revenue from this fishery, to declare a cultural, economic, and social emergency.[10][11] Gradually warming ocean temperatures have also led to changes in abundance and distribution of many groundfish and crab species,[12][13][14] as well as marine mammals. In addition to declines in important subsistence salmon species, decreasing sea ice, increasing harmful algal blooms and associated increases in paralytic shellfish poisoning occurrences, marine mammal and seabird bird die-offs are inhibiting subsistence practices with devastating impacts on food security, culture, and knowledge transfer.

Recent Federal fisheries disasters are almost exclusively attributed to extreme environmental events such as these, resulting in billions of revenue loss for the federal government and direct revenue

[3]Barange, M., Bahri, T., Beveridge, M. C., Cochrane, K. L., Funge-Smith, S., & Poulain, F. (2018). Impacts of climate change on fisheries and aquaculture. United Nations' Food and Agriculture Organization, 12(4), 628-635.

[4]Suryan RM, Arimitsu ML, Coletti HA et al (2021) Ecosystem response persists after a prolonged marine heatwave. Sci Rep 11:1–17. https://doi.org/10.1038/s41598-021-83818-5

[5]Suryan, R. M., Arimitsu, M. L., Coletti, H. A., Hopcroft, R. R., Lindeberg, M. R., Barbeaux, S. J., et al. (2021). Ecosystem response persists after a prolonged marine heatwave. Scientific reports, 11(1), 6235.

[6]Ferris, B. (2023). Ecosystem Status Report 2022: Gulf of Alaska. Stock Assessment and Fishery Evaluation Report.

[7]Barbeaux, S. J., Holsman, K., & Zador, S. (2020). Marine Heatwave Stress Test of Ecosystem-Based Fisheries Management in the Gulf of Alaska Pacific Cod Fishery. Frontiers in Marine Science, 7, 703. https://doi.org/10.3389/fmars.2020.00703

[8]Siddon, E. (2023). Ecosystem Status Report: Eastern Bering Sea. Stock Assessment and Fishery Evaluation Report.

[9]Szuwalski, C. S., Aydin, K., Fedewa, E. J., Garber-Yonts, B., & Litzow, M. A. (2023). The collapse of eastern Bering Sea snow crab. Science, 382(6668), 306-310.

[10]Farley, E. V., Yasumiishi, E. M., Murphy, J. M., Strasburger, W., Sewall, F., Howard, K., et al. (2024). Critical periods in the marine life history of juvenile western Alaska chum salmon in a changing climate. Marine Ecology Progress Series 726, 149–160. doi: 10.3354/meps14491

[11]Szuwalski, C. S., Aydin, K., Fedewa, E. J., Garber-Yonts, B., and Litzow, M. A. (2023). The collapse of eastern Bering Sea snow crab. Science 382, 306–310. doi: 10.1126/science.adf6035

[12]Rooper, C. N., Ortiz, I., Hermann, A. J., Laman, N., Cheng, W., Kearney, K., & Aydin, K. (2021). Predicted shifts of groundfish distribution in the Eastern Bering Sea under climate change, with implications for fish populations and fisheries management. ICES Journal of Marine Science, 78(1), 220–234. https://doi.org/10.1093/icesjms/fsaa215

[13]Bernton, H. (2022, April 3). Into the ice: A quest for snow crab in a Bering Sea upended by climate change. Anchorage Daily News. https://www.adn.com/alaska-news/2022/04/03/into-the-ice-a-crab-boats-quest-for-snow-crab-in-a-bering-sea-upended-by-climate-change/

[14]Szuwalski, C., Cheng, W., Foy, R., Hermann, A. J., Hollowed, A., Holsman, K., Lee, J., Stockhausen, W., & Zheng, J. (2021).

loss from the fishing industry.[15] There is a need to understand how these changes will affect fisheries and fishing communities. Beyond these impacts, many community members are also observing additional ecological changes based on their own Local and Traditional Knowledge of the area. These observations are vital to understand broad longitudinal patterns, particularly in data limited areas.[16][17] (For examples of how Local Knowledge has informed Federal management for certain data-poor fisheries, see rockfish[18] and Dungeness crab[19] examples; aqua-culture,[20] co-management,[21] and disaster and risk.[22])

The effects of climate change and other disruptions (such as the Covid-19 pandemic) affect the vulnerability and resilience of communities in different ways. The increased frequency of disasters are exacerbating the impacts of individual events and compounding risk to communities,[23][24] specifically fishing communities.[25][26] Climate vulnerability is the degree to which a community is at risk of exposure to the biophysical effects of climate change, such as sea level rise or storm events. Increasingly, community climate vulnerability assessments are used to analyze the expected climate impacts, risk, and adaptive capacity. To date, there are no systematic assessments across Alaska communities leading to a patchwork of information for use in preparing for and responding to climate stressors.

The extent to which a community depends on particular marine resources impacted by climate change (across the commercial, recreational, or subsistence sectors) affects community vulnerability and risk. Additionally, a community's adaptive capacity to offset the effects of climate change can

[15]Bellquist, L., Saccomanno, V., Semmens, B. X., Gleason, M., & Wilson, J. (2021). The rise in climate change-induced federal fishery disasters in the United States. PeerJ, 9, e11186. https://doi.org/10.7717/peerj.11186

[16]Carothers, C., Brown, C., Moerlein, K. J., López, J. A., Andersen, D. B., & Retherford, B. (2014). Measuring perceptions of climate change in northern Alaska: Pairing ethnography with cultural consensus analysis. Ecology and Society, 19(4), art27. https://doi.org/10.5751/ES-06913-190427

[17]Marino, E. (2015). Fierce Climate Sacred Ground: An Ethnography of Climate Change in Shishmaref, Alaska. In Fierce Climate Sacred Ground: An Ethnography of Climate Change in Shishmaref, Alaska (pp. 1–122). Univ Alaska Press. https://www.webofscience.com/wos/woscc/full-record/WOS:000374781600008

[18]Beaudreau, A. H., & Levin, P. S. (2014). Advancing the use of local ecological knowledge for assessing data-poor species in coastal ecosystems. Ecological Applications, 24(2), 244–256. https://doi.org/10.1890/13-0817.1

[19]Ban, N. C., Eckert, L., McGreer, M., & Frid, A. (2017). Indigenous knowledge as data for modern fishery management: a case study of Dungeness crab in Pacific Canada. Ecosystem Health and Sustainability, 3(8), 1379887.

[20]Ryan, T. (2009). "S'kuu See": Integrating Forms of Knowledge. In Aquaculture, Innovation and Social Transformation (pp. 191-204). Dordrecht: Springer Netherlands.

[21]Nakashima, D. J. (1993). 10. Astute Observers on the Sea Ice Edge: Inuit knowledge as a basis for Arctic Co-Management. Traditional ecological knowledge concepts and cases.

[22]Rai, P., & Khawas, V. (2019). Traditional knowledge system in disaster risk reduction: Exploration, acknowledgement and proposition. Jàmbá: Journal of Disaster Risk Studies, 11(1), 1-7.

[23]Hayhoe, K., D.J. Wuebbles, D.R. Easterling, D.W. Fahey, S. Doherty, J. Kossin, W. Sweet, R. Vose, and M. Wehner, 2018: Our Changing Climate. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 72–144. doi: 10.7930/NCA4.2018.CH2

[24]Singh, D., A.R. Crimmins, J.M. Pflug, P.L. Barnard, J.F. Helgeson, A. Hoell, F.H. Jacobs, M.G. Jacox, A. Jerolleman, and M.F. Wehner, 2023: Focus on compound events. In: *Fifth National Climate Assessment*. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. https://doi.org/10.7930/NCA5.2023.F1

[25]Carothers, C., Brown, C., Moerlein, K. J., López, J. A., Andersen, D. B., & Retherford, B. (2014). Measuring perceptions of climate change in northern Alaska: Pairing ethnography with cultural consensus analysis. Ecology and Society, 19(4), art27. https://doi.org/10.5751/ES-06913-190427

[26]Marino, E. (2015). Fierce Climate Sacred Ground: An Ethnography of Climate Change in Shishmaref, Alaska. In Fierce Climate Sacred Ground: An Ethnography of Climate Change in Shishmaref, Alaska (pp. 1–122). Univ Alaska Press. https://www.webofscience.com/wos/woscc/full-record/WOS:000374781600008

vary based on social networks, income level, economic diversity, and population composition.[27][28] Adaptive capacity is informed by robust knowledge systems, strong social networks, and economic and institutional support.[29] Others also include aspects such as infrastructure, technology, social capital, and good governance.[30][31][32]

Each community sketch will include discussions of how that community is being impacted by climatic changes, including through fisheries closures, as well as their potential adaptive capacity and risk level given many of the factors outlined here.

In previous versions of ACEPO, community sketches included indices of climate change vulnerability, categorized as exposure to biophysical effects, fisheries resource dependence, and limitation on adaptive capacity. These indices have been removed from the sketches and replaced by narratives of community climate vulnerability. The narrative approach allows for a more robust representation of climate vulnerabilities with specificity that moves away from indicators that in many cases are not relevant for and do not adequately represent a community's climate vulnerability.

[27] Himes-Cornell, A., & Kasperski, S. (2015). Assessing climate change vulnerability in Alaska's fishing communities. Fisheries Research, 162, 1–11. https://doi.org/10.1016/j.fishres.2014.09.010

[28] Loring, P. A., Gerlach, S. C., & Penn, H. J. (2016). "Community work" in a climate of adaptation: responding to change in rural Alaska. Human Ecology, 44, 119-128.

[29] Whitney, C. K., Bennett, N. J., Ban, N. C., Allison, E. H., Armitage, D., Blythe, J. L., ... & Yumagulova, L. (2017). Adaptive capacity: from assessment to action in coastal social-ecological systems. Ecology and Society, 22(2).

[30] Adger, W.N. (2003). Social Capital, Collective Action, and Adaptation to Climate Change. Economic Geography, 79(4): 387-404. https://www.jstor.org/stable/30032945

[31] Jones, L., Ludi, E. and Levine, S. (2010). Towards a characterisation of adaptive capacity: A framework for analysis of adaptive capacity at the local level. ODI Background Note.

[32] Visseren-Hamakers, I. J., Razzaque, J., McElwee, P., Turnhout, E., Kelemen, E., Rusch, G. M., ... & Zaleski, D. (2021). Transformative governance of biodiversity: insights for sustainable development. Current Opinion in Environmental Sustainability, 53, 20-28.

3. Subsistence Fishing and Food Security

Alaska fisheries provide seafood for the nation and international market, while supporting vital subsistence needs for Alaskan communities. Alaska communities rely on a range of marine resources for subsistence uses which have significant social, cultural, and economic value. Alaska Natives have harvested and shared traditional foods for thousands of years, and doing so is vital to their physical, mental, and spiritual wellbeing.[1][2] Given the importance of subsistence to social sustainability and wellbeing, additional information is included in ACEPO to provide context.

In 1978, the State of Alaska enacted its first subsistence law allowing the Board of Fisheries (BOF) and the Board of Game (BOG) to adopt regulations governing subsistence (AS 16.05.251 for BOF and AS 16.05.255). Once the two boards have determined the status of customary and traditional use, they must set "the amount reasonably necessary for subsistence uses," (considering the sustained yield principle), which prioritizes subsistence over recreational and commercial uses. This is often referred to as the "ANS".[3][4] In 1990, the Federal government began managing subsistence hunting, trapping, and fishing on Alaska's Federal public lands and non-navigable waters.[5][6]

Subsistence fishing supports the food security and sovereignty of many households through the nutritional, economic, and cultural benefits provided,[7] comprising 56% of statewide subsistence harvest (cite). Subsistence practices provide critical nutritional requirements for many rural residents,[8] and support invaluable social and sharing networks,cultural identity, and knowledge transfer pathways.[9][10] Furthermore, the cost of foods to replace subsistence fisheries represents a substantial

[1]Heeringa, K., Huntington, O., Woods, B., Chapin, F. S., Hum, R., Brinkman, T., & Participants, W. (2019). A Holistic Definition of Healthy Traditional Harvest Practices for Rural Indigenous Communities in Interior Alaska. Journal of Agriculture, Food Systems, and Community Development, 9(B), 115–129. https://doi.org/10.5304/jafscd.2019.09B.009

[2]Fall, J. A. (2018). Subsistence in Alaska: A Year 2017 Update. Alaska Dept. of Fish and Game Division of Subsistence.

[3]Alaska Department of Fish and Game. (n.d.). Subsistence in Alaska: Amounts Reasonably Necessary for Subsistence. https://www.adfg.alaska.gov/index.cfm?adfg=subsistence.reasonable

[4]Alaska Stat. § 16.05.258 (2023).

[5]Developing a Research and Restoration Plan for Arctic-Yukon-Kuskokwim (Western Alaska) Salmon. (2005). National Academies of Sciences, Engineering, and Medicine. Washington, DC: The National Academies Press. https://doi.org/10.17226/11080.

[6]McGee, Jack B. (2010). SUBSISTENCE HUNTING AND FISHING IN ALASKA: DOES ANILCA'S RURAL SUBSISTENCE PRIORITY REALLY CONFLICT WITH THE ALASKA CONSTITUTION? Alaska Law Review, 287(2): 221-256.

[7]U.S. Department of the Interior. (n.d.). Federal Subsistence Management Program. https://www.doi.gov/subsistence/federal-subsistence-management-program

[8]Loring, P. A., Gerlach, S. C., & Harrison, H. L. (2013). Seafood as Local Food: Food Security and Locally Caught Seafood on Alaska's Kenai Peninsula. Journal of Agriculture, Food Systems, and Community Development, 3(3), 13–30. https://doi.org/10.5304/jafscd.2013.033.006

[9]Wittman, H. (2011). Food Sovereignty: A New Rights Framework for Food and Nature? Environment and Society, 2(1). https://doi.org/10.3167/ares.2011.020106

[10]Trainor, A., Gerkey, D., McDavid, B. M., Cold, H. S., Park, J., & Koster, D. S. (2021). How Subsistence Salmon Connects Households and Communities: An Exploration of Salmon Production and Exchange Networks in Three Communities on the Yukon River, 2018–2019 (Technical Paper No. 481; p. 298). Alaska Dept. of Fish and Game

portion of household income and would be unsustainable for many residents.[11]

Food security exists, "when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences in order to lead a healthy and active life."[12] Food sovereignty is a complementary concept to food security and describes "the right of Peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems."[13] Maintaining both food security and sovereignty supports community resilience to stressors, including climate change and large social disruptions, such as the COVID-19 pandemic, by ensuring that communities can still access sufficient nutritious food when global supply chains are disrupted or ecological changes impact certain sectors.

Division of Subsistence.

[11]Fall, J. A. (2018). Subsistence in Alaska: A Year 2017 Update. Alaska Dept. of Fish and Game Division of Subsistence.

[12]Peng, W., & Berry, E. M. (2019). The concept of food security. In P. Ferranti, E. M. Berry, & J. R. Anderson (Eds.), *Encyclopedia of Food Security and Sustainability* (pp. 1-7). Elsevier. https://doi.org/10.1016/B978-0-08-100596-5.22314-7

[13]LVC (La Via Campesina). (2007). *Declaration of Nyéléni*. Nyéléni, Sélingué, Mali. Retrieved October 15, 2024, from https://nyeleni.org/IMG/pdf/DeclNyeleni-en.pdf

Part II.

Community Participation Indices

The ACEPO analysis considers four performance metrics of community fisheries participation to understand the different ways that communities are involved in Alaska fisheries: commercial processing engagement, commercial harvesting engagement, the processing regional quotient which measures the percentage of all Alaska commercial landings within the specific FMPs occurring in each community, and the harvesting regional quotient that measures the percentage of all Alaska landings attributable to vessels owned by residents of each community. Time series summary tables of these four metrics provide a quantitative measure of community participation in Alaska commercial fisheries and how that participation may have changed from 2008 through 2023, the most recent available data. The Community Participation Indices are relative, in that each community's level of engagement is dependent on the other communities included in the analysis, which in this case includes eight non-Alaska community groupings: Bellingham, WA; Other Washington; Newport, OR; Other Oregon; All California; All Other States; the At-Sea Processor grouping; and the Seattle metropolitan statistical area (Seattle MSA) which is defined as King, Pierce, and Snohomish counties of Washington, including: Seattle, Tacoma, Everett, and Bellevue. These groupings were chosen to maintain consistency with Council analyses.

By examining fishing community participation over time, it is possible to trace sustained participation in specific fisheries, as well as flag changes in participation for some communities. Further research may then clarify some of the drivers of these changes. ACEPO presents an overview of communities substantially engaged in FMP groundfish and FMP crab fisheries, and highlights those communities highly engaged according to the established criteria. Due to the differences in the overall fisheries framework, involvement in CDQ programs was not among the criteria used to identify communities.

Note on Confidentiality Due to the small number of reporting entities, some results are suppressed to protect the confidentiality of proprietary information. For example, confidentiality concerns required that Akutan, Sand Point, and King Cove's fishing engagement data be aggregated to avoid disclosure of confidential information. For that reason, the Akutan community sketch provides information specific to the community of Akutan, but presents aggregated fishing data from Akutan, King Cove, and Sand Point communities.*

Additional data about those communities are provided in order to offer valuable rich context and best available science to inform decision making. The dataset includes data on Alaska commercial fishing activities from 2008-2023 for all communities in the U.S. In line with continued efforts to increase relevance, we could expand to include additional information in the future.

In response to comments from the SSC, the analysis presented here remains limited to participation in the commercial processing and harvesting sectors in North Pacific fisheries groundfish and crab FMP fisheries. If interest grows, additional fisheries can be added to the analysis. Effort was made to provide most relevant fisheries data while adhering to confidentiality constraints. Most communities that emerged were discrete entities; however Kodiak Island Borough (KIB) was analyzed on the borough level separately from the City of Kodiak in order to reflect the significance of smaller communities on Kodiak Island, which may otherwise be obscured. For communities where the small number of participating entities requires the suppression of individual statistics, reasons for data aggregation are noted.

Several assumptions were made within this analysis. Vessels were assigned to the community based upon the ownership address listed in the Alaska Commercial Fisheries Entry Commission (CFEC) registry. Vessel ownership can be dynamic; and there are multiple reasons for registration practices that may not relate to residency of owner(s). Permit information was assigned when possible.

Given a mobile workforce and possibility of multiple home ports, these indicators only allow for a partial understanding of the flow of economic and social benefits associated with individuals and vessels. Shoreside processors were associated with geographic location although it is understood that economic benefits likely extend beyond one geographic community.

Commercial Fisheries Engagement Indices

The study population includes communities with any shoreside landings for FMP groundfish and both at-sea and shoreside landings for FMP crab; and communities with residents owning vessels that fished in those fisheries. For the groundfish fisheries engagement indices, communities were included if they had shoreside landings in any of the 15 years from 2008-2023 or residents owning vessels that fished in any year from 2008-2023 while for the crab fisheries engagement indices communities were included if they had shoreside landings in any of the 23 years from 2000-2023 or had residents owning vessels that fished for FMP crab in any year from 2000-2023. At this time, the engagement indices exclude inshore floating processors that we cannot assign to a location as well as any landings where the landing port is unknown or missing. The analysis separates variables into two categories of fisheries involvement: commercial processing, which reflects the port of landing, and commercial harvesting, which reflects residency of the vessel making the landing, for each FMP. Processing engagement is represented by the amount of landings and associated revenues from landings in the community, the number of vessels delivering any FMP groundfish or crab in the community, and the number of processors in the community processing any FMP groundfish or crab. Harvesting engagement is represented by: the volume of FMP groundfish and crab landings from vessels owned by residents, revenues associated with vessels owned by community residents, the number of vessels with FMP groundfish or crab landings owned by residents in the community, and the number of distinct resident vessel owners whose vessels made FMP groundfish or crab landings in any community. By separating commercial processing from commercial harvesting, the engagement indices highlight the importance of fisheries in communities that may not have a significant amount of landings or processing in their community, but have a large number of fishers and/or vessel owners that participate in commercial fisheries who are based in the community.

The study population includes communities with any shoreside landings for FMP groundfish and both at-sea and shoreside landings for FMP crab; and communities with residents owning vessels that fished in those fisheries. For the groundfish fisheries engagement indices, communities were included if they had shoreside landings in any of the 15 years from 2008-2023 or residents owning vessels that fished in any year from 2008-2023 while for teh crab fisheries engagement indices communities were included if they had shoreside landings in any of the 23 years from 2000-2023 or had residents owning vessels that fished for FMP crab in any year from 2000-2023. At this time, the engagement indices exclude inshore floating processors that we cannot assign to a location as well as any landings where the landing port is unknown or missing. The analysis separates variables into two categories of fisheries involvement: commercial processing, which reflects the port of landing, and commercial harvesting, which reflects residency of the vessel making the landing, for each FMP. Processing engagement is represented by the amount of landings and associated revenues from landings in the community, the number of vessels delivering any FMP groundfish or crab in the community, and the number of processors in the community processing any FMP groundfish or crab. Harvesting engagement is represented by: the volume of FMP groundfish and crab landings from vessels owned by residents, revenues associated with vessels owned by community residents, the number of vessels with FMP groundfish or crab landings owned by residents in the community,

and the number of distinct resident vessel owners whose vessels made FMP groundfish or crab landings in any community. By separating commercial processing from commercial harvesting, the engagement indices highlight the importance of fisheries in communities that may not have a significant amount of landings or processing in their community, but have a large number of fishers and/or vessel owners that participate in commercial fisheries who are based in the community.

To examine the relative harvesting and processing engagement of each community, a separate principal components factor analysis (PCFA) was conducted each year for each category to determine a community's engagement relative to all other Alaska communities. Two PCFAs are conducted (processing engagement and harvesting engagement) each year for 15 years for groundfish or 23 years for crab (total of 30 PCFAs for groundfish and 46 PCFAs for crab). PCFA is a variable reduction strategy that separates a large number of correlated variables into a set of fewer, linearly independent components. These components are used to create quantitative indices of engagement for each community by using the regression method of summing the standardized coefficient scores multiplied by the included variable values. A unique processing index and harvesting index value for each community in each year is created using the first unrotated extracted factor from the PCFA, each of which resulted in single factor solutions with second factor eigenvalues below 1.00 for all 76 PCFAs. Each index is normalized to have a mean of zero and a standard deviation of one. These indices are relative scores: they represent each community's engagement in commercial fisheries relative to all other communities in that year. Indices are then combined across all years to create a series of relative engagement over time. Communities that scored above one (above one standard deviation from the mean of zero) for any year are classified as Highly Engaged for that year. Communities that were Highly Engaged in all 15 years from 2008-2023 for groundfish or 23 years from 2000-2023 for crab were used in additional analyses to explore the changes in their fisheries participation in processing engagement or harvesting engagement.

These are relative indices: a large change in the total number of active vessels over time will only cause a change in an index if one community loses a larger share of their vessels (or other commercial fisheries activities) than another community. If the change in number of active vessels (or other commercial fishing activities) are directly proportional to the existing number of vessels across communities, there will not be a change in the indices. This also means that the indices do not provide consistent values near zero participation and additional statistical methods are needed to identify communities with little participation losing what little participation they had. AFSC authors have developed those necessary methods and expect to published the results in a scientific journal in early 2024 and use the methods for next year's ACEPO (data through 2023).

Regional Quotient

The regional quotient (RQ) measures the proportion of a specific fishery (for all fisheries in aggregate) associated with a particular community, in relation to all communities within the region. This metric is meant to reflect a community's degree of involvement (as measured by fisheries landings in that community) in a select fishery, in both the harvesting and processing sectors. The RQ is calculated both as the landings and revenue attributable to a community divided by the total landings or revenue from all communities. To reflect each community's share of landings or revenue of the total fishery, the RQ takes into account landings in the at-sea sector (catcher processors and motherships) and at inshore floating processors, and treats the "at-sea" group as a separate community of practice. Calculated separately for the dimensions of processing engagement

and harvesting engagement, the RQ uses the same criteria for inclusion as the commercial fisheries engagement indices for all selected fisheries.

4. Community Participation in North Pacific Groundfish Fisheries

4.0.1. Alaska FMP Groundfish Fisheries

The North Pacific region's commercial fisheries have transformed over time with changing technology, labor, market demand, and legislation. The earliest commercial fishing efforts by U.S. vessels in waters off the coast of Alaska emerged in the 1860s, primarily targeting Pacific cod. With the development of diesel engines, commercial fisheries for Pacific halibut and groundfish expanded north to the Gulf of Alaska (Gulf) and into the Bering Sea (BS) region by the 1920s. By the mid-1900s, fisheries had developed for a variety of groundfish species. Groundfish fisheries changed dramatically in the wake of World War II as Alaskan commercial fisheries expanded and industrialized. From the end of World War II to the introduction of the Exclusive Economic Zone under the Magnuson-Stevens Act (MSA), the North Pacific region's harvests increased substantially. The greatest increase was in the groundfish and crab sectors in the Bering Sea Aleutian Islands (BSAI) and Gulf. Groundfish harvests grew to exceed 2 million tons (mt) per year in the early 1970s. Technological developments and changes in marketing continued to increase harvests, leading to some concern of overexploitation, particularly by foreign fleets. The 1945 Truman Proclamation stressed the U.S.'s right to manage and conserve living marine resources in these areas and to require foreign compliance.8 This claim was not effectively exercised until the MSA was implemented in 1977. The MSA has been amended over the years, most substantially in 1996 with the Sustainable Fisheries Act, and in 2006 with the Reauthorization Act. The Sustaining America's Fisheries for the Future Act is currently being considered in Congress.

4.0.2. Commercial Groundfish Harvesting Engagement

Data were collected for 103 communities or community groupings throughout the U.S. to create performance metrics of community participation in Alaska groundfish FMP fisheries from 2008-2023. Communities were included if they had either some commercial BSAI or Gulf FMP groundfish fisheries landings or residents who owned vessels used in commercial BSAI or Gulf FMP groundfish fishing during this time period. Of these 103 communities, 63 had some groundfish landings in

their community while 93 had a resident who owned a vessel that participated in commercial groundfish harvest. All 103 communities were included in both the commercial harvesting and processing engagement index. The results of the commercial harvesting engagement PCFA analyses are shown here in Table 4.1, which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient cited for all variables. The results suggest fairly strong relationships among variables, and that a single index based on the first extracted factor explains over 78% of the variation in each of the variables in each year. Figure 4.1 displays the aggregate annual values of the four variables that make up the harvesting engagement index for each year to better understand the absolute changes in North Pacific groundfish harvesting activities that are underlying the relative harvesting engagement index. Aggregate revenues were down 1.48% with pounds landed falling by 1.88%, respectively, in 2023 compared with their 2018 - 2022 average while being harvested by 2.47% fewer vessels, which were owned by 3.06% fewer individuals.

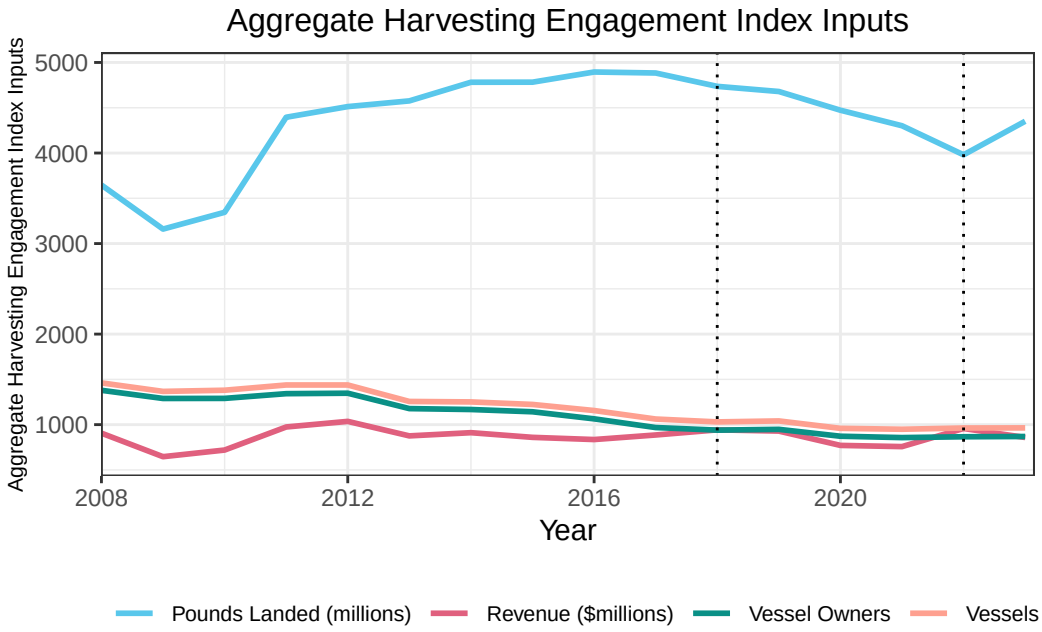


Figure 4.1.: Aggregate annual Groundfish Harvesting Engagement Index inputs. Dotted lines indicate the previous 5 year period (2018 - 2022)

In addition to the goodness of fit statistics of the analyses provided in Table 4.1, each PCFA provides an index score for each of the 103 communities included in the harvesting engagement analyses. Table 4.2 displays commercial groundfish harvesting engagement index results for the 6 communities that were highly engaged in FMP groundfish harvesting for at least one year between 2008-2023. Communities are defined as highly engaged when their index score is above one, or one standard deviation above the mean of zero.

The harvesting engagement index is a relative indicator of community participation compared to the participation of all other communities that harvest BSAI and Gulf FMP groundfish. It measures the presence of commercial fishing participation through residents who own commercial fishing vessels that are active in FMP groundfish fisheries. Variables included in the index are pounds landed and revenue by resident vessel owners, the number of active vessels, and the number of unique vessel owners in the community.

Table 4.1.: Commercial harvesting engagement PCFA results 2008-2023

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value from vessel owners	Pounds landed by vessel owners	Total # fishing vessels	Total # of unique vessels owners	Percent variance explained	Armor's Theta
2008	3.12	0.83	0.06	0.00	0.99	0.98	0.49	0.97	0.78	0.91
2009	3.11	0.85	0.05	0.00	0.99	0.98	0.46	0.98	0.78	0.90
2010	3.10	0.86	0.04	0.00	0.99	0.98	0.44	0.98	0.77	0.90
2011	3.10	0.84	0.05	0.00	0.99	0.98	0.47	0.97	0.78	0.90
2012	3.09	0.85	0.06	0.00	0.99	0.98	0.46	0.97	0.77	0.90
2013	3.10	0.84	0.05	0.00	0.99	0.98	0.47	0.98	0.78	0.90
2014	3.12	0.83	0.05	0.00	0.99	0.98	0.49	0.97	0.78	0.91
2015	3.12	0.81	0.07	0.00	0.99	0.98	0.51	0.96	0.78	0.91
2016	3.14	0.78	0.07	0.00	0.98	0.98	0.54	0.97	0.79	0.91
2017	3.16	0.76	0.08	0.00	0.98	0.98	0.56	0.96	0.79	0.91
2018	3.13	0.78	0.08	0.00	0.98	0.97	0.54	0.96	0.78	0.91
2019	3.13	0.78	0.08	0.00	0.98	0.97	0.54	0.96	0.78	0.91
2020	3.12	0.78	0.10	0.00	0.98	0.97	0.55	0.96	0.78	0.91
2021	3.11	0.79	0.10	0.00	0.98	0.97	0.54	0.96	0.78	0.90
2022	3.09	0.78	0.13	0.00	0.97	0.96	0.56	0.95	0.77	0.90
2023	3.04	0.81	0.15	0.00	0.96	0.95	0.56	0.94	0.76	0.89

All 6 community groupings listed in Table 4.2 were Highly Engaged in commercial harvesting in all years from 2008-2023 : Homer, Kodiak, Petersburg, Sitka, Seattle MSA, and Other Washington communities. Seattle MSA has by far the highest degree of engagement over time, with fairly consistent index scores from 2008-2023. Aside from Seattle MSA, Kodiak and Sitka have the highest engagement scores over time. Between 2022 and 2023. Other Washington declined by -15.7%, while the Seattle MSA declined by -0.508%.

Kodiak, Sitka, Homer, and Petersburg experienced slight increases in index scores (1.31%, 1.91%, 5.03%, and 5.58%, respectively) (Figure 4.2).

Table 4.2.: Index scores of communities highly engaged in commercial harvest of groundfish 2008 - 2023

Year	Homer	Kodiak	Other Washington	Petersburg	Seattle MSA	Sitka
2008	1.18	2.66	1.37	1.50	8.78	2.36
2009	1.32	2.73	1.27	1.39	8.67	2.77
2010	1.44	2.83	1.21	1.59	8.57	2.78
2011	1.40	3.30	1.11	1.33	8.49	2.69
2012	1.49	3.14	1.08	1.38	8.52	2.73
2013	1.53	2.45	1.10	1.45	8.74	2.77
2014	1.45	2.62	1.12	1.54	8.62	2.89
2015	1.64	3.02	1.07	1.55	8.60	2.43
2016	1.75	3.04	1.06	1.55	8.69	2.05
2017	1.83	2.28	1.03	1.68	8.82	2.31
2018	1.85	2.00	1.20	1.65	8.83	2.38
2019	1.80	2.12	1.21	1.77	8.78	2.43
2020	1.69	2.01	1.26	1.74	8.80	2.48
2021	2.10	2.23	1.11	1.88	8.70	2.26
2022	2.04	2.51	1.25	1.82	8.59	2.36
2023	2.14	2.55	1.05	1.92	8.55	2.41

*Shaded cells are index scores above one (one standard deviation above the mean of zero) for at least one year (2008-2023)

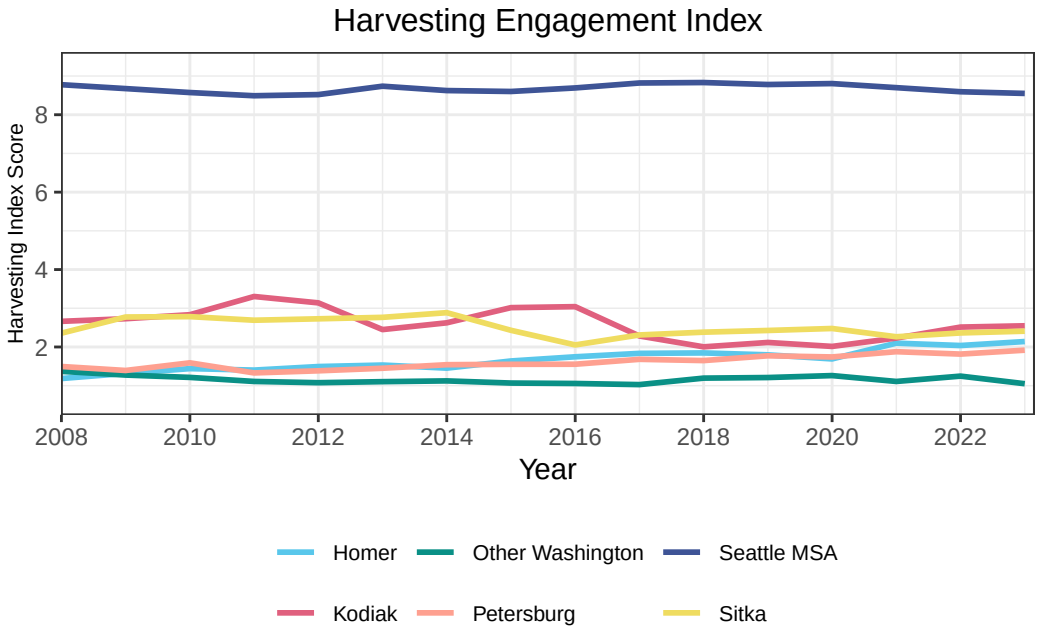


Figure 4.2.: Index scores of communities highly engaged in commercial harvest for at least 1 year from 2009-2023

4.0.3. Harvesting Regional Quotient

The commercial harvesting Regional Quotient (RQ) is associated with a community's resident vessel owners to account for where the proportion of fishing revenue enters the local economy. Figure 4.3 shows the harvesting RQ for North Pacific groundfish revenue from 2008-2023. The RQ indicates the percentage contribution in revenue of FMP groundfish from resident vessel owners in a community relative to the total (shore-based and at-sea) revenue from BSAI and Gulf FMP groundfish fisheries.

The community with the largest share of harvesting vessel owners is the Seattle MSA, which averaged 16.7% from 2008-2023, followed by Sitka (12.4%), Kodiak (11.5%), Homer (8.34%), Petersburg, (7.96%), and Other Washington (4.88%). While the Seattle MSA has only a slightly larger share of the Alaskan groundfish vessels, those dominate the share of groundfish volume (77.6%) and groundfish value (69.8%). The other highly engaged communities had vessels which accounted for 1.61% of total Alaska groundfish revenues in Sitka, 5.21% in Kodiak, 1.47% in Homer, 1.87% in Petersburg, and 5.43% from vessels with owners residing in Other Washington. The regional quotient of harvest revenue in 2023 is fairly similar to those from the 2008-2023 period, with the Seattle MSA losing some of its revenue share which fell to 69.4% (from an average of 69.8%), while the other highly engaged communities increased their share, including: Kodiak (5.07%), Other Washington, (5.33%), Sitka, (2.02%), Homer, (1.61%), and Petersburg (1.48%).

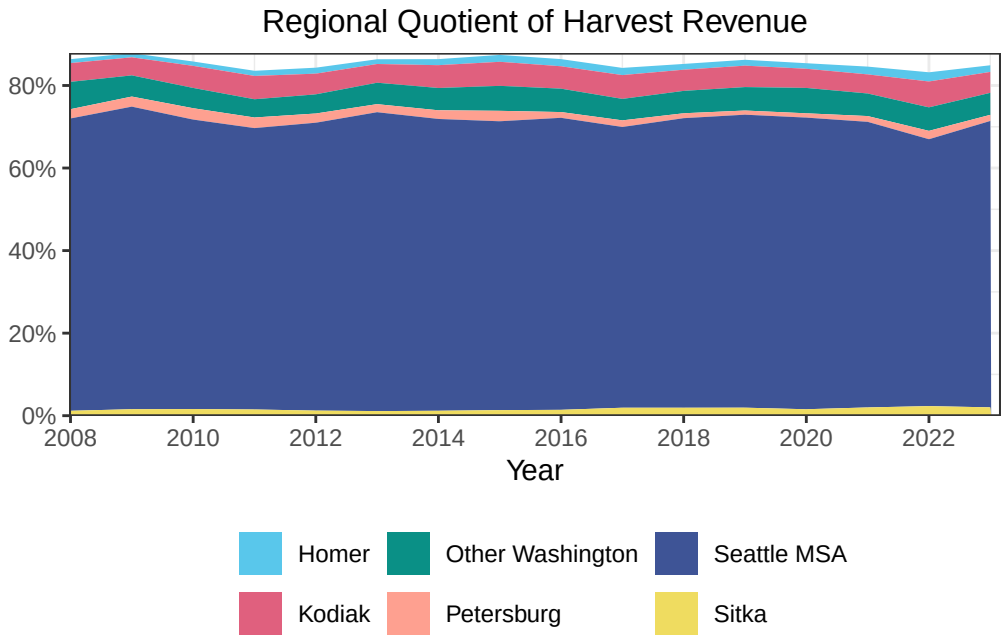


Figure 4.3.: Harvesting regional quotient of revenue for communities highly engaged in commercial harvesting for all years from 2008-2023

4.0.4. Commercial Processing Engagement

The results of the commercial processing engagement PCFA analyses are shown in Table 4.3, which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. Vessel deliveries and landings were used as a proxy metric for processing engagement. The results suggest strong relationships among variables and that a single index based on the first extracted factor explains 76% of the variation in each of the variables in each year. In addition to the goodness of fit statistics of the analyses provided in Table 4.3, each PCFA provides an index score for each of the 63 communities included in the analyses.

The commercial processing engagement index is a relative indicator of community participation compared to the participation of all other communities that process BSAI and Gulf FMP groundfish. Figure 4.4 displays the aggregate annual values of the four variables that make up the processing engagement index for each year to better understand the absolute changes in North Pacific groundfish processing activities that are underlying the relative processing engagement index. As with the harvesting engagement indices, comparing 2023 with their 2018-2022 mean shows that aggregate revenues were down 1.48% with pounds landed declining by 1.88%. These harvests were delivered to 3.12% more processors in 2023 than the average of 2018-2022 and harvested by 6.94% fewer delivering vessels.

Table 4.4 presents index scores for the 6 community groupings that were Highly Engaged (i.e., had an index score above one, which is one standard deviation above the mean of zero) for at least one year from 2008-2023, and these cells are shaded in Table 4.4. Four communities (Akutan, At-Sea Processors, Kodiak, and Unalaska/Dutch Harbor) were highly engaged in commercial processing

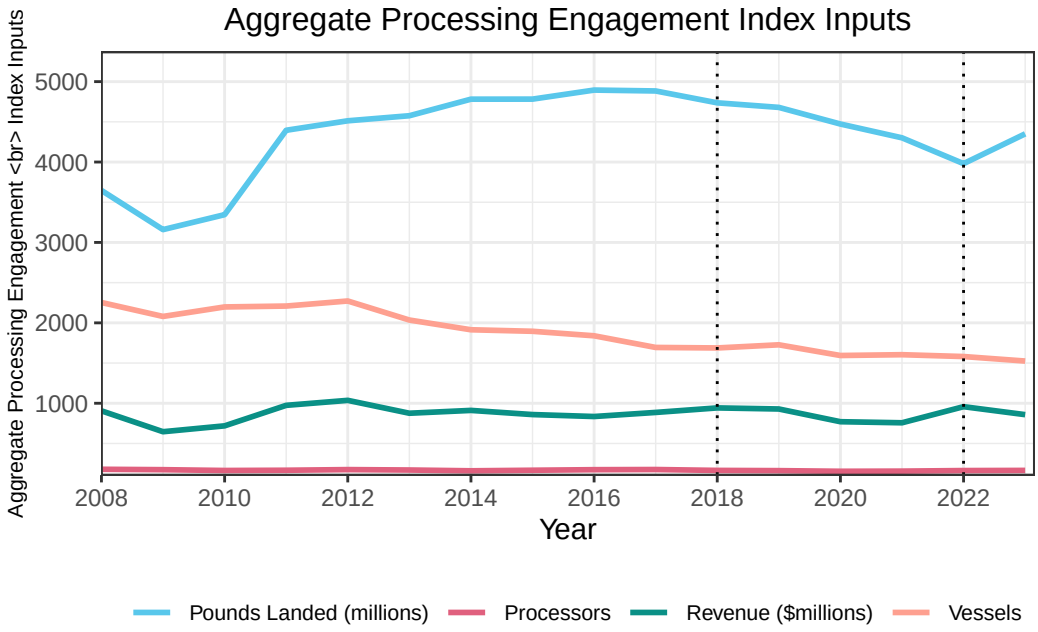


Figure 4.4.: Aggregate annual Groundfish Processing Engagement Index inputs. Dotted lines indicate the previous 5 year period (2018-2022).

Table 4.3.: Commercial processing engagement PCFA results 2008-2023

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value	Pounds landed in community	Number vessels delivering	Number of processors	Percent variance explained	Armor's Theta
2000	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2001	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2002	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2003	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2004	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2005	3.98	0.02	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2006	3.93	0.07	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2007	3.90	0.10	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2008	3.94	0.06	0.00	0.00	0.99	0.99	0.99	0.99	0.99	1.00
2009	3.93	0.07	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2010	3.91	0.09	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2011	3.90	0.10	0.00	0.00	0.99	0.99	0.99	0.98	0.97	0.99
2012	3.88	0.12	0.00	0.00	0.98	0.99	0.99	0.98	0.97	0.99
2013	3.85	0.14	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2014	3.83	0.17	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2015	3.85	0.15	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2016	3.83	0.17	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2017	3.81	0.19	0.00	0.00	0.98	0.98	0.98	0.97	0.95	0.98
2018	3.84	0.15	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2019	3.86	0.14	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2020	3.97	0.02	0.00	0.00	1.00	1.00	1.00	1.00	0.99	1.00
2021	3.98	0.02	0.00	0.00	1.00	1.00	1.00	1.00	0.99	1.00
2022	3.78	0.22	0.00	0.00	0.97	0.97	0.97	0.98	0.94	0.98
2023	3.71	0.29	0.00	0.00	0.96	0.96	0.96	0.96	0.93	0.97

Table 4.4.: Index scores of communities highly engaged in commercial processing of Groundfish 2008 - 2023

Year	Akutan	At-Sea Processor	Unalaska-Dutch Harbor	Homer	Kodiak	Sitka
2008	1.09	9.31	2.38	0.63	1.71	0.85
2009	1.08	9.38	2.17	0.73	1.65	0.80
2010	1.10	9.41	1.94	0.66	1.85	0.76
2011	1.15	9.29	2.28	0.66	1.92	0.82
2012	1.11	9.31	2.25	0.61	1.95	0.77
2013	1.15	9.30	2.28	0.68	1.85	0.79
2014	1.21	9.18	2.51	0.68	2.05	0.83
2015	1.32	9.13	2.48	0.68	2.17	0.78
2016	1.29	9.12	2.49	0.78	2.16	0.71
2017	1.50	9.17	2.21	0.83	1.93	0.82
2018	1.44	9.17	2.44	0.90	1.65	0.83
2019	1.48	9.20	2.37	0.80	1.65	0.85
2020	1.53	9.09	2.66	0.76	1.70	0.90
2021	1.66	9.02	2.57	0.85	1.82	0.88
2022	1.67	8.96	2.36	1.29	2.05	0.80
2023	1.50	8.85	2.60	1.58	2.04	1.10

*Shaded cells are index scores above one (one standard deviation above the mean of zero) for at least one year (2008-2023)

for all 16 years from 2008-2023, as shown in Figure 4.5 . The At-Sea Processor grouping has consistently held the highest engagement scores over time, partially due to the large number of vessels and the allocations of BSAI FMP groundfish species to this sector relative to shore-based communities. Homer became highly engaged in groundfish processing for the first year in 2022 and continued in 2023 while Sitka became highly engaged for the first time in 2023.

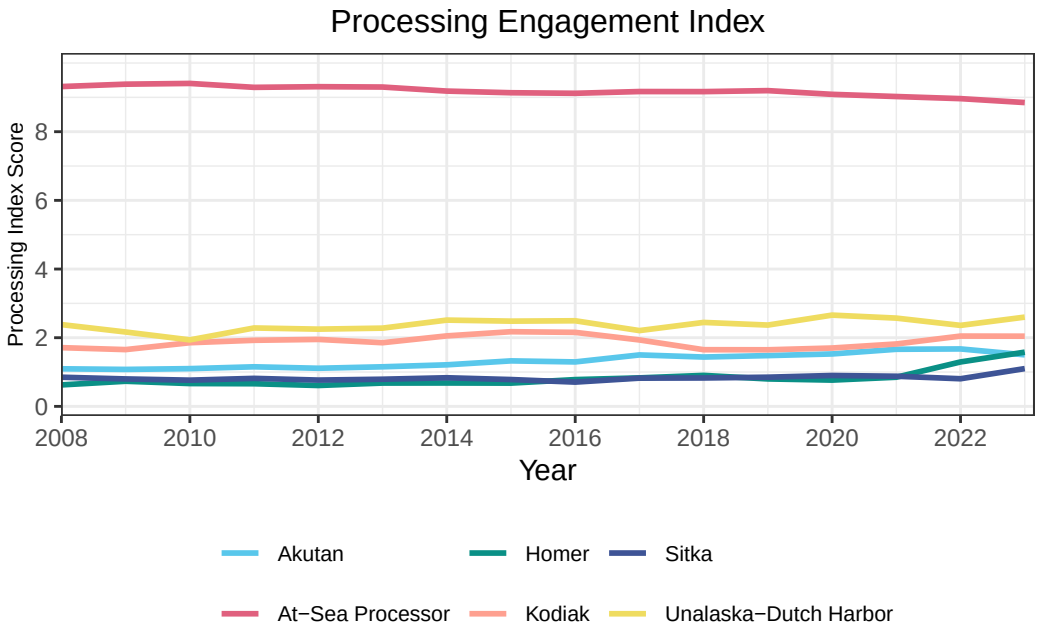


Figure 4.5.: Index scores of communities highly engaged in commercial processing for at least 1 year from 2008-2023

4.0.5. Processing Regional Quotient

Another measure of community participation in commercial FMP groundfish fisheries is its processing regional quotient (RQ), defined as the share of commercial revenues within a community out of the total North Pacific FMP groundfish revenues. The RQ is an indicator of the percentage contribution in that community, relative to the total revenues (including shorebased and at-sea) from all BSAI and Gulf FMP Groundfish landings. Figure 4.6 shows the processing RQ in terms of ex-vessel revenue from 2008-2023.

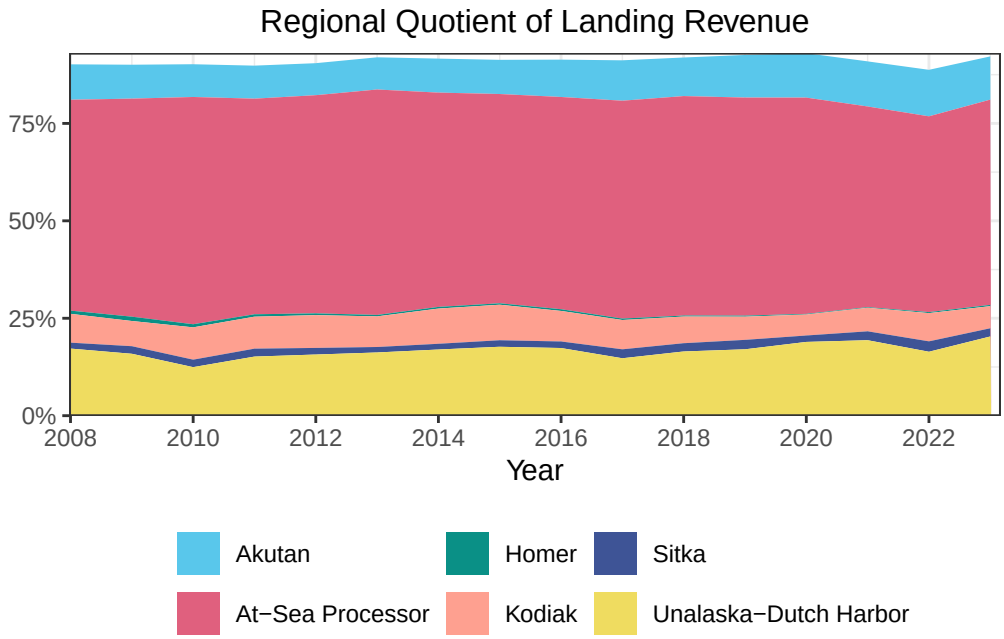


Figure 4.6.: Processing regional quotient of landings revenue for communities highly engaged in commercial processing for all years from 2008-2023

The most prominent community for processing FMP groundfish in terms of landing weight has been the At-Sea Processing grouping, which accounted for approximately 54.6% of FMP groundfish landing exvessel revenues over the period 2008-2023. In terms of shoreside processing, Dutch Harbor/Unalaska had the largest share of landings revenue, averaging 16.6% over the same period. The two other communities highly engaged in FMP groundfish processing for all years are Kodiak and Akutan. Kodiak averaged nearly 7.34% of FMP groundfish landings revenues over this period while Akutan and all other not highly engaged communities averaged 19.1%. Sitka averaged 1.92% of FMP groundfish landings revenues over this period while Homer averaged 0.438%.

Comparing 2023 to the past five years, the share of landings revenue for the at-sea sector has fallen by nearly 1.46% to 52.7% in 2023. Dutch Harbor had a relatively large increase in RQ in 2023 compared with the 2018-2023 period of 17.1% in processing RQ to 20.3% in 2023. Processing RQ in Kodiak fell by 9.82% which results in a processing RQ value in 2023 of 5.68% for Kodiak. Processing RQ in Akutan was relatively flat with a 0.642% change which results in a processing RQ value in 2023 of 22.9% for Akutan and all other non-highly engaged communities. Processing RQ in Homer increased by 46.3% which results in a relatively low processing RQ value in 2023 of 0.324% for Homer. Processing RQ in Sitka had a modest increase with a 5.61% change which results in a processing RQ value in 2023 of 2.1% for Sitka.

4.0.6. Participation Summary for FMP Groundfish Fisheries

Based on the community engagement index scores for both commercial processing and commercial harvesting engagement, communities were categorized into low (index scores below the mean of 0), medium (index scores between 0 and 0.5), medium-high (index scores between 0.50001 and 1), and

Table 4.5.: Number of years by processing engagement level for all commercial fisheries. Alaska communities not listed had low processing and harvesting engagement in all years (2008-2023). Darker shading indicates higher numbers of years at a particular engagement level.

	Harvesting Engagement				Processing Engagement			
	Low	Medium	Medium-High	High	Low	Medium	Medium-High	High
Adak	16	0	0	0	13	3	0	0
Akutan	16	0	0	0	0	0	0	16
All Other States	0	14	2	0	16	0	0	0
Anchorage	0	13	3	0	16	0	0	0
At-Sea Processor	16	0	0	0	0	0	0	16
Cordova	4	12	0	0	0	16	0	0
Craig	0	16	0	0	4	12	0	0
Delta Junction	15	1	0	0	16	0	0	0
Dutch Harbor	16	0	0	0	0	0	0	16
Haines	13	3	0	0	16	0	0	0
Homer	0	0	0	16	0	0	14	2
Hoonah	16	0	0	0	11	5	0	0
Inshore Stationary Floating Processor	16	0	0	0	9	7	0	0
Juneau	0	0	16	0	0	16	0	0
Ketchikan	0	16	0	0	4	12	0	0
King Cove	15	1	0	0	0	15	1	0
Kodiak	0	0	0	16	0	0	0	16
Newport	0	16	0	0	16	0	0	0
Other Oregon	0	14	2	0	16	0	0	0
Other Washington	0	0	0	16	16	0	0	0
Petersburg	0	0	0	16	0	10	6	0
Saint Paul	15	1	0	0	16	0	0	0
Sand Point	0	16	0	0	0	16	0	0
Seattle Msa	0	0	0	16	16	0	0	0
Seward	13	3	0	0	0	6	10	0
Sitka	0	0	0	16	0	0	15	1
Wasilla	4	12	0	0	16	0	0	0
Whittier	16	0	0	0	12	4	0	0
Wrangell	7	9	0	0	10	6	0	0
Yakutat	16	0	0	0	0	16	0	0

high engagement (index scores above 1) for each year. The number of years a community is in each category for the processing and harvesting engagement indices is presented in Table 4.5.

There are 30 communities or community groupings in Table 4.5 that had medium, medium-high, or high engagement in either harvesting or processing engagement and 9 communities were highly engaged in one aspect of commercial fisheries in any year from 2008-2023. There were 6 communities that were highly engaged in processing engagement and 6 that were highly engaged in harvesting engagement for at least one year from 2008-2023 with Homer becoming highly engaged in groundfish processing 2022 and 2023 and Sitka becoming highly engaged in groundfish processing in 2023.

4.0.7. Groundfish Fishery Taxes

Taxes generated by the fishing industry, particularly the fish processing sector, are important revenue sources for communities, boroughs, and the State. There are two main sources of fishery taxes in Alaska: shared taxes administered through the State of Alaska, and municipal fisheries taxes independently established and collected at select municipalities. Fisheries tax revenue across the 8 highly engaged fishing communities in FMP groundfish fisheries is presented in Figure 4.7. This tax data should not stand alone to inform community engagement levels, as the data has many nuances with some communities not reporting taxes in some years, many reporting $0 in given years with no explanation, and with the sales tax including raw fish taxes in some communities, but with the inability to disaggregate. We have noted in figure descriptions when nuances were observed. Furthermore, to improve accuracy in this report and to increase communication and trust-building amongst institutions, this tax data has been reviewed by communities.

4.0.7.1. State Taxes

The fisheries business tax, implemented in 1990, is levied on businesses that process or export fisheries resources from Alaska. Tax rates vary under the fisheries business tax, depending on a variety of factors, including: how well established the fishery is, and whether processing takes place on a shoreside or offshore facility. Although the fisheries business tax is typically administered and collected by the individual boroughs, revenue from the tax is deposited in Alaska's General Fund. According to State statute, each year, the State legislature appropriates 25%-50% of the revenue from the tax to the municipality or borough where processing occurs.

The State of Alaska has collected the fisheries resource landing tax since 1994. This tax is levied on processed fishery resources that were first landed in Alaska, whether they are destined for local consumption or shipment abroad. This tax is collected primarily from catcher-processor and at-sea processor vessels that process fishery resources outside of the State's three-mile management jurisdiction, but within the U.S. Exclusive Economic Zone, and bring their products into Alaska for trans-shipment. Fishery resource landing tax rates vary from 1%-3%, depending on whether the resource is classified as "established" or "developing." According to State statute, all revenue from the Fishery Resource Landing Tax is deposited in the State's General Fund, but half of the revenue is available for sharing with municipalities where fishery resources are landed.

4.0.7.2. Municipal Taxes

In addition to these State taxes, some communities have developed local tax programs related to the fishing industry. These include taxes on raw fish transfers across public docks, fuel transfers, extraterritorial fish, and marine fuel sales, and fees for bulk fuel transfer, boat hauls, harbor usage, port and dock usage, and storing gear on public land. There is no one source for data on these revenue streams; however, most communities self-report in their annual municipal budgets collected by the Alaska Division of Community and Regional Affairs. However, some communities report fish tax revenue as sales tax, which affects the accuracy of municipal tax data reported throughout this document and included in Figure 4.7.

For the Alaska communities identified as highly engaged in commercial harvest or processing of groundfish from 2008-2023, Figure 4.7 shows fishery-related tax revenue from municipal and shared

taxes from 2012-2023. Unalaska consistently brings in the most fishery related tax revenue through the Fishery Business and Fishery Landing taxes and municipal raw fish tax. Unalaska experienced over a $4 million loss of fishery tax revenue from 2016 to 2017, but increased between 2018 and 2020 and between 2021 and 2022, recovering approximately $2 million of that loss. It is worth noting that until 2017, Akutan was entirely dependent on fishery tax income. In 2017, Akutan implemented a 1.5% sales tax, and stopped collecting a municipal raw fish tax. No taxes were reported by Kodiak in 2021.

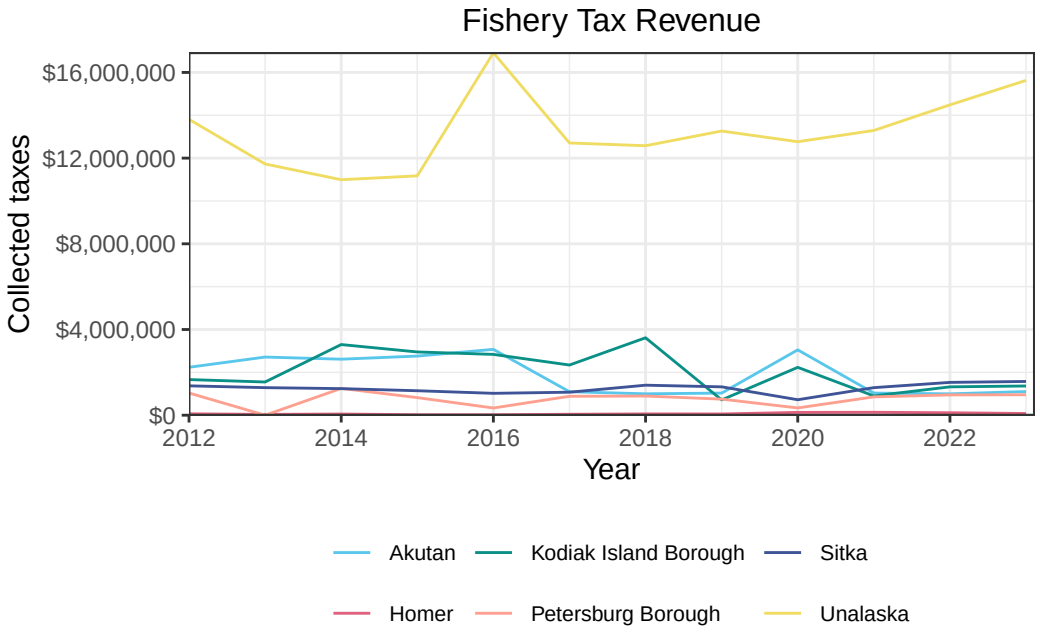


Figure 4.7.: Fishery tax revenue for highly engaged fishing communities in FMP Groundfish Fisheries from 2012-2023. Includes only Alaskan communities; excludes data associated with Seattle MSA, Washington, Oregon, and at-sea landings. Kodiak tax data were not reported in 2021. Kodiak, Sitka, and Petersburg include borough-level tax data.

4.0.8. School Enrollment in Groundfish Communities

Ensuring the productivity and sustainability of fishing communities is a core mandate of Federal fisheries management. One indicator to evaluate community vitality is K-12 public school enrollment. Declining enrollment trends, and particularly school closures, signal the community is in transition and possible social disruption. Public educational institutions offer a space for people to gather and invest in community events and shared wellbeing. Communities with struggling schools are likely also experiencing population outmigration, a declining tax base, and reduced public services. Figure 4.8 presents K-12 public school enrollment numbers for the six highly engaged groundfish communities within Alaska (including those in the harvesting or processing sector).

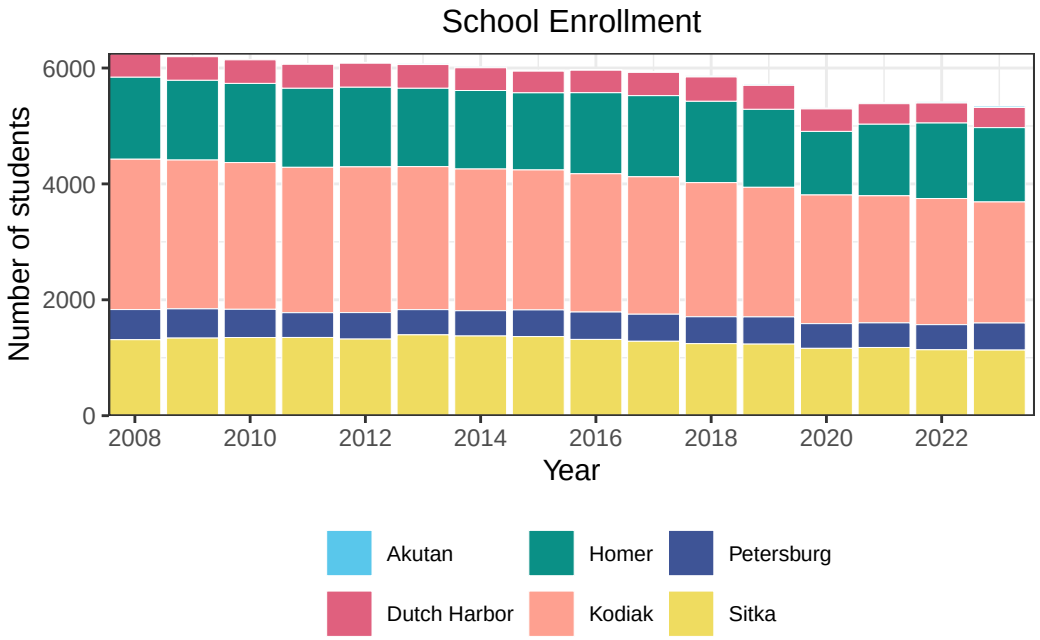


Figure 4.8.: Highly engaged FMP groundfish communities (either harvesting or processing) K-12 public school student enrollment from 2008-2023

Overall, from 2008-2023, there has been a decline of 912 students (down 14.6% in total enrollment) for Akutan, Homer, Kodiak (Kodiak Island Borough), Petersburg, Sitka, and Unalaska combined. Akutan school district experienced a 243% growth in enrollment over this period, though it should be noted that Akutan has very low student enrollment numbers, with a maximum of 24 students in any year from from 2008 to 2023. All other communities have seen declines in school enrollment from 2008 to 2023, with percentage declines ranging from 10% in Homer and Petersburg to 14% in Unalaska and Sitka and 19% for Kodiak Island Borough.

The sharpest decline in enrollment occurred in 2020, due to the COVID-19 pandemic. Over all communities, enrollment declined 7%, with Homer seeing the largest percentage decline (18.5%). While there has been some recovery of enrolled students since 2020, the overall trend since 2008 has been of steadily declining enrollment.

5. Community Participation in North Pacific Crab Fisheries

5.0.1. Alaska Commercial Crab Fisheries

Ten species of crabs are caught in Alaskan crab fisheries, and seven of these have commercial importance: red king crab, *Paralithodes camtschaticus*; blue king crab, P. platypus; golden king crab, *Lithodes aequispinus*; Tanner crab, *Chionoecetes bairdi*; snow crab, *C. opilio*; hair crab, *Erimacrus isenbeckii;* and Dungeness crab, *Cancer magister.* The three minor species, scarlet king crab, *L. couesi;* grooved Tanner crab, *C. tanneri;* and Triangle Tanner crab, *C. angulatus*, are landed mostly as incidental catch in other crab fisheries. In addition to commercial fisheries, subsistence and personal use fisheries support local food security and cultural cohesion.

The Bering Sea/Aleutian Islands (BSAI) king and Tanner crab fisheries are co-managed by the State of Alaska, NMFS, and NPFMC. In 2023, the FMP BSAI crab fisheries (including the non-rationalized Norton Sound red king crab fishery) had an active fleet of 78 harvesting vessels and landed and processed at 14 processing facilities throughout the region.[1] Commercial crab fisheries blossomed in the 1950s with the market of king crab fisheries in the Bering Sea, but today many of the stocks are in a depressed state. The declines in Bering Sea crab fisheries and the subsequent closures drastically affected fishermen as well as the social, cultural, and economic well being of fishing communities, including economic dependence, social networks, food security, and identity.[2]

In 2021 and 2022, several crab stocks experienced unprecedented declines, resulting in closures and drops in total allowable catch (TAC) for a suite of crab fisheries. In 2020, ADFG announced

[1]Garber-Yonts, B., A. Abelman, R. Dame, S. Kasperski, and J. Lee. 2024. *Stock assessment and fishery evaluation report for the king and Tanner crab fisheries of the Bering Sea/Aleutian Islands area: Economic status of the BSAI king and tanner crab fisheries off Alaska, 2023.* Anchorage, AK: North Pacific Fishery Management Council. Retrieved from https://www.npfmc.org/wp content/PDFdocuments/resources/SAFE/CrabSAFE/CrabEconSAFE.pdf

[2]Ritzman, J., Brodbeck, A., Brostrom, S., McGrew, S., Dreyer, S., Klinger, T., & Moore, S. K. (2018). Economic and sociocultural impacts of fisheries closures in two fishing-dependent communities following the massive 2015 U.S. West Coast harmful algal bloom. *Harmful Algae, 80*, 35-45. https://doi.org/10.1016/j.hal.2018.09.002

a closure of the summer commercial Norton Sound Red King Crab (NSRKC) fishery due to historical record declines. To support rebuilding efforts, The Norton Sound Economic Development Corporation ceased buying NSRKC through 2023.

In January 2023, The Department of Commerce announced **federal fishery disasters for the following harvests:**

- 2020/2021 Alaska Norton Sound Red King Crab Fisheries
- 2021/2022 Alaska Bristol Bay Red King Crab and Bering Sea Snow Crab Fisheries
- 2022/2023 Alaska Bristol Bay Red King Crab and Bering Sea Snow Crab Fisheries

Cancellations of the 2022/2023 Bering Sea snow crab, the 2022/2023 Bristol Bay red king crab, and the 2021/2022 Bristol Bay red king crab harvests have caused an estimated $287.7 million in economic losses for fisheries.

Evidence indicates that snow crab and red king crab declines are related to climate change. The crash of the Bering Sea snow crab stock was affected by the 2019 heat wave in the North Pacific. Marine heat waves have been attributed to climate change.[3] Ongoing research into the social and economic effects of declining fisheries can inform adaptation strategies for future climate risks and decision-making and climate-ready fisheries.[4]

5.0.2. Commercial Crab Harvesting Engagement

Performance metrics of community participation in BSAI King and Tanner crab FMP fisheries for calendar years 2000-2023 were created with data collected from 40 communities or community groupings throughout the U.S. that had either some commercial FMP crab fisheries landings or residents who owned vessels used in commercial FMP crab fishing during this time period. Of these 40 communities, only 15 had any FMP crab landings in their community while 36 had a resident who owned a vessel that participated in FMP crab fisheries. All 40 communities were included in both the crab harvesting and processing engagement indices.

Figure 5.1 shows the aggregate annual values of the four variables that make up the harvesting engagement index for each year to better understand the absolute changes in North Pacific crab harvesting activities that are underlying the relative harvesting engagement index. Aggregate revenues in calendar year 2023(during which the Bering Sea Snow crab fishery was closed) were down 47% compared with the 2018-2022 baseline period average but were up 7.66% compared with 2022. In 2023, landings were also down 68.3% from the 2018-2022 baseline period average and 1.71% compared with 2022. The number of vessels harvesting FMP crab also decreased in 2023 by 15.8% compared with the 2018-2022 baseline period average and decreased by -13.7% compared with 2022. Crab vessel owners show a similar pattern to active vessels with 17.67554% fewer vessel owners compared with the average of the 2018-2022 baseline period and -15% fewer owners compared with 2022.

[3] Reiley, L. (2022, August 21). Alaska's snow crabs have disappeared. Where they went is a mystery. *The Washington Post*. https://www.washingtonpost.com/business/2022/08/21/alaska-crab-climate/

[4] White, C. (22, November 18). Difficult future ahead for Alaska's crab industry. *SeafoodSource*. https://www.seafoodsource.com/news/supply-trade/difficult-future-ahead-for-alaska-s-crab-industry

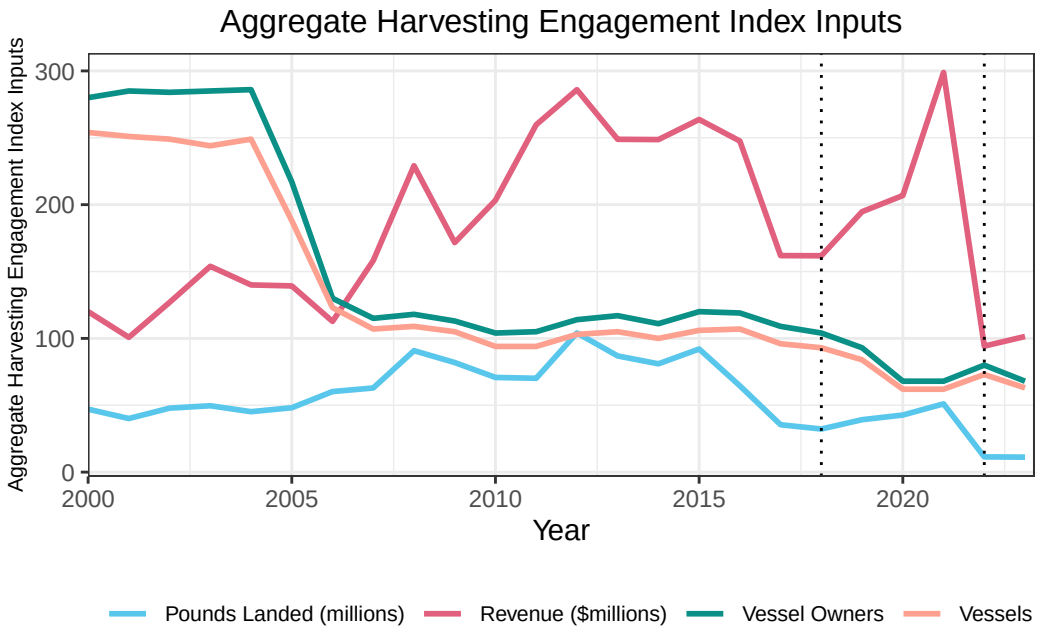


Figure 5.1.: Aggregate annual Crab Harvesting Engagement Index inputs. Dotted lines indicate the previous 5 year period (2018 - 2022)

The results of the commercial harvesting engagement PCFA analyses are shown in Table 5.1 which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient for all variables. The results suggest very strong relationships among variables, and that a single index based on the first extracted factor explains over 93% of the variation in each of the variables in each year. In addition to the goodness of fit statistics of the analyses provided in Table 5.1 , each PCFA provides an index score for each of 40 communities included in the analysis. Table 5.2 presents these index scores for the 4 communities identified as highly engaged in BSAI FMP crab harvesting for at least one year between 2000 and 2023.

The harvesting engagement index is a relative indicator of community participation compared to the participation of all other communities that harvest FMP crab in Alaska. It is a measure of the presence of commercial crab fishing through residents who own commercial fishing vessels: this includes pounds landed by vessel, revenue, the number of vessel owners, and the total number of owners in a community.

Table 5.2 presents the index scores for the communities that emerged as Highly Engaged in harvesting FMP crab (index score above one, which is one standard deviation above the mean of zero) for at least one year (2000-2023). Of the groupings listed in Table 5.2, Seattle MSA is the only community grouping emerging as Highly Engaged in commercial crab harvesting for all years (see Figure 5.2).

Seattle MSA, which consists of Seattle and surrounding satellites and suburbs, has the highest degree of engagement over time, with consistent index scores well above 5.0 in all years from 2000-2023. Historically, Kodiak had high engagement scores, but since 2010 has had engagement scores below the threshold of 1.0. The relative decrease in engagement indices suggests fluctuations in U.S. crab fisheries participation. Anchorage's index scores rose from 2000 onward, peaking in 2015

Table 5.1.: Commercial harvesting engagement PCFA results 2008-2023

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value from vessel owners	Pounds landed by vessel owners	Total # fishing vessels	Total # of unique vessels owners	Percent variance explained	Armor's Theta
2000	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2001	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2002	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2003	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2004	3.99	0.01	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2005	3.98	0.02	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
2006	3.93	0.07	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2007	3.90	0.10	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2008	3.94	0.06	0.00	0.00	0.99	0.99	0.99	0.99	0.99	1.00
2009	3.93	0.07	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2010	3.91	0.09	0.00	0.00	0.99	0.99	0.99	0.99	0.98	0.99
2011	3.90	0.10	0.00	0.00	0.99	0.99	0.99	0.98	0.97	0.99
2012	3.88	0.12	0.00	0.00	0.98	0.99	0.99	0.98	0.97	0.99
2013	3.85	0.14	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2014	3.83	0.17	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2015	3.85	0.15	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2016	3.83	0.17	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2017	3.81	0.19	0.00	0.00	0.98	0.98	0.98	0.97	0.95	0.98
2018	3.84	0.15	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2019	3.86	0.14	0.00	0.00	0.98	0.98	0.98	0.98	0.96	0.99
2020	3.97	0.02	0.00	0.00	1.00	1.00	1.00	1.00	0.99	1.00
2021	3.98	0.02	0.00	0.00	1.00	1.00	1.00	1.00	0.99	1.00
2022	3.78	0.22	0.00	0.00	0.97	0.97	0.97	0.98	0.94	0.98
2023	3.71	0.29	0.00	0.00	0.96	0.96	0.96	0.96	0.93	0.97

Table 5.2.: Index scores of communities highly engaged in commercial harvest of Crab for at least 1 year 2000 - 2023

Year	Anchorage	Kodiak	Nome	Seattle MSA
2000	-0.03	1.40	-0.17	5.89
2001	0.03	1.30	-0.10	5.92
2002	0.04	1.15	-0.06	5.95
2003	0.03	0.94	-0.11	5.98
2004	0.04	1.01	-0.09	5.96
2005	0.13	0.86	0.09	6.01
2006	0.17	0.94	0.41	5.97
2007	0.78	0.94	0.45	5.88
2008	0.86	1.12	0.28	5.86
2009	0.64	1.09	0.38	5.90
2010	0.97	0.81	0.61	5.86
2011	0.85	0.81	0.63	5.87
2012	0.96	0.87	0.69	5.83
2013	1.17	0.80	0.73	5.76
2014	1.21	0.77	0.79	5.74
2015	1.24	0.72	0.67	5.76
2016	0.69	0.66	0.84	5.87
2017	0.62	0.65	0.94	5.86
2018	0.68	0.54	0.83	5.91
2019	0.63	0.57	0.74	5.93
2020	0.63	0.69	-0.26	6.00
2021	0.92	0.66	-0.27	5.95
2022	0.92	0.27	1.03	5.81
2023	0.61	0.14	1.33	5.81

*Shaded cells are index scores above one (one standard deviation above the mean of zero) for at least one year (2008-2023)

above 1.0. Since 2016, however, Anchorage's engagement score has remained below the threshold of 1.0. Nome for the first time was a highly engaged crab FMP harvesting community in 2022, with an index score of 1.03 which increased in 2023to 1.33. Between 2022 and 2023, the Seattle MSA's index scores remained roughly flat while Anchorage's decreased by 33.2%, a larger decline in Kodiak of 47.6%, while Nome's index score increased by 28.8%.

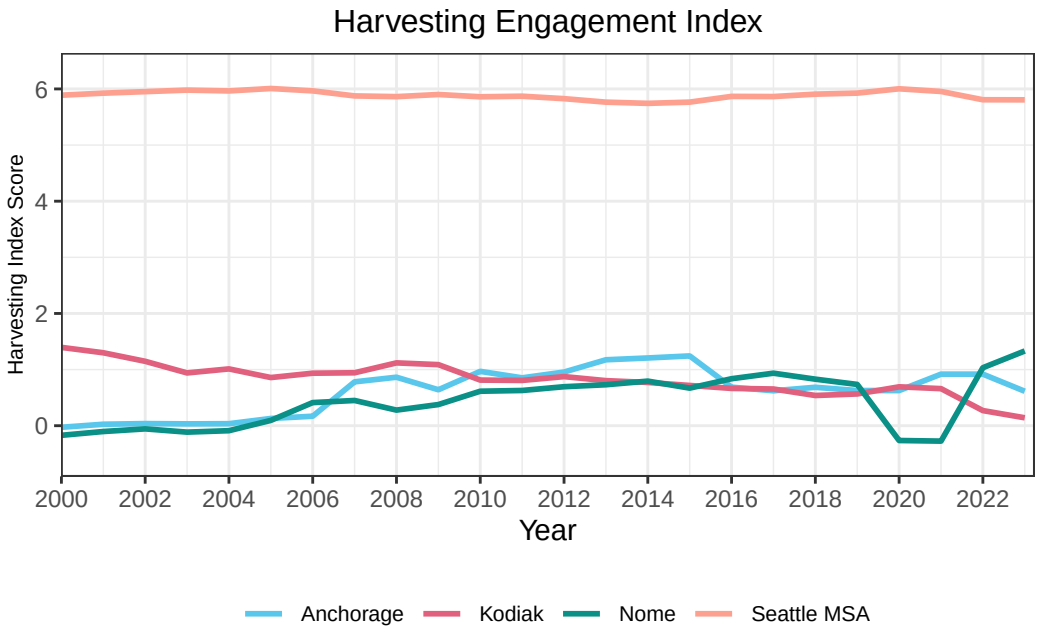


Figure 5.2.: Index scores of communities highly engaged in commercial harvest for at least 1 year from 2000-2023. Dotted lines indicate the previous 5 year period (2018 - 2022)

5.0.3. Harvesting Regional Quotient

The Regional Quotient (RQ) of commercial crab harvesting was calculated using vessel owner residency for those vessels participating in BSAI FMP crab fisheries to better understand where revenues from crab harvesting enters local economies. This metric is based on residency of vessel owners with vessels that are active in the fisheries. It is assumed that some portion of revenue

gained from participation in the FMP crab fisheries is spent and circulated in the local economy through direct and indirect purchases of goods and services. The harvesting RQ is an indicator of the percentage of revenue from FMP crab from resident vessel owners in a community relative the total (shore-based and at-sea) revenue across all BSAI crab FMP fisheries.

Figure 5.3 shows the harvesting RQ for BSAI FMP crab revenue from 2000-2023. The Seattle MSA has had the largest share of crab harvesting vessel owners, which had a value-weighted mean of 58.7% over the 2000-2023 period, followed by Anchorage, Kodiak, and Nome at 10.8%, 9.07%, and 0.484%, respectively. However, Kodiak's share has fallen over time from a high of 15.6% in 2000 to a new low of 2.26% in 2023. Anchorage's share of crab revenue attributable to vessels owned by residents has increased from 2.52% in 2000 to a peak of 16.2% in 2015 and was 8.87% in 2023. While low on average for the entire time period, Nome's share of crab revenue reached a peak of % in 2022 and was % in 2023.

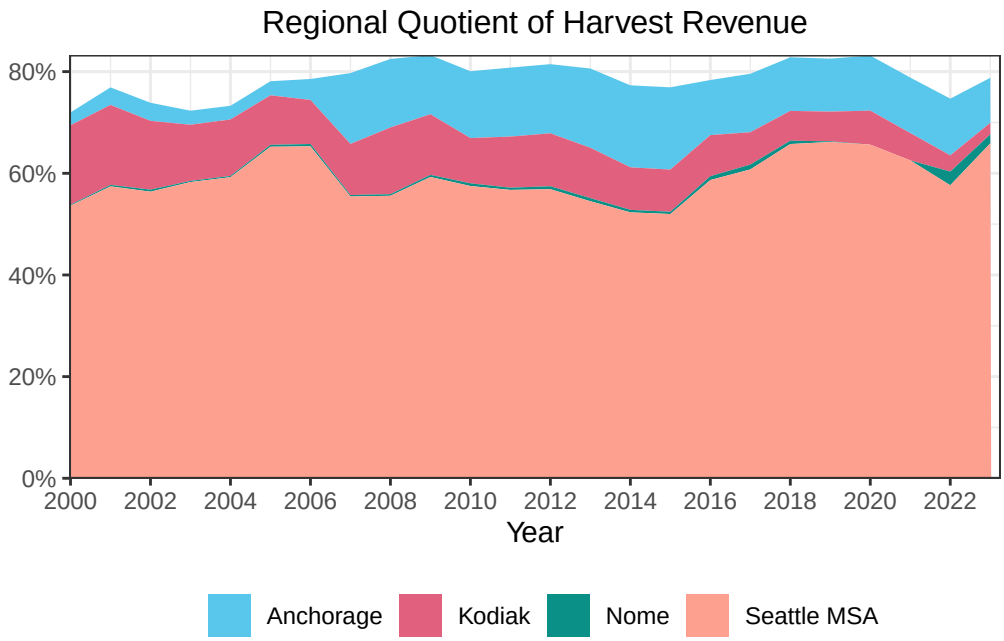


Figure 5.3.: Harvesting regional quotient of revenue for communities highly engaged in commercial harvesting for any year from 2000-2023

Crew on crab fishing vessels also constitute an important component of crab fishery participants. The distribution of the primary residence of crew participating in Crab Rationalization Program fisheries across highly engaged communities is shown in Figure 5.4 .The share of crew from highly engaged communities averaged 50% over the entire post-Crab Rationalization Period, 2006-2023, but their share has fallen from a high of 56% in 2007 to 45% in 2023, with a notable low of 30% in 2020. It is likely the travel restrictions implemented during the Covid-19 pandemic accounted for most of the difference. Crew from Alaska communities reached a peak in 2020 at 41% while Oregon and Washington had their lowest crew participation rates at 4.3% and 30%, respectively. Participation rates in 2023 were similar at 34% for Alaska, 12% for Oregon, and 30% for Washington.

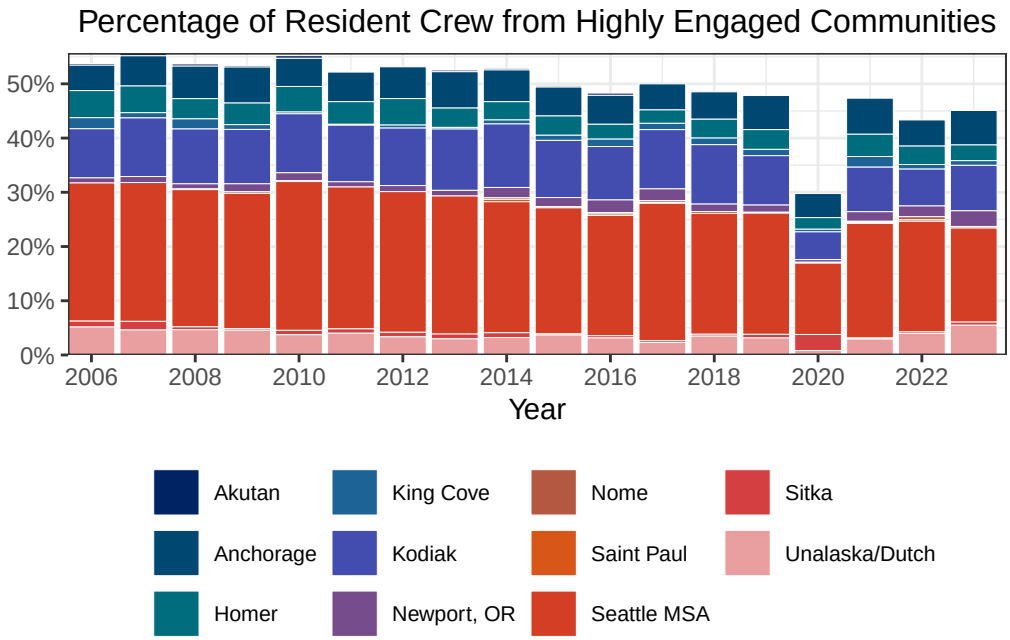


Figure 5.4.: Percentage of crew by residence for top communities participating in crab harvest from rationalized crab fisheres in the BSAI, 2006-2023

5.0.4. Commercial Crab Processing Engagement

The results of the commercial processing engagement PCFA analyses are shown in Table 5.3, which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient (Armor, 1974) for all of the variables included in each PCFA. The results suggest very strong relationships among variables and that a single index based on the first extracted factor explains over 82% of the variation in each of the variables in each year. In addition to the goodness of fit statistics of the analyses provided in Table 5.3, each PCFA provides an index score for each of the communities included in the analyses.

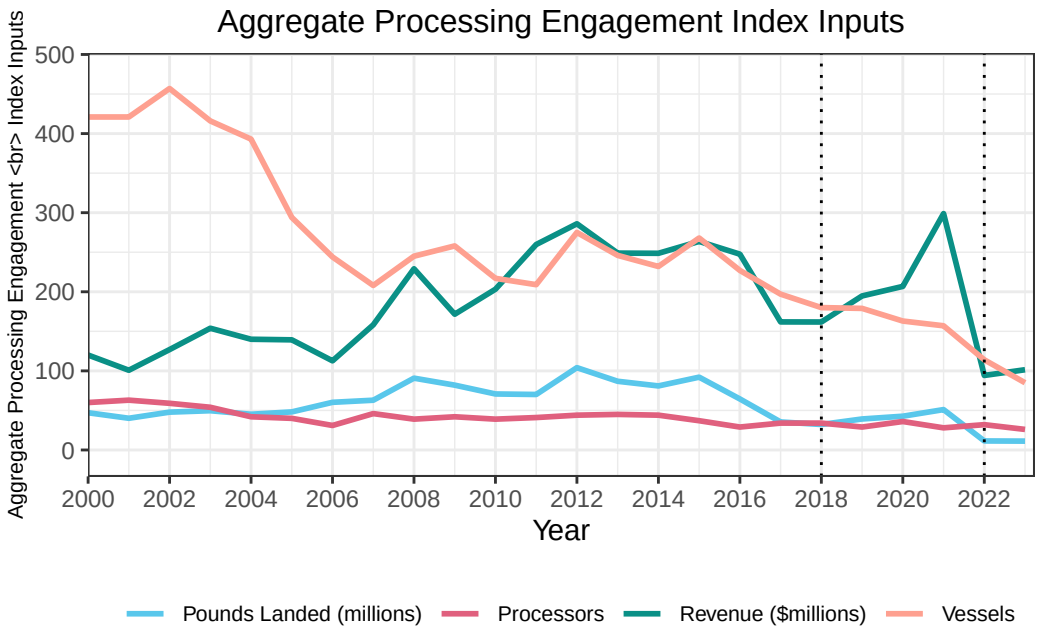


Figure 5.5.: Aggregate annual Crab Processing Engagement Index inputs. Dotted lines indicate the previous 5 year period (2018 - 2022)

These index scores are presented in Table 5.4 for the 6 communities or groupings that were highly engaged (index score above one, which is one standard deviation above the mean of zero) for at least one year from 2000-2023. Cells indicating high engagement are shaded in Table 5.4. The index is a relative indicator of community participation compared to the participation of all other communities that process BSAI FMP crab.

To better understand the absolute changes in BSAI FMP crab processing over time, Figure 5.5 displays the aggregate annual values of the four variables that make up the processing engagement index for each year. Aggregate revenues and pounds landed were both down 47% and 68.3%, respectively, in 2023 compared with their 2018-2022 average. Similarly, the number of active crab vessels and crab vessel owners were both down 46.4% and 18.2%, respectively, in 2023 compared with their 2018-2022 average.

Of the 6 communities found in Table 5.4, only Unalaska/Dutch Harbor was highly engaged in commercial crab processing for all years from 2000-2023. St. Paul was highly engaged for all years post-rationalization (2005) through 2022 (excluding 2007, the year it was frozen in and deliveries were made to floating processors) but with the ongoing closure of the Bering Sea snow crab, St. Paul's high engagement score in fell from a record high in 2021 of 3.9 to a new low of -0.26 in 2023. As the sole processing plant in St. Paul primarily focuses on snow crab, the declines in that fishery are having large impacts on municipal and local fisher revenues. Other communities that were highly engaged for some portion of the time period include Akutan (highly engaged in 2022 but not in 2021 or 2023), Nome (highly engaged in 2022 and 2023), At-Sea Processors (not highly engaged since 2015), and King Cove which was only highly engaged in 3 total years: 2005, 2006, and 2016. The At-Sea processing sector scored as highly engaged fairly consistently until 2015 when it declined to just above zero for the past 8 years. Consistently Unalaska/Dutch Harbor has held the highest engagement scores over time, followed by Saint Paul. Processing engagement

Table 5.3.: Commercial processing engagement PCFA results 2000-2023

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Ex-vessel value	Pounds landed in community	Number vessels delivering	Number of processors	Percent variance explained	Armor's Theta
2000	3.47	0.50	0.02	0.01	0.98	0.97	0.99	0.76	0.87	0.95
2001	3.28	0.66	0.04	0.02	0.97	0.96	0.99	0.66	0.82	0.93
2002	3.39	0.55	0.03	0.02	0.97	0.95	0.99	0.76	0.85	0.94
2003	3.51	0.46	0.02	0.01	0.98	0.97	0.99	0.80	0.88	0.95
2004	3.58	0.39	0.03	0.01	0.98	0.97	0.99	0.84	0.90	0.96
2005	3.53	0.42	0.05	0.01	0.98	0.96	0.98	0.82	0.88	0.96
2006	3.67	0.20	0.11	0.02	0.98	0.97	0.96	0.92	0.92	0.97
2007	3.55	0.41	0.03	0.01	0.97	0.94	0.98	0.87	0.89	0.96
2008	3.56	0.36	0.07	0.01	0.98	0.95	0.98	0.86	0.89	0.96
2009	3.72	0.21	0.06	0.02	0.98	0.97	0.98	0.93	0.93	0.97
2010	3.58	0.35	0.06	0.02	0.97	0.94	0.98	0.89	0.89	0.96
2011	3.74	0.17	0.08	0.01	0.98	0.97	0.97	0.95	0.94	0.98
2012	3.74	0.22	0.03	0.01	0.98	0.97	0.99	0.93	0.93	0.98
2013	3.61	0.34	0.04	0.01	0.96	0.97	0.98	0.89	0.90	0.96
2014	3.55	0.39	0.05	0.01	0.96	0.95	0.97	0.88	0.89	0.96
2015	3.67	0.31	0.02	0.01	0.97	0.95	0.98	0.93	0.92	0.97
2016	3.77	0.18	0.04	0.01	0.98	0.97	0.96	0.97	0.94	0.98
2017	3.60	0.29	0.09	0.02	0.97	0.94	0.94	0.94	0.90	0.96
2018	3.56	0.36	0.07	0.01	0.96	0.94	0.95	0.92	0.89	0.96
2019	3.75	0.17	0.07	0.01	0.98	0.97	0.96	0.96	0.94	0.98
2020	3.77	0.16	0.06	0.01	0.99	0.99	0.96	0.94	0.94	0.98
2021	3.84	0.12	0.04	0.01	0.98	0.99	0.98	0.96	0.96	0.99
2022	3.52	0.44	0.04	0.00	0.95	0.94	0.93	0.94	0.88	0.95
2023	3.58	0.39	0.03	0.00	0.95	0.95	0.94	0.95	0.89	0.96

Table 5.4.: Index scores of communities highly engaged in commercial processing of Crab for at least one year from 2000 - 2023

Year	Akutan	At-Sea Processor	Unalaska-Dutch Harbor	King Cove	Nome	Saint Paul
2000	0.79	3.70	4.28	0.60	0.61	0.82
2001	0.53	3.26	4.56	0.45	0.89	1.27
2002	0.54	3.24	4.52	0.59	0.86	1.39
2003	0.57	3.15	4.72	0.74	0.81	0.98
2004	0.71	3.51	4.51	0.67	0.44	0.93
2005	0.62	2.77	4.92	1.03	0.57	1.15
2006	1.08	2.55	4.77	1.11	0.53	1.53
2007	1.11	3.11	4.75	0.60	0.95	0.04
2008	1.36	0.98	4.54	0.82	0.64	3.14
2009	0.86	2.41	4.21	0.79	0.66	3.01
2010	1.11	2.59	4.17	0.91	0.90	2.60
2011	1.66	2.16	4.01	0.65	0.78	3.09
2012	1.96	1.81	3.88	0.62	0.85	3.29
2013	1.71	1.24	4.02	0.69	1.17	3.40
2014	1.90	1.10	4.13	0.72	1.35	3.17
2015	2.51	1.12	4.13	0.85	1.10	2.78
2016	2.13	0.13	4.38	1.07	0.79	3.04
2017	2.06	0.08	4.51	0.79	1.16	2.81
2018	2.06	0.06	4.40	0.73	1.45	2.90
2019	1.93	0.14	4.25	0.70	0.64	3.47
2020	1.89	0.42	4.47	0.65	-0.21	3.33
2021	0.83	0.18	4.40	0.97	0.08	3.85
2022	1.35	0.09	5.09	0.53	1.86	2.00
2023	0.57	0.39	5.72	0.45	1.81	-0.26

*Shaded cells are index scores above one (one standard deviation above the mean of zero) for at least one year (2008-2023)

indices in Akutan increased, reaching a peak in 2015. Although below the threshold of 1.0 from 2000 - 2012, Nome's relative engagement indices have steadily increased over time with a dips in 2016, and 2019-2021 but is back in the highly engaged processing category again for 2022 and 2023. Index scores of communities highly engaged for at least one year from 2000-2023 are shown in Figure 5.6.

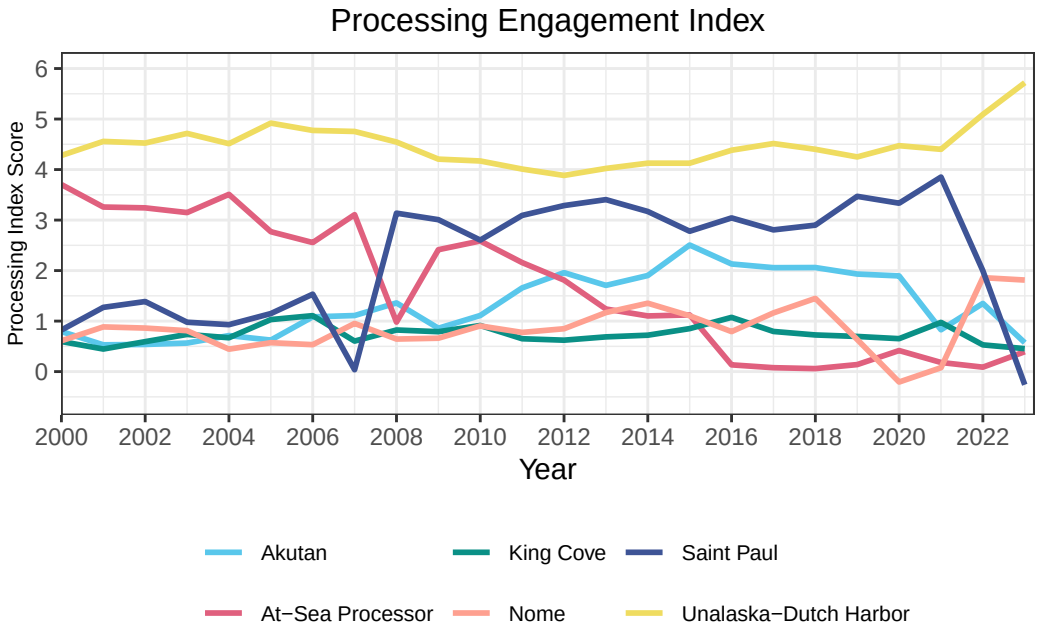


Figure 5.6.: Index scores of communities highly engaged in commercial processing for at least 1 year from 2000-2023

5.0.5. Processing Regional Quotient

The crab processing regional quotient (RQ) is defined as the share of commercial revenues within a community out of the total BSAI FMP crab revenues. The RQ is an indicator of the percentage contribution in that community relative to the total revenues (including shore-based and at-sea) from all communities. Figure 5.7 shows the BSAI FMP crab processing RQ for revenue from 2000-2023. The most prominent community for processing FMP crab in terms of landing weight and revenue in 2023was Unalaska/Dutch Harbor, which accounted for 44.9% of FMP crab ex-vessel revenue, but that reached a new high in 2023 at 83.5.

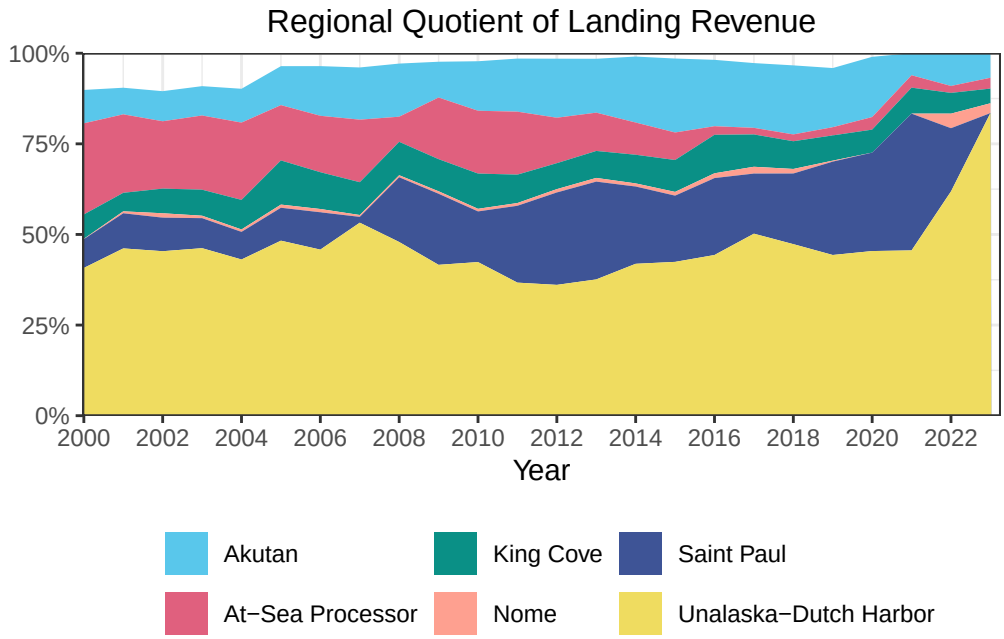


Figure 5.7.: Processing regional quotient of landings revenue for communities highly engaged in commercial crab processing for at least one year from 2000-2023

5.0.6. Participation Summary for FMP Crab Fisheries

Based on the community engagement index scores for both commercial processing and harvesting engagement in the North Pacific crab FMP fisheries, communities were categorized into low (index scores below the mean of 0), medium (index scores between 0 and 0.5), medium-high (index scores between 0.50001 and 1), and high engagement (index scores above 1) for each year. The number of years a community is in each category for the processing and harvesting engagement indices is presented in Table 5.5. There are 20 communities or community groupings in Table 5.5 that had medium, medium-high, or high engagement in either harvesting or processing engagement and 9 communities were highly engaged in one aspect of FMP crab fisheries in any year from 2008-2023. There were 6 communities that were highly engaged in processing engagement and 4 that were highly engaged in harvesting engagement for at least one year from 2008-2023. For 2023, the Seattle MSA continues to dominate the crab harvesting engagement index while Dutch Harbor has increased it's already large crab processing engagement index as a result of the closure of the Bering Sea snow crab fishery and associated landings in St. Paul.

5.0.7. Crab Fishery Taxes

Taxes generated by fisheries, are important revenue sources for communities, boroughs, and the State. There are two main sources of fishery taxes in Alaska: shared taxes administered through the State of Alaska, and municipal fisheries taxes independently established and collected at select municipalities.

Table 5.5.: Number of years by processing engagement level for all commercial fisheries. Alaska communities not listed had low FMP crab processing and harvesting engagement in all years (2000-2023). Darker shading indicates higher numbers of years at a particular engagement level.

	Harvesting Engagement				Processing Engagement			
	Low	Medium	Medium-High	High	Low	Medium	Medium-High	High
Adak	24	0	0	0	14	10	0	0
Akutan	24	0	0	0	0	0	9	15
All Other States	22	2	0	0	24	0	0	0
Anchorage	1	6	14	3	24	0	0	0
At-Sea Processor	24	0	0	0	0	8	1	15
Dutch Harbor	24	0	0	0	0	0	0	24
Golovin	22	2	0	0	24	0	0	0
Homer	6	18	0	0	24	0	0	0
Hood River	15	9	0	0	24	0	0	0
King Cove	24	0	0	0	0	2	19	3
Kodiak	0	2	16	6	5	16	3	0
Lincoln	0	24	0	0	24	0	0	0
Nome	7	5	10	2	1	2	14	7
Other Oregon	2	22	0	0	24	0	0	0
Other Washington	3	21	0	0	24	0	0	0
Saint Paul	24	0	0	0	1	1	3	19
Seattle Msa	0	0	0	24	24	0	0	0
Shaktoolik	17	7	0	0	24	0	0	0
Unalakleet	12	11	1	0	22	2	0	0
Wasilla	21	3	0	0	24	0	0	0

5.0.7.1. State Taxes

The fisheries business tax, implemented in 1990, is levied on businesses that process or export fisheries resources from Alaska. Tax rates vary between 1%- 35 under the fisheries business tax, depending on a variety of factors, including: level of establishment, and whether processing occurs shoreside or offshore. Although the fisheries business tax is typically administered and collected by individual boroughs, revenue from the tax is deposited in Alaska's General Fund; then the State legislature appropriates 25%-50% of the tax revenue back to the municipality or borough. This tax is levied on processed fishery This tax is levied on processed fishery resources— primarily from catcher-processors and at-sea processors that bring their products into Alaska for trans-shipment— whether they are destined for local national consumption or shipment abroad.

5.0.7.2. Municipal Taxes

Some communities also collect local taxes related to the fishing industry. These include taxes on raw fish transfers across public docks, fuel transfers, extraterritorial fish, and marine fuel sales, and fees for bulk fuel transfer, boat haulouts, harbor usage, port and dock usage, and storing gear on public land. There is no one source for data on these revenue streams; however, most communities self-report in annual municipal budgets collected by the Alaska Division of Community and Regional Affairs. Notably, some communities report fish tax revenue as sales tax, which affects the accuracy of municipal tax data reported throughout this document. Tax data can contribute to the understanding of fisheries benefits to communities, but should be considered carefully given the inconsistencies variations in reporting. Because the fisheries taxes are managed by various municipal bodies (e.g., the community, state, borough, harbor, or municipality) , there are variations in the timing and of recording of tax data, as well as which communities collect raw fish tax. These nuances render the data inadequate for time series or direct comparisons of communities or regions. Despite these challenges, these data can provide a general overview of some quantifiable fisheries benefit to communities. Figure descriptions include specific nuances within the dataset, but it should be noted that this analysis is a preliminary approach and work continues with communities to improve accuracy.

For the Alaska communities identified as highly engaged in commercial harvest or processing of crab from 2000-2023, Figure 5.8 shows fishery-related tax revenue from municipal and shared taxes from 2012-2023. Unalaska consistently brings in the most fishery related tax revenue through the Fishery Business and Fishery Landing taxes and municipal raw fish tax. Unalaska experienced over a $4 million loss of fishery tax revenue from 2016 to 2017, but increased between 2018 and 2020 and between 2021 and 2022, recovering approximately $2 million of that loss. Akutan was entirely dependent on fishery tax revenue until 2017, when the community implemented a 1.5% sales tax, and ceased the municipal raw fish tax. Saint Paul did not report a raw fish tax in 2013 or 2015.

5.0.8. School Enrollment in Crab Communities

School enrollment trends can provide information on community wellbeing. Public schools offer a space for people to gather and participate in community events and shared wellbeing, particularly in rural areas with limited infrastructure. Schools provide public resources such as libraries, internet access, and other facilities that benefit the greater community. Schools with declining

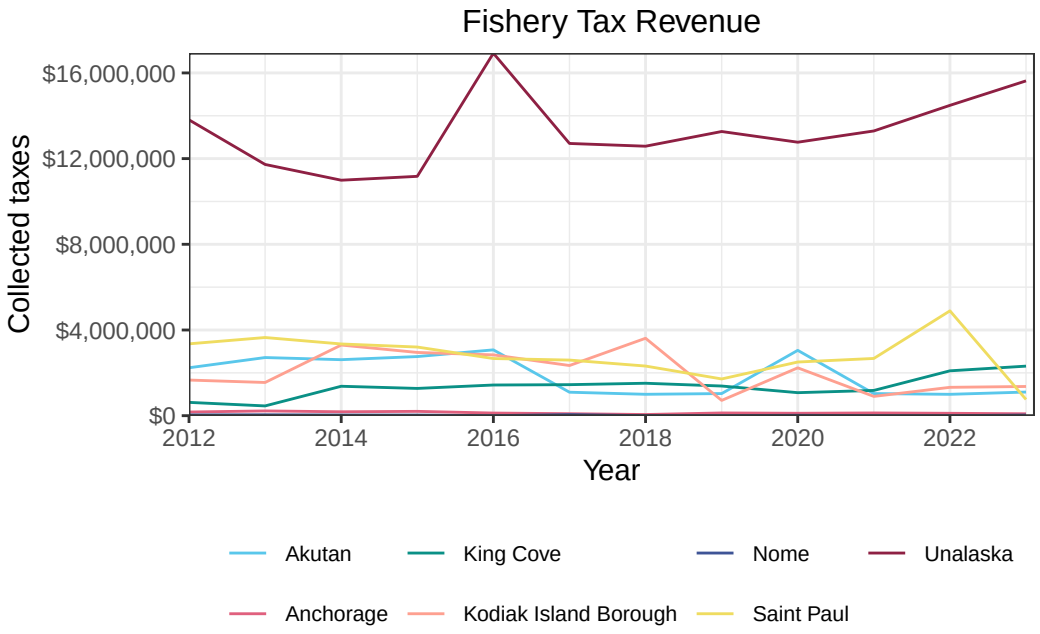


Figure 5.8.: Fishery tax revenue for highly engaged fishing communities in FMP Crab Fisheries from 2012-2023. Includes only Alaskan communities; excludes data associated with at-sea landings. Kodiak tax data were not reported in 2021. Kodiak includes borough-level tax data.

enrollment may indicate population outmigration, a declining tax base, or shifts in employment opportunities.

Figure 5.9 presents annual K-12 school enrollment from 2008-2003 for the seven Alaska communities highly engaged in FMP crab fisheries in the North Pacific (including those in harvesting and/or processing).

Over these seven communities combined, there has been a 12% decrease in total enrollment, representing a decline of 6465 students, between 2008-2023. Communities with declining student enrollment between 2008 and 2023 include: Saint Paul (-58%), Anchorage (-12%), Kodiak (-19%), King Cove (-26%), Unalaska (-14%). Saint George Island school closed in 2018, leaving Saint Paul's school the only remaining in the Pribilof Islands.

Akutan's student enrollment went up by 243%, from 7 in 2008 to 24 in 2023, and Nome's enrollment went up by about 3%. It should be noted that Akutan has very low student enrollment numbers, with a maximum of 24 students in any year from from 2008 to 2023.

In general, there have been important declines in school enrollment for most of the communities rated as highly engaged in Alaska FEP crab fisheries. Additional research is needed to better understanding the causes of these declines, as well as the enduring effects of the COVID pandemic on school enrollment.

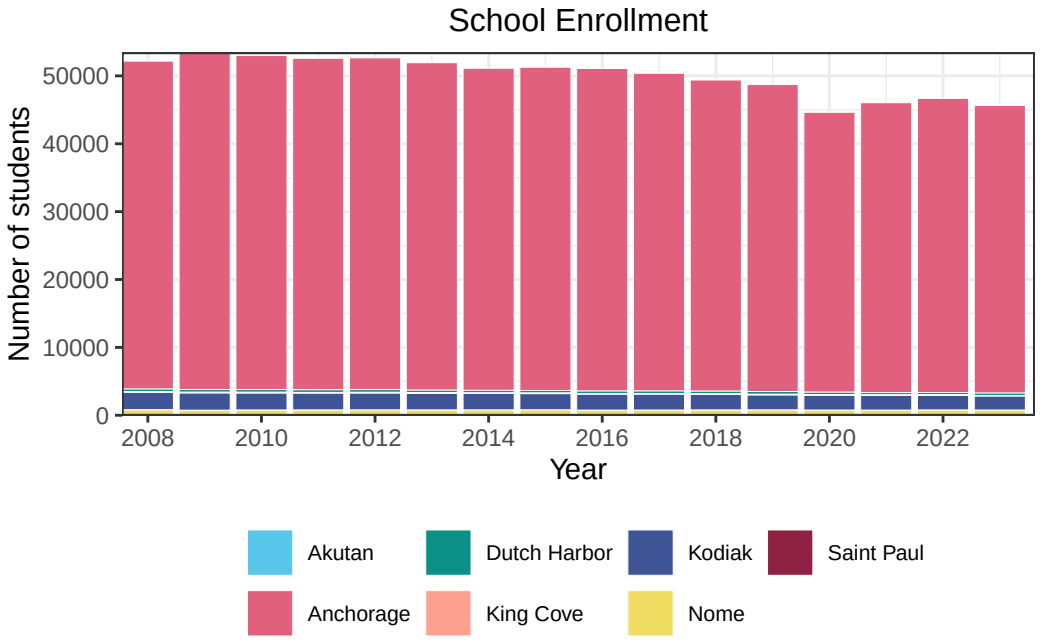


Figure 5.9.: K-12 public school enrollment for highly engaged crab communities combined (either harvesting or processing from 2008-2023

6. Alaska Recreational Fisheries

6.0.1. Alaska Recreational Fisheries

Sport fishing in Alaska provides an important source of income, culture, and food security for resident anglers as well as an important source of tourism revenue from non-resident anglers. These sport anglers fish in both fresh and saltwater using guides, charters, and on their own primarily for salmon (freshwater) and halibut (saltwater). Saltwater recreational anglers alone account for more than 1 million fishing days per year and anglers on charter fishing trips in Alaska catch about half of the approximately 500,000 Pacific salmon and 350,000 halibut harvested by all saltwater anglers in Alaska each year.[1]

6.0.2. Alaska Community Recreational Fishing Engagement

Data were collected for 296 communities or community groupings throughout the U.S. to create performance metrics of community participation in Alaska recreational fisheries from 2003-2023. Communities were included if they had some amount of sport fishing licenses sold in the community, sportfishing guides, sport fishing businesses, or residents that held sport fishing licenses during this time period. The results of the recreational engagement PCFA analyses are shown here in Table 6.1, which presents the eigenvalues, factor loadings, total variance explained, and Armor's theta reliability coefficient cited for all variables. The results suggest moderately strong relationships among variables, and that a single index based on the first extracted factor explains over 68.7% of the variation in each of the variables in each year. Figure 6.1 displays the aggregate annual values of the four variables that make up the recreational engagement index for each year to better understand the absolute changes in North Pacific recreational fishing activities that are underlying the relative recreational engagement index. The total number of sport fishing licenses sold to Alaska residents was down -4.09% despite total sportfishing licenses sold in Alaska communities increasing by 15.2%, respectively, in 2023 compared with their 2018-2022 average. There was a modest increase in sport fishing businesses by 3.98%, which employed an additional 7.43% sport fishing guides in 2023 compared with their 2018-2022 average.

[1]National Oceanic and Atmospheric Administration. (2019, June 3). *Alaska's valuable recreational fishing industry.* NOAA Fisheries. Retrieved November 15, 2024, from https://www.fisheries.noaa.gov/feature-story/alaskas-valuable-recreational-fishing-industry

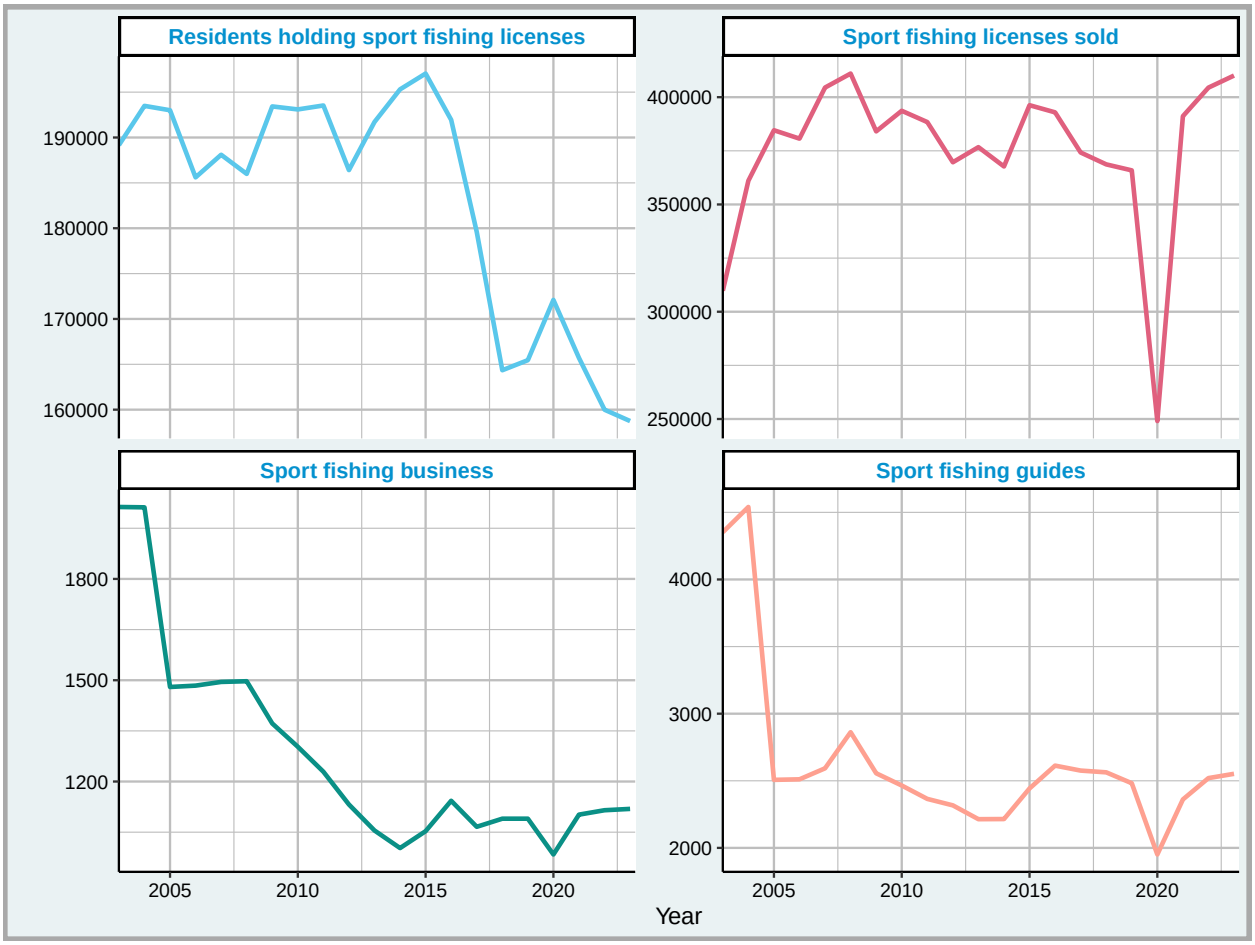


Figure 6.1.: Aggregate annual recreational engagement index inputs.

In addition to the goodness of fit statistics of the analyses provided in Table 6.1, each PCFA provides an index score for each of the 296 communities included in the recreational engagement analyses. Table 6.2 displays recreational engagement index results for the 23 communities that were highly engaged in recreational fishing for at least one year between 2003-2023. Communities are defined as highly engaged when their index score is above one, or one standard deviation above the mean of zero.

The recreational engagement index is a relative indicator of community participation compared to the participation of all other communities that participate in recreational fisheries in Alaska. It measures the presence of recreational fishing participation through the number of residents who hold sport fishing licenses, the number of sport fishing licenses sold within the community, the number of sport fishing guide businesses, and the number of sport fishing guides in the community.

Table 6.1.: Recreational engagement PCFA results 2003-2023

	Eigenvalues				Factor Loadings					
Year	1	2	3	4	Sport fishing licenses sold	Sport fishing guides	Sport fishing business	Residents holding sport fishing licenses	Percent variance explained	Armor's Theta
2003	3.70	0.25	0.03	0.01	0.93	0.99	0.95	0.98	0.92	0.97
2004	3.68	0.26	0.04	0.02	0.92	0.98	0.95	0.98	0.92	0.97
2005	3.60	0.35	0.04	0.01	0.89	0.98	0.95	0.97	0.90	0.96
2006	3.53	0.40	0.06	0.01	0.87	0.97	0.95	0.96	0.88	0.96
2007	3.50	0.38	0.10	0.01	0.87	0.96	0.95	0.97	0.88	0.95
2008	3.43	0.42	0.12	0.02	0.86	0.95	0.94	0.96	0.86	0.95
2009	3.43	0.42	0.12	0.02	0.86	0.95	0.94	0.96	0.86	0.95
2010	3.40	0.45	0.13	0.02	0.86	0.94	0.93	0.96	0.85	0.94
2011	3.36	0.47	0.14	0.02	0.85	0.93	0.93	0.95	0.84	0.94
2012	3.38	0.42	0.17	0.03	0.87	0.92	0.94	0.95	0.85	0.94
2013	3.32	0.47	0.18	0.03	0.85	0.92	0.93	0.94	0.83	0.93
2014	3.29	0.44	0.24	0.03	0.84	0.90	0.93	0.95	0.82	0.93
2015	3.27	0.37	0.33	0.03	0.86	0.86	0.94	0.96	0.82	0.93
2016	3.21	0.42	0.34	0.03	0.85	0.82	0.94	0.96	0.80	0.92
2017	3.08	0.54	0.35	0.03	0.85	0.75	0.94	0.96	0.77	0.90
2018	3.00	0.59	0.38	0.03	0.83	0.72	0.93	0.97	0.75	0.89
2019	2.96	0.65	0.36	0.03	0.84	0.68	0.93	0.97	0.74	0.88
2020	2.80	0.82	0.36	0.02	0.85	0.51	0.93	0.97	0.70	0.86
2021	2.82	0.86	0.30	0.02	0.87	0.46	0.95	0.98	0.70	0.86
2022	2.79	0.88	0.31	0.02	0.87	0.43	0.94	0.98	0.70	0.86
2023	2.75	0.89	0.35	0.02	0.85	0.43	0.93	0.98	0.69	0.85

Ten of the 23 community groupings listed in Table 6.2 were Highly Engaged in recreational fishing in all years from 2003-2023 : Anchorage, Fairbanks, Homer, Juneau, Kenai, Ketchikan, Kodiak, Sitka, Soldotna, and Wasilla (Seward has been highly engaged for all years after 2003). The other communities that were highly engaged in at least one year over this period include Kenai, King Salmon, Palmer, Craig, Cooper Landing, and Ninilchik. Anchorage has by far the highest degree of engagement over time, even while its index score consistently declines over time. Aside from Anchorage, Soldotna and Juneau have the highest engagement scores over time. Between 2022 and 2023, Anchorage experienced a slight decline in index scores -3.72%, while Soldotna and Juneau experienced moderate increases in index scores, (4.53% and 8.11%, respectively) (Figure 6.2).

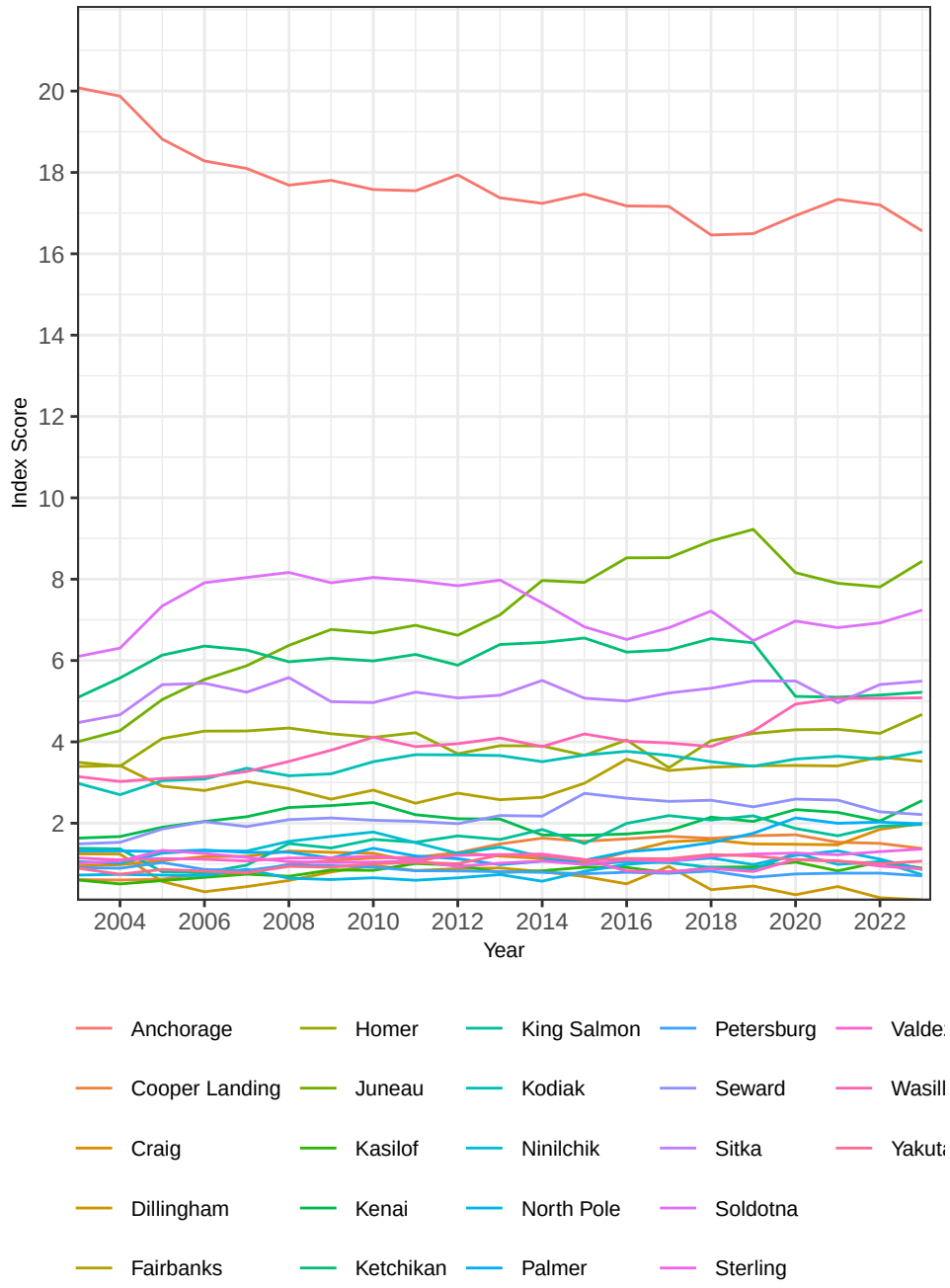


Figure 6.2.: Index scores of communities highly engaged in recreational fishing for at least 1 year from 2003-2023

Of the other communities that were highly engaged in all years between 2022 and 2023, only Fairbanks experienced a decrease in their recreational engagement index by -2.9%. Ketchikan, Sitka, and Wasilla each experienced small increases in recreational engagement scores between 2022 and 2023 of 1.35%, 1.58%, and 0.237%, respectively. Kodiak experienced a modest 4.99% increase while Homer increased by 11.1%, and Kenai increased by 24.5%.

Table 6.2.: Index scores of communities highly engaged in recreational fishing 2003 - 2023. Shaded cells are index scores above one (one standard deviation above the mean of zero) for at least one year 2003 - 2023.

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Anchorage	20.08	19.88	18.82	18.28	18.1	17.69	17.81	17.58	17.55	17.94	17.37	17.24	17.47	17.18	17.16	16.46	16.5	16.94	17.34	17.2	16.56
Cooper Landing	0.61	0.6	0.62	0.77	0.77	0.99	1.08	1.14	1.16	1.28	1.49	1.63	1.56	1.61	1.68	1.63	1.69	1.72	1.53	1.5	1.38
Craig	0.95	0.98	1.08	1.18	1.19	1.32	1.28	1.26	1.04	1.28	1.19	1.13	1.02	1.29	1.54	1.59	1.49	1.48	1.47	1.85	1.99
Dillinghan	1.25	1.24	0.57	0.31	0.44	0.59	0.8	0.96	0.84	0.88	0.9	0.81	0.69	0.51	0.94	0.37	0.46	0.24	0.44	0.17	0.11
Fairbanks	3.39	3.42	2.91	2.8	3.03	2.85	2.59	2.81	2.49	2.74	2.58	2.64	2.98	3.57	3.3	3.38	3.41	3.42	3.41	3.63	3.52
Homer	3.5	3.4	4.08	4.26	4.27	4.34	4.2	4.11	4.22	3.71	3.91	3.9	3.67	4.05	3.36	4.03	4.21	4.3	4.31	4.21	4.67
Juneau	4	4.28	5.04	5.53	5.87	6.37	6.76	6.68	6.87	6.62	7.12	7.97	7.92	8.52	8.53	8.94	9.22	8.16	7.9	7.81	8.44
Kasilof	0.6	0.51	0.59	0.67	0.75	0.7	0.85	0.84	1.01	0.97	0.79	0.83	0.92	0.91	0.78	0.92	0.93	1.05	0.83	1.05	0.9
Kenai	1.63	1.67	1.9	2.04	2.16	2.39	2.43	2.51	2.21	2.11	2.1	1.71	1.7	1.74	1.82	2.15	2.04	2.33	2.27	2.05	2.56
Ketchikan	5.09	5.57	6.13	6.35	6.26	5.97	6.06	5.99	6.15	5.89	6.39	6.44	6.55	6.21	6.26	6.54	6.44	5.12	5.1	5.15	5.22
King Salmon	1.38	1.37	0.81	0.79	0.97	1.5	1.39	1.6	1.53	1.69	1.6	1.84	1.5	2	2.19	2.08	2.18	1.87	1.69	1.93	1.97
Kodiak	2.98	2.7	3.05	3.09	3.35	3.17	3.21	3.51	3.68	3.68	3.66	3.51	3.67	3.77	3.67	3.51	3.4	3.58	3.65	3.58	3.75
Ninilchik	1.05	1.01	1.26	1.32	1.32	1.55	1.67	1.78	1.52	1.26	1.41	1.17	0.98	1.06	1.03	0.91	0.86	1.26	0.99	1.06	0.73
North Pole	0.73	0.74	0.72	0.71	0.87	0.65	0.62	0.66	0.6	0.66	0.74	0.57	0.82	0.99	1.07	1.14	0.98	1.21	1.32	1.12	0.86
Palmer	1.32	1.32	1.3	1.34	1.28	1.29	1.15	1.38	1.19	1.13	0.98	1.07	1.09	1.3	1.37	1.52	1.75	2.13	2	2.03	1.98
Petersburg	0.91	0.89	1.03	0.86	0.84	0.97	0.96	0.92	0.83	0.83	0.81	0.79	0.76	0.79	0.77	0.82	0.67	0.75	0.77	0.77	0.71
Seward	1.49	1.53	1.86	2.04	1.92	2.09	2.13	2.07	2.05	1.99	2.19	2.17	2.73	2.61	2.54	2.56	2.4	2.59	2.57	2.28	2.21
Sitka	4.47	4.67	5.41	5.44	5.22	5.58	4.99	4.97	5.22	5.08	5.15	5.51	5.07	5	5.2	5.32	5.5	5.5	4.96	5.41	5.49
Soldotna	6.1	6.3	7.34	7.91	8.04	8.16	7.91	8.04	7.96	7.84	7.98	7.42	6.83	6.52	6.81	7.21	6.49	6.97	6.81	6.93	7.24
Sterling	1.02	1.07	1.33	1.26	1.16	1.05	1.03	1.04	1.07	0.94	1.02	1.07	0.99	1.1	1.06	1.19	1.24	1.27	1.22	1.3	1.37
Valdez	1.14	1.1	1.13	1.11	1.07	1.14	1.15	1.19	1.11	1.21	1.23	1.24	1.11	0.83	0.81	0.89	0.81	1.11	1.08	0.95	0.88
Wasilla	3.15	3.03	3.1	3.14	3.27	3.52	3.8	4.11	3.88	3.95	4.1	3.88	4.19	4.02	3.97	3.89	4.27	4.93	5.07	5.07	5.08
Yakutat	0.89	0.75	0.86	0.82	0.78	0.94	0.92	1	1.04	1	1.22	1.2	1.09	1.13	1.13	1.23	1.2	1.1	1.07	1	1.07

Based on the community engagement index scores for recreational fishing engagement, communities were categorized into low (index scores below the mean of 0), medium (index scores between 0 and 0.5), medium-high (index scores between 0.50001 and 1), and high engagement (index scores above 1) for each year. The number of years a community is in each category for the recreational engagement indices is presented here in Table 6.3.

There are 79 communities or community groupings in Table 6.3 that had medium, medium-high, or high engagement in recreational fishing in Alaska for at least one year from 2003-2023, while only 23 communities were highly engaged in recreational fisheries in any year from 2003-2023. A total of 11 communities were highly engaged in all years over this period.

Table 6.3.: Number of years by engagement level for all recreational fisheries. Alaska communities not listed had low recreational engagement in all years (2003-2023). Darker shading indicates higher numbers of years at a particular engagement level.

	Low	Medium	Medium-High	High
Aleknagik	5	16	0	0
Anchor Point	0	4	17	0
Anchorage	0	0	0	21
Angoon	2	19	0	0
Aniak	8	13	0	0
Bethel	4	17	0	0
Big Lake	5	16	0	0
Cantwell	9	12	0	0
Chitina	19	2	0	0
Clam Gulch	19	2	0	0
Coffman Cove	9	12	0	0
Cold Bay	14	7	0	0
Cooper Landing	0	0	6	15
Copper Center	0	21	0	0
Cordova	0	12	9	0
Craig	0	0	2	19
Delta Junction	0	21	0	0
Dillingham	0	8	11	2
Eielson Air Force Base	16	5	0	0
Ekwok	20	1	0	0
Elfin Cove	0	21	0	0
Fairbanks	0	0	0	21
Fritz Creek	19	2	0	0
Gakona	9	12	0	0
Glennallen	10	11	0	0
Goodnews Bay	15	6	0	0
Gustavus	0	19	2	0
Haines	0	19	2	0
Homer	0	0	0	21
Hoonah	0	21	0	0
Hope	20	1	0	0
Houston	19	2	0	0
Igiugig	18	3	0	0
Iliamna	0	14	7	0
Juneau	0	0	0	21
Kasilof	0	0	18	3
Kenai	0	0	0	21
Ketchikan	0	0	0	21

(continued)

	Low	Medium	Medium-High	High
King Salmon	0	0	3	18
Klawock	0	15	6	0
Kodiak	0	0	0	21
Larsen Bay	0	21	0	0
Moose Pass	14	7	0	0
Nikiski	3	18	0	0
Ninilchik	0	0	5	16
Nome	10	11	0	0
Nondalton	20	1	0	0
North Pole	0	0	16	5
Old Harbor	10	11	0	0
Palmer	0	0	1	20
Pedro Bay	18	3	0	0
Pelican	0	21	0	0
Petersburg	0	0	20	1
Port Alexander	16	5	0	0
Port Alsworth	0	21	0	0
Port Lions	0	21	0	0
Quinhagak	15	6	0	0
Seldovia	4	17	0	0
Seward	0	0	0	21
Sitka	0	0	0	21
Skagway	6	15	0	0
Skwentna	1	20	0	0
Soldotna	0	0	0	21
Sterling	0	0	2	19
Sutton-Alpine	20	1	0	0
Talkeetna	0	2	19	0
Thorne Bay	0	19	2	0
Togiak	11	10	0	0
Tok	20	1	0	0
Two Rivers	13	8	0	0
Unalakleet	5	16	0	0
Unalaska Dutch Harbor	8	13	0	0
Valdez	0	0	6	15
Wasilla	0	0	0	21
Waterfall	20	1	0	0
Whittier	7	14	0	0
Willow	0	19	2	0
Wrangell	0	20	1	0
Yakutat	0	0	7	14

Part III.

Community Sketches

Twelve communities were identified as being *Highly Engaged* in the North Pacific FMP groundfish and crab fisheries (in the harvesting or processing sector, or both) for at least one year from 2008-2023: Akutan, King Cove, Sand Point, Homer, Kodiak Island, Nome, Petersburg, the Seattle MSA, Sitka, Seward, St. Paul, and Unalaska. In the following section, detailed sketches provide an overview of how these communities differ geographically, historically, culturally, economically, and demographically. The purpose of the Community Sketches is to: 1) present a detailed snapshot of the communities with sustained and substantial engagement in Alaska FMP crab and groundfish fisheries; and 2) show linkages among social, economic, and policy processes to inform management decisions. By identifying key social and economic trends, these sketches can inform decision-making in Federally managed fisheries.

Seattle MSA and Anchorage were rated as *Highly Engaged*; however, as major cities, both are involved in multiple industries and are distinct from smaller, more remote fisheries dependent communities. Seattle MSA was added in 2022 to the Community Sketches in an effort to capture the role of Alaska fisheries within the Seattle MSA.

The sketches will be updated yearly and additional communities of interest may be developed and presented according to feedback and decision-making needs. Given the aim of the Community Sketches, it was necessary to modify the constraints of the information slightly for certain communities. The engagement indices identified Kodiak City as one of the substantially engaged communities; however, the choice was made to include the greater Kodiak Island borough in the

community sketch in order to give attention to the close economic, social, and governance linkages among Kodiak Island communities. Finally, confidentiality concerns required that Akutan's and King Cove's fishing engagement data be aggregated with neighboring communities in order to avoid disclosure of confidential information. For that reason, the Akutan and King Cove sketches provides information on each community, but presents aggregated fishing data from Akutan, King Cove, and Sand Point communities.

Note on Tax Data

In the "Current Economy" section of the community snapshots, we present ***municipal tax*** *data as reported in the Alaska Taxable 2023 report,*[2] *as well as* ***shared fisheries-related taxes*** *reported by the State of Alaska Fiscal Year 2023 Shared Taxes and Fees Annual Report.*[3] *Municipal taxes as presented in the snapshots include property tax, sales tax, raw fish taxes, and "other taxes", which include bed tax, alcohol tax, among other taxes. It should be noted that some municipalities include raw fish taxes in their sales taxes and do not report these separately in the Alaska Taxable report; in these cases, we are unable to extrapolate these raw-fish taxes without the capacity to groundtruth the reported data. Additionally, municipal raw fish taxes are sometimes collected at the borough level—for example, in the Aleutians East borough. Total values of fisheries-related taxes–the sum of shared fisheries business, shared fisheries landing, and municipal raw fish taxes, where these are reported separately from sales tax—are included in Current Economy section, and comparisons between these total values across communities can be found in the and Fishery Tax sections of the earlier chapters on community participation in North Pacific groundfish and crab fisheries. Aleutians East borough and Kodiak Island borough both receive revenue from shared fisheries taxes, in addition to member communities also receiving disbursements from the shared revenue program.*

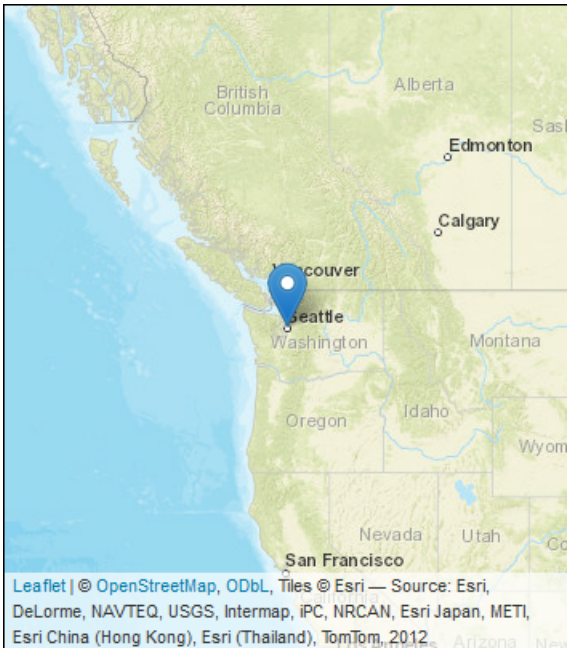
[2]Alaska Department of Commerce, Community, and Economic Development. (2024). *Alaska Taxable 2023.* Juneau, AK: Alaska Division of Community and Regional Affairs. Retrieved from https://www.commerce.alaska.gov/web/Portals/4/pub/OSA/taxable%20reports/2023%20Taxable%20Final.pdf?ver=2galdYexo8Z0NAYS6wwyvQ%3d%3d

[3].Alaska Department of Revenue, Tax Division. (2023). *Fiscal Year 2023 Shared Taxes and Fees Annual Report.* Retrieved from https://tax.alaska.gov/programs/documentviewer/viewer.aspx?1791r

7. Seattle MSA

7.0.0.1. Area Description & History

The Seattle Metropolitan Statistical Area (Seattle MSA) is an urban conglomeration in Washington state comprising three of the three most populous counties—King, Pierce, Snohomish—and includes the Pacific Northwest's largest city, Seattle. The area has long had a vital role in Alaska commercial fisheries, with 75% of Alaska's commercial fishing vessels mooring, docking, and conducting repairs in Seattle. Before Seattle and its suburbs became home to a technology industry, logging was its first major industry. Later in the 19th century, the city became the gateway to Alaska with newfound commercial and shipbuilding industries. For over 100 years, commercial fishers in Seattle have traveled to work and fish in Alaska waters.[1] Commercial fishermen use the three core facilities in the Port of Seattle including Fishermen's Terminal, Maritime Industrial Center, and Terminal 91.[2]



7.0.0.2. Demographics

We attempted to isolate data used to the Seattle MSA to the degree possible; however in some cases accessible datasets were based on the broader Puget Sound Region. There are strong social and economic linkages across the region, however we isolated Seattle MSA data where possible. With a population just over 4 million, the Seattle MSA is the largest community in Washington state and supports Alaska fisheries through supplying crew members, captains, as well as the vessels themselves. On average from 2018-2022, the Seattle MSA had a median household income of over $107,000 and had over 1.65 million housing units.

[1] Ott, J. (2017, December 1). Fishermen's Terminal (Seattle). HistoryLink.org Essay 20488. Retrieved November 14, 2024 from https://www.historylink.org/file/20488.

[2] Swift, C. (2019). Five Fast Facts about Commercial Fishing. Port of Seattle. Accessed May 25, 2022 from https://www.portseattle.org/blog/five-fast-facts-about-commercial-fishing

Demographics	
Population	4,001,701
Median household income	107,206
Housing units	1,657,075
Percentages	
Male	50.6%
Female	49.4%
White	63%
American Indian or Alaska Native	0.8%
Black or African American	6%
Asian	15%
Native Hawaiian or Pacific Islander	0.9%
Hispanic or Latino	7.7%
Below poverty line	8.3%
High school diploma or higher	93.2%
Population under 5	5.7%
Population over 18	79%
Population over 65	13.8%

Source:
*US Census Bureau American Community Survey 5-year estimates (2018-2022)

7.0.0.3. Current Economy

Seattle MSA plays an integral role in Alaska commercial fisheries. Seattle is the home port to 300 vessels with 226 of those involved in fishing Alaska waters for Pollock, Alaskan king crab, groundfish, and salmon.[3] Alaskan fisheries account for an annual harvest greater than all other U.S. states combined, adding more than $4 billion dollars in sales annually to the U.S. economy.[4]

In 2017*, the Seattle MSA's commercial fishing industry supplied 7,200 jobs. Of that, 5,100 individuals worked on fishing vessels, and 4,900 of those fished in Alaskan waters, supporting over $313 million in labor ($150 million in fishing employment; $163 million in onshore labor). In the same year, commercial fishing operations through the Port of Seattle generated $13.2 million in taxes to Washington State.[5]

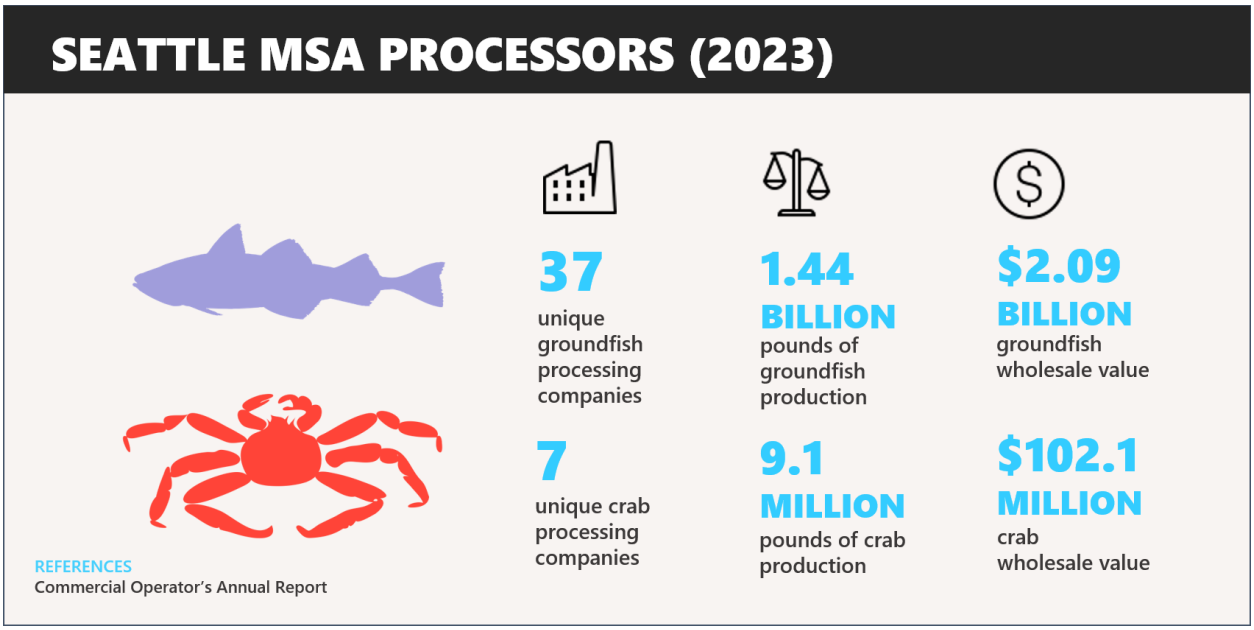
To gain understanding of the economic and social linkage between Seattle and Alaska fisheries, the following sections highlight: 1) seafood processing sector, 2) observer programs, 3) fleet modernization efforts, and 4) shipping operations in the Seattle MSA region. This information can provide information on how communities interact, work to support adaptation and resilience in the face of global change.

* Most recent data available was used.

[3]Swift, C. (2019). Five Fast Facts about Commercial Fishing. Port of Seattle. Accessed May 25, 2022 from https://www.portseattle.org/blog/five-fast-facts-about-commercial-fishing
[4]Swift, C. (2019). Five Fast Facts about Commercial Fishing. Port of Seattle. Accessed May 25, 2022 from https://www.portseattle.org/blog/five-fast-facts-about-commercial-fishing
[5]National Marine Fisheries Service (NMFS). (2017). Fisheries Economics of the United States, 2015. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-170, 247 p.

7.0.0.4. Seafood Processors

In 2023, 37 groundfish and 7 crab processors had headquarters located in the Seattle MSA (including both at-sea and shore-based operations). These company's facilities processed 1.44 billion pounds of groundfish worth $2.09 billion, and 9.1 million pounds of crab worth $102 million4 across all fisheries. Disaggregated data for total revenue from Alaska catch were not yet available; however, 96% of Seattle fishing vessels fish in Alaskan waters, and of that, 44% of Alaska commercial fisheries' gross earnings is accounted for by Seattle-based fishers.[6] The figure below presents the pounds of production and wholesale value of groundfish and crab processed in the Seattle MSA. In order to better understand the social and economic linkages, how these connections may change with climate change, and the localized effects requires continued work with the best available disaggregated data.



7.0.0.5. Observer Programs

In addition to the many Alaska fishing vessels who dock, moor, and conduct repairs in the Seattle MSA, several organizations provide trained observers for Alaska fisheries. These entities operate out of the Seattle MSA with earnings contributing to Washington and the broader Nation's economy. For example, The North Pacific Observer Program (NPOP) began in 1990 to provide observers to vessels participating in Alaska's groundfish fishery. These observers are available year-round to meet industry coverage requirements and Federal mandates.[7] According to the 2021 North Pacific Observer Program Annual Report, Washington-based observer programs operating in Alaska

[6]Swift, C. (2019). Five Fast Facts about Commercial Fishing. Port of Seattle. Accessed May 25, 2022 from https://www.portseattle.org/blog/five-fast-facts-about-commercial-fishing

[7]National Oceanic and Atmospheric Administration (NOAA). (n.d.). *Fisheries Monitoring and Analysis Division history.* NOAA Fisheries. https://www.fisheries.noaa.gov/alaska/fisheries-observers/fisheries-monitoring-and-analysis-division-history

fisheries contributed nearly $17 million to the Washington state economy.[8] The data used here derives from summary statistics from invoices submitted by at least three observer providers to meet confidentiality requirements

7.0.0.6. Fleet Modernization & Maintenance

In addition to processor and observer activities conducted in Seattle MSA, fleet modernization activities contribute millions of dollars per year to Washington's economy. An estimated $800 million will be spent in fleet modernization activities in the Puget Sound between the years 2017 and 2026[9] contributing to Seattle MSA's fisheries related expenditures.

7.0.0.7. Fishing History & Regulatory Background

For over 100 years, the Seattle fleet has fished Alaskan waters. With immigrants from Scandinavia arriving in the 1880's, these same groups brought their skills in fishing and maritime activities to the Pacific Northwest. The Puget Sound Fisheries Association Committee, which founded Fisherman's Terminal, was composed of primarily Norwegian immigrants.[10] On January 10, 1914, over 200 fishing vessels hailed from Olympia, Washington to Alaska, marking the opening of, "Fishermen's Headquarters," known today as Fishermen's Terminal that is home to a significant North Pacific fishing fleet.[11] In 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. Oral history research on fishermen residing in the broader Pacific Northwest, who participate in Alaska Federal fisheries, identified factors that led them to engage in Alaska fisheries. These included established social connections, expanded opportunities, sense of adventure, and economic possibilities.[12] Today, two out of three Seattle MSA vessels fish in Alaska.[13]

[8] Alaska Fisheries Science Center and Alaska Regional Office. (2021). North Pacific Observer Program 2020 Annual Report. AFSC Processed Rep. 2021 2021-03, 143 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

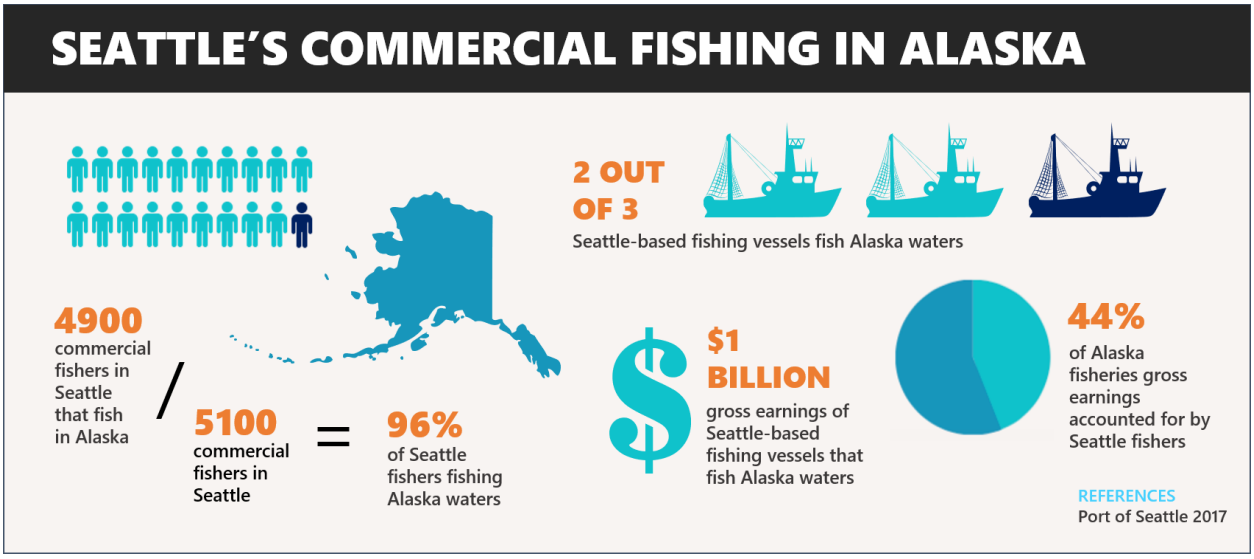
[9] Modernization of the North Pacific Fishing Fleet: Economic Opportunity Analysis. (2016). McDowell Group. https://www.portseattle.org/sites/default/files/2018-03/Fleet%20Modernization%20Final%2011_11.pdf

[10] Forssblad, M. (2001). Norwegians in Seattle and King County. HistoryLink.org Essay 3476. https://www.historylink.org/file/3476.

[11] Port of Seattle. Fishermen's Terminal History. https://www.portseattle.org/page/fishermens-terminal-history

[12] Kahrs, Jeffrey. (2015-2018). Commercial Fishermen Oral History Project with commercial fishers in Seattle (Collection Number: 2018.63) Museum of History & Industry, Sophie Frye Bass Library. Seattle, WA. https://archiveswest.orbiscascade.org/ark:/80444/xv988280#dscID

[13] Swift, C. (2019). Five Fast Facts about Commercial Fishing. Port of Seattle. Accessed May 25, 2022 from https://www.portseattle.org/blog/five-fast-facts-about-commercial-fishing



7.0.0.8. Climate Change Vulnerability & Adaptive Capacity

Due to the distinct nature of the Seattle MSA compared to other highly engaged communities, social indicators and levels of engagement have not been included for Seattle MSA's involvement in Alaska commercial fisheries. Instead, a discussion of the vulnerability and adaptive capacity to climate risk for the Seattle MSA's commercial fishing industry is included here to inform understandings of climate effects on Seattle's economy and coastal infrastructure. Finally, this section highlights several gaps in knowledge necessary to explore the adaptive capacity and climate vulnerability within Seattle MSA fisheries.

The city of Seattle is predicted to get increasingly warmer temperatures and episodes of heatwaves. Drier summers and wetter winters are also expected with increased chances of extreme precipitation events. Sea levels are expected to rise up to nine inches by the 2030s, and storm surges and high tides will periodically increase these levels.[14] The climate driven shifts in distribution and abundance of commercial fisheries in Alaska will likely affect the sustained participation of Seattle MSA in Alaska federal fisheries; however, there is a great deal of uncertainty.

The Port of Seattle has developed $1.6 billion in modernization projects and mitigation measures to address projected climate risks to the port and fisheries operations.[15][16] These efforts include increased fuel efficiency and improved processing capacity. Approximately 50% of all fleet modernization plans are expected to take place in Puget Sound. Additional research is necessary to inform climate ready fisheries

[14] Port of Seattle. 2016. Sea Level Rise Considerations. https://www.portseattle.org/sites/default/files/2018-03/T5_FEIS_volume_II_Appx_I.pdf

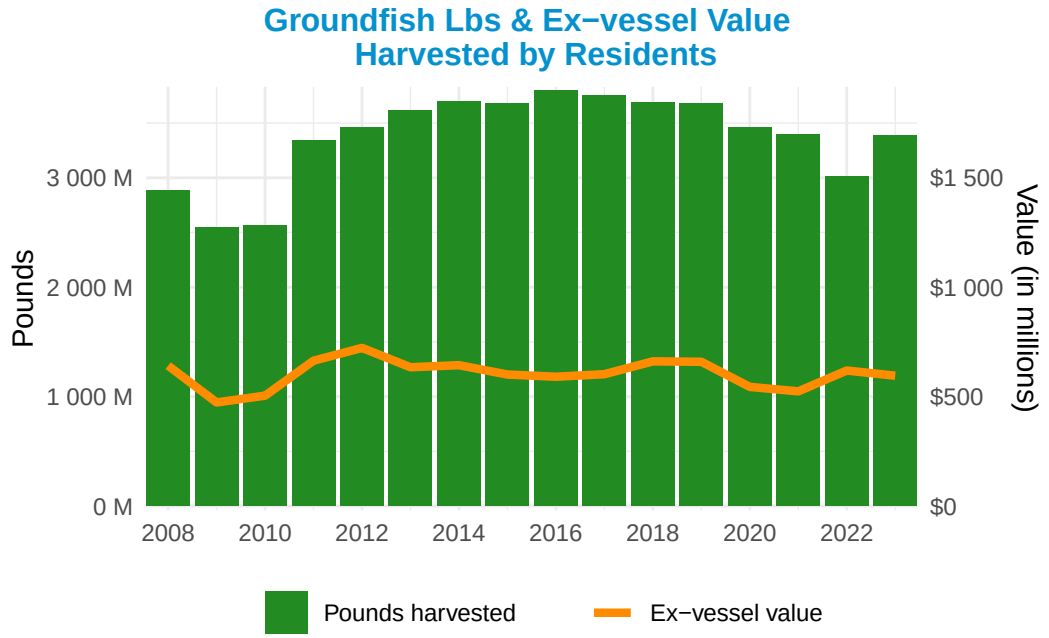
[15] Modernization of the North Pacific Fishing Fleet: Economic Opportunity Analysis. (2016). McDowell Group. https://www.portseattle.org/sites/default/files/2018-03/Fleet%20Modernization%20Final%2011_11.pdf

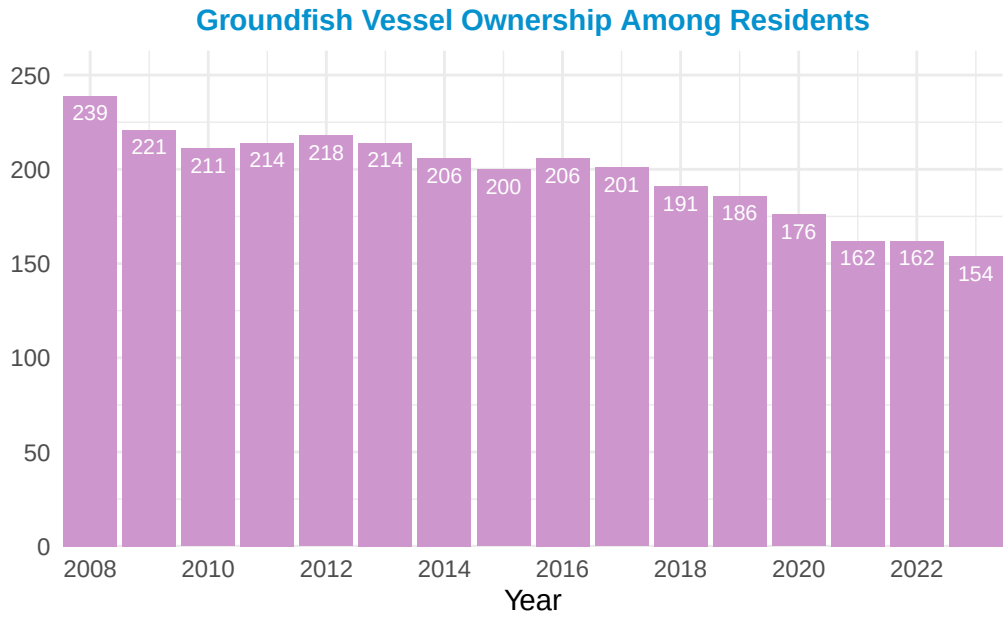
[16] City of Seattle. 2013. Climate Action Plan. https://www.seattle.gov/documents/Departments/Environment/ClimateChange/2013_CAP_20130612.pdf

7.0.0.9. Groundfish Harvesting Engagement - HIGH

Seattle MSA has the highest degree of groundfish harvesting engagement in Alaskan waters over time compared to all other Alaska communities. The volume of groundfish harvested reached its peak in 2016 at almost 3.8 million pounds. Pounds of groundfish harvested began increasing significantly starting in 2011 and remained high through 2019 but have since declined over the past four years. This may have initially been due to COVID19 pandemic effects on maintaining crew, difficulties with travel, plant closures, and overall safety concerns but these patterns persist into 2023. Similarly, the ex-vessel value of groundfish harvested by Seattle owned vessels experienced an increase in ex-vessel value in 2011 and was relatively stable until 2019 and has been generally declining since with the exception of 2022 which increased revenues despite lower volume of harvests.

Groundfish fishing vessels owned by Seattle residents continued a slight downward trend from a peak of 239 in 2008 to 154 in 2023. The 154 vessels owned by Seattle residents in 2023 reflects another all time low since 2008. Between 2019 and 2023, there was a 17% decrease in fishing vessels owned by Seattle residents fishing in Alaska (32 vessels).





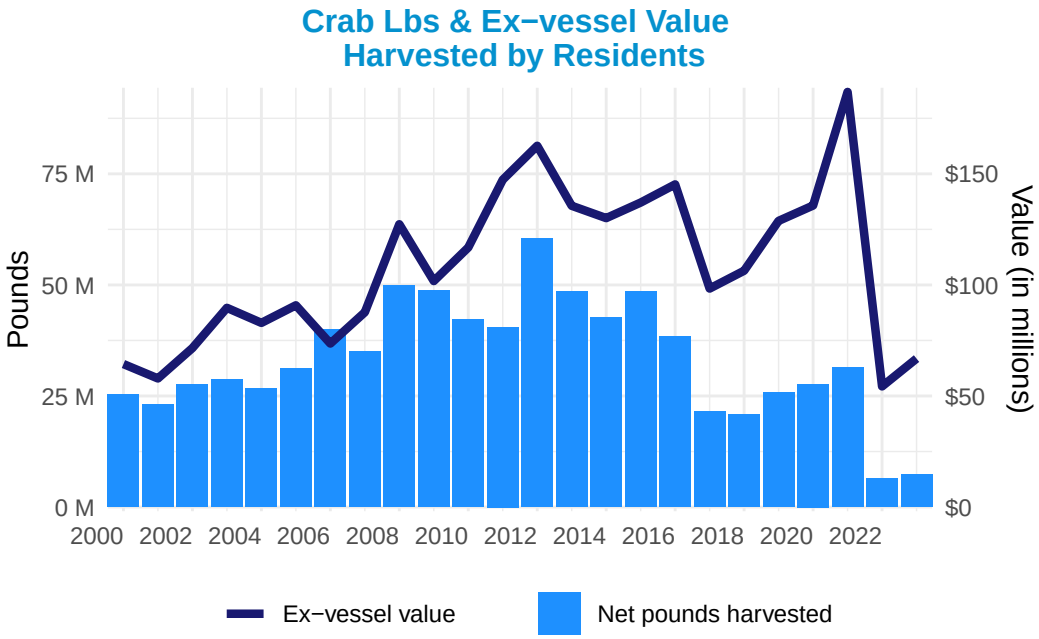
7.0.0.10. Groundfish Processing Engagement - LOW

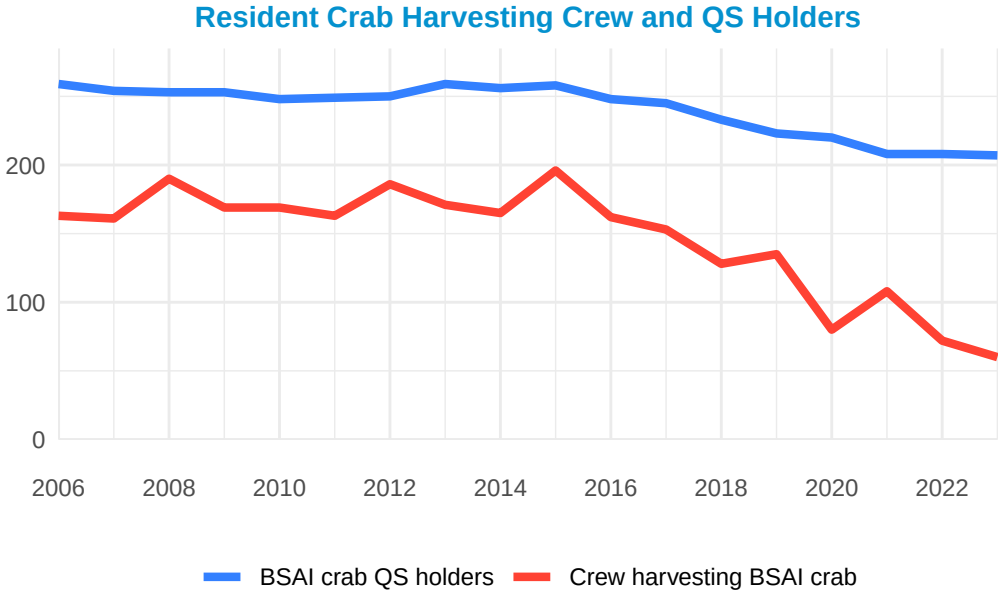
Despite a large number of groundfish processing companies being headquartered in the Seattle MSA area, there is not a substantial amount of Alaska groundfish processing activity in Seattle to report as nearly all of the primary processing occurs at plants located in Alaska.

7.0.0.11. Crab Harvesting Engagement - HIGH

Seattle's resident vessels harvesting BSAI crab fisheries saw a dramatic decline in both harvest volume and associated value beginning in 2017 when harvest decreased by 17,441,359 pounds (46%) and $46.9 million (32%). Harvest volumes increased through 2021 until closures of both Bristol Bay red king crab and Bering Sea snow crab fisheries dropped to record lows in calendar years 2022 and 2023. Seattle vessels also benefited from high crab ex-vessel and first-wholesale prices in 2021 which resulted in a record high level of (real) revenue over this period despite relatively low historical volumes.

The number of crew residing in Seattle who engage in FMP crab fisheries has decreased sharply beginning in 2020, likely as a result of travel restrictions associated with the COVID-19 pandemic, with a decrease in 55 crewmembers harvesting BSAI or 41% between 2019 and 2020. This number rebounded slightly in 2021 to 108 crewmembers but continued its downward trend since 2015 and reached a new low in 2023 of 60 crewmembers. Similarly, Seattle MSA based quota share (QS) holders has been declining since 2015 when it was near its high of 258 QS holders to a new low of 207 in 2023.





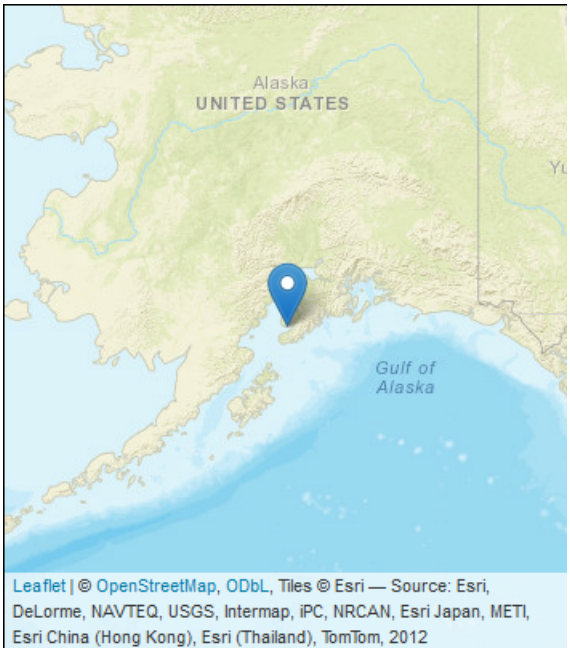
*Includes crew and quota holders in rationalized crab fisheries only

7.0.0.12. Crab Processing Engagement - LOW

Despite a large number of crab processing companies being headquartered in the Seattle MSA area, there is not a substantial amount of Alaska crab processing activity in Seattle to report as nearly all of the primary processing occurs at plants located in Alaska.

8. Homer

8.0.0.1. Area Description & History



Homer is located on the north shore of Kachemak Bay on the southwestern edge of the Kenai Peninsula. This is the traditional territory of the Kenaitze people, a branch of Athabascan Native Peoples who speak Dena'ina. Today, fewer than 100 people speak this language and efforts to preserve it are led by the Tribe's Dena'ina Language and Culture Revitalization Project.[1] Historically, the Kenaitze had summer fish camps along the rivers and shores of Cook Inlet. In 1895, workers from the Alaska Gold Mining Company settled in the area and named the community after Homer Pennock, a gold mining company promoter.[2] Commercial fisheries began in the Cook Inlet in the mid-1800s with salmon and herring. Commercial exploitation of halibut and groundfish first extended into the Gulf of Alaska in the 1920s. The first year-round processing facility in Homer opened in 1954 specializing in frozen king crab and shrimp. The city government was incorporated in March 1964. Today, Homer is located in the Lower Cook Inlet state Fishery Management Area, Federal Statistical and Reporting Area 630, Pacific Halibut Fishery Regulatory Area 3A, and the Central Gulf Federal Sablefish Regulatory Area1. Homer is in House District 31, Senate District P. Homer was not included under the Alaska Native Claims Settlement Act (ANCSA). The Aleut Ninilchik Native Association is the primary Native Association active in the city.

8.0.0.2. Infrastructure & Transportation

Homer is often referred to as "The End of the Road," because it lies at the terminus of the Sterling Highway. The state owns and operates the Homer Airport, which has an asphalt runway, float plane basin, and a seaplane base at Beluga Lake. The Alaska Marine Highway and local ferry services

[1] Kenaitze Indian Tribe. (n.d.). *Home.* Kenaitze Indian Tribe. https://www.kenaitze.org/

[2] Armstrong, M. (2014, July 23). *Parks Day: Celebrating early Homer Spit history. Homer News.* https://www.homernews.com/life/parks-day-celebrating-early-homer-spit-history/

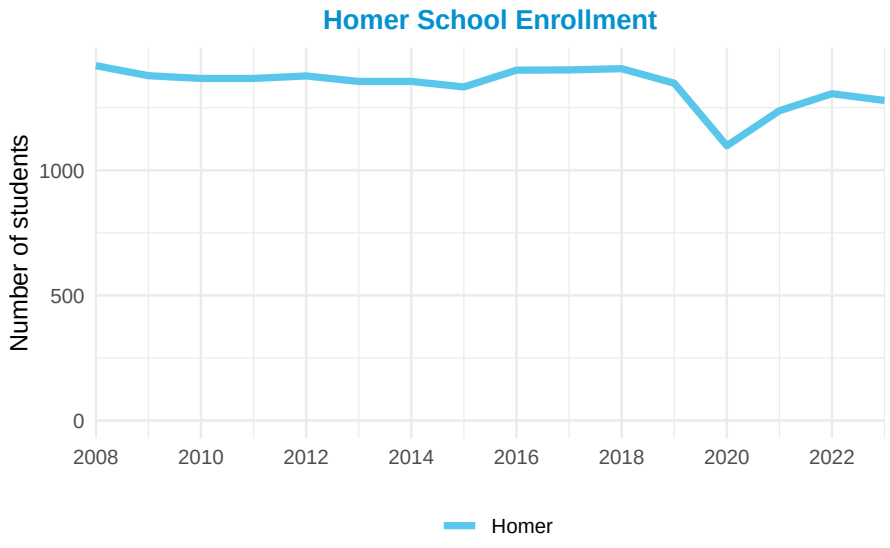
provide water transportation.[3] There are several medical facilities and eight schools in the Homer area. School enrollment has decreased 10% since 2008 but is up 16% from a low in 2020, likely due to the COVID-19 pandemic.[4] Road and other transportation access,[5] as well as the presence of schools and medical care, ensure that residents have access to necessary services and infrastructure that support community resilience.

8.0.0.3. Demographics

Homer's population has been steadily increasing between 2010 and 2020. In 2021, population declined by 5% before increasing again in 2022. With increases in population, the proportion of the population over 65 has also increased, suggesting that older individuals are moving to Homer while the proportion of young children (under 5 years) is declining. Approximately 87%, on average, of the population identified as white between 2018 and 2022, down 3% from the 2010 to 2014 average, while approximately 6% of the population identifies as American Indian or Alaskan Native, up 1% from the 2010 to 2014 average.

The percentage of the population 25 years and older with a high school diploma (or equivalent) or higher has remained stable since 2010, with an average of 95% of the population having a high school diploma or higher between 2018 and 2022. Additionally, the median household income (in 2022 USD) has remained stable between 2010 (~$69,000) and 2022 (~$70,000). Within this time period, however, the percentage of the population that lives below the poverty line has increased from 8% in 2010 to 13% in 2022, suggesting an increase in wealth disparity.

8.0.0.4.



[3] Alaska Department of Commerce, Community, and Economic Development. (n.d.). *Homer, Alaska.* https://dcced.maps.arcgis.com/apps/MapJournal/index.html?appid=3c2b1529debe4bfdb4babe4038a6db2f

[4] School enrollment statistics compiled from AK. Dept. of Education & Early Development. http://www.eed.state.ak.us/stats/

[5] Alaska Department of Commerce, Community, and Economic Development. (n.d.). *Road connection in community.* ArcGIS Open Data. https://dcra-cdo-dcced.opendata.arcgis.com/datasets/DCCED::road-connection-in-community/explore

Demographics	
Population	5669
Population in group housing	175
Median household income	69,757
Housing units	2,941
Percentages	
Male	51.2%
Female	48.8%
White	80.4%
American Indian or Alaska Native	7.7%
Black or African American	0.2%
Asian	1.7%
Native Hawaiian or Pacific Islander	0.4%
Hispanic or Latino	4.3%
Below poverty line	12.7%
High school diploma or higher	95.2%
Population under 5	4.6%
Population over 18	81.1%
Population over 65	22.2%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

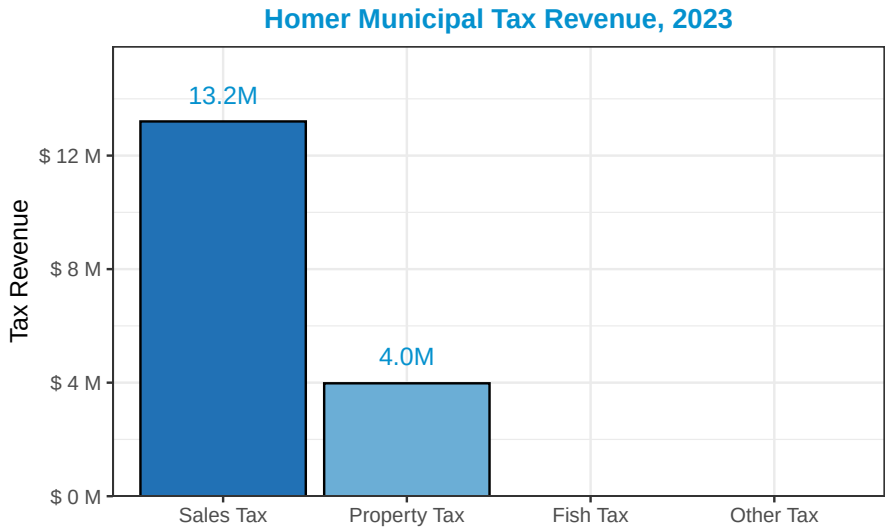
8.0.0.5. Current Economy

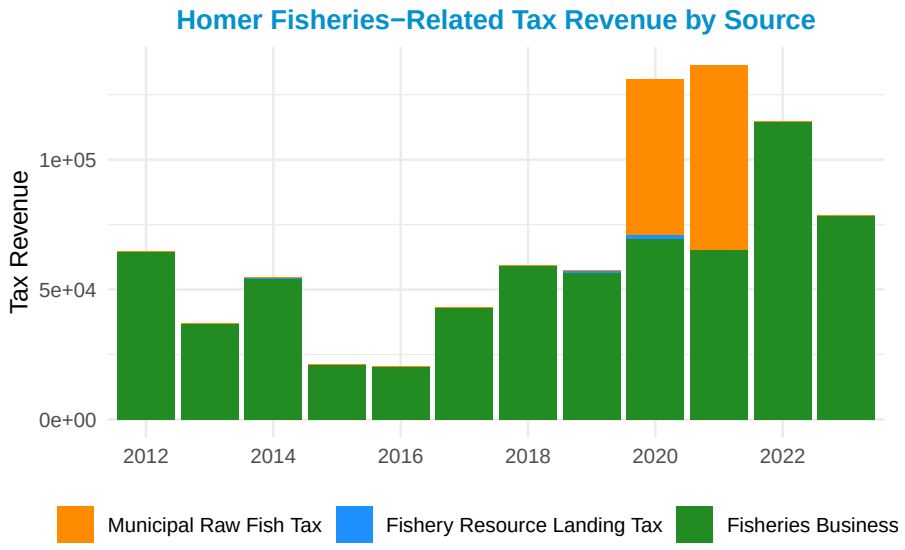
While commercial fishing has long been the mainstay of the Homer economy, tourism has become increasingly prominent.[6] In 2022, Homer generated $3,559,504 in property tax and $12,178,465 in sales tax.[7]

These revenues support city services including education, sanitation, and transportation. In 2022, per capita income was estimated to be $42,604 and the median household income was estimated to be $69,757.8 The percentage of the population living below the poverty line was 12.7%, a slight downtick from last year.8 These measures are important for understanding the current economic wellbeing of residents and indicate potential changes in their economic security. Additionally, these factors contribute to the community's ability to adapt to stressors, such as food security issues and climate change.

[6] Alaska Community Survey, Alaska Fisheries Science Center 2013

[7] Tax data from AK. Dept. of Revenue, Annual Reports 2008 2008-2021. Retrieved 06/30/2022 from http://tax.alaska.gov/programs/sourcebook/index.aspx aspx; and Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retrieved 10/2022.





8.0.0.6. Climate Change Vulnerability and Adaptive Capacity

8.0.0.6.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include impacts to the biological organisms and physical landscape surrounding them, aids in determining their vulnerability. Biophysical risks to the Gulf of Alaska as a whole include sea level rise, coastal erosion, extreme weather events, changes in precipitation (rates, timing, and snowpack), increasing landslides and avalanches, and increased storm severity. The City of Homer's Hazard Management Plan[8] describes the potential biophysical hazards of climate change as: sea level rise, coastal erosion, increased average annual maximum temperature, increased average annual precipitation, severe moisture deficit/drought, and wildfires. The plan further details these biophysical effects as:

[8]City of Homer. (2018). City of Homer All All-Hazard Mitigation Plan. https://www.cityofhomer-ak.gov/sites/default/files/fileattachments/fire/page/42801/red_for_web_homer_ahmp_2018_update_final.pdf

- Sea level rise: 15% of the critical facilities and infrastructure in the city are in the low-lying areas on the Homer Spit and will be at risk of inundation. Flooding due to sea level rise will cause destructive erosion; flooding; and soil contamination with salt; loss of habit for fish, birds, and plants; disruption and/or delay of transportation; and damages to homes and businesses on a more regular basis.
- Temperature and precipitation: SNAP temperature models show that all of Homer will experience a temperature increase of 5.3ºF by the end of the century, while precipitation models show that for the same reporting period, Homer will see an average rainfall increase of 2.8 inches. In the summer, an increase in temperature will cause an increase in fire risk.
- Mega storms that are linked to climate change can cause severe flooding. Along the coast, deadly and destructive storm surges may push farther inland than they once did, which means more frequent nuisance flooding.

8.0.0.6.2. Dependence on Fisheries Affected by Climate Change

Reliance on fishery resources affected by climate change may influence a community's degree of vulnerability to climate driven disruption. The city of Homer is highly engaged in commercial fishing activities, including groundfish harvesting and processing. A number of fishery downturns have affected the community in the last several years. In 2020, and again in 2023, the Homer community experienced a closure of commercial Chinook salmon fisheries in Cook Inlet federal waters. In 2024, much of the Gulf of Alaska experienced substantially worse than projected pink salmon returns. The Lower Cook Inlet harvested just over 8.5 thousand pink salmon, compared with an 11-year average of 600,000 pink salmon.[9] Recent fishery closures compound market volatility and associated steep price declines in 2023. In turn, these events compound increased costs and decreased revenues during the COVID pandemic as well as the closure of the directed commercial Pacific cod fishery in the Gulf of Alaska in 2020, which greatly affected numerous fishermen in Homer.

Recreational and subsistence fishing also play important roles in Homer's economy, wellbeing, and culture. Sport fishing provides an additional source of food, and supports the local economy through the money spent on lodging, guide services, equipment, and supplies.[10] In 2024, multiple Chinook sport fisheries were closed around Homer due to preseason projections of salmon returns.

Subsistence fishing is an important part of Homer's fisheries. Subsistence practices continue to support social networks and cultural identity, increased nutritional options, and contribute to food security in the region.

As the effects of climate change continue to impact commercial, recreational, and subsistence fisheries in this region, Homer is vulnerable to economic and social disruption.

NOAA Fisheries developed a national Community Social Vulnerability Indicators Toolbox that currently comprises a suite of 14 statistically robust social, economic, and climate change indicators that attempt to characterize and evaluate a community's vulnerability and resilience to disturbances

[9] Lopez, S. (2024, October 10). *After tough salmon season, Lower Cook Inlet fishermen say it will be a struggle to stay afloat.* KBBI. https://www.kbbi.org/local-news/2024-10-10/after-tough-salmon-season-lower-cook-inlet-fishermen-say-it-will-be-a-struggle-to-stay-afloat

[10] Alaska Dept. of Fish and Game. (2009). Economic Impacts and Contributions of Sportfishing in Alaska. https://www.adfg.alaska.gov/static/home/library/pdfs/sportfish/2007economic_impacts_of_fishing.pdf

Homer	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED-HIGH
Poverty	MED
Population Composition	LOW
Personal Disruption	LOW

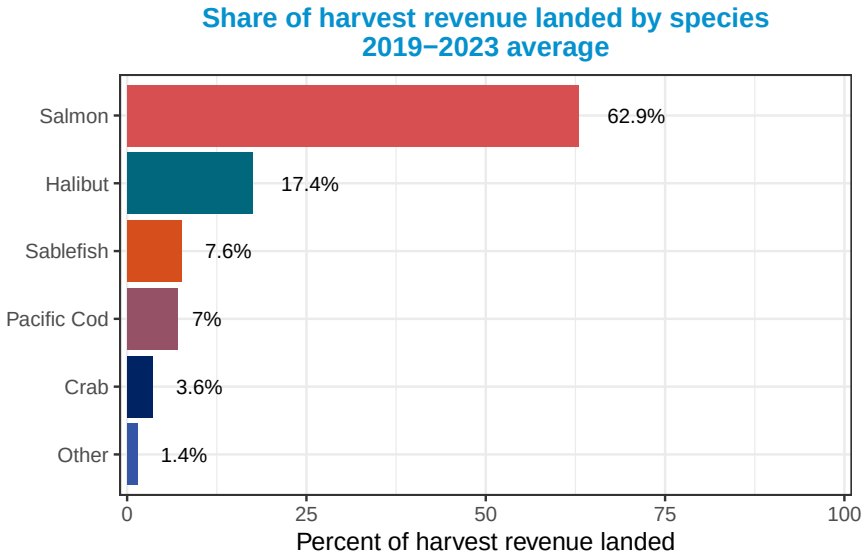
Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

(such as regulatory shifts, extreme weather, oil spills, sea level rise, etc.). A selection of these indicators most relevant to the Alaska region is included below.

8.0.0.6.3. Local Adaptive Capacity

Social indicators for Homer indicate that labor force structure, population composition, and levels of personal disruption are low risk; however poverty levels are medium risk and infrastructure in the community, specifically housing characteristics, have a moderately high vulnerability to coastal hazards which therefore increases overall vulnerability.[11] These indicators serve to inform about a community's potential vulnerability in the face of diverse stressors, including climate change. However, it is important to keep in mind that these indicators are not specific to the fishing fleet, which could have different levels of vulnerability than the overall community.

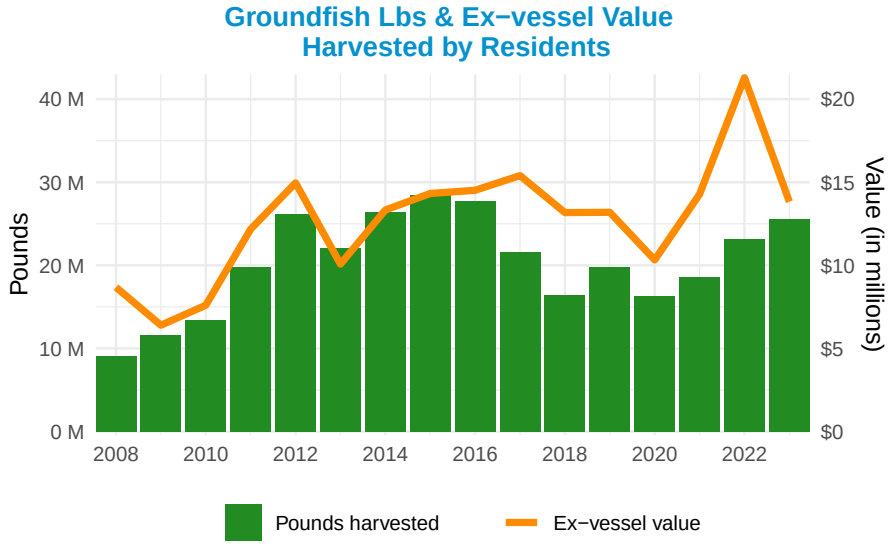
8.0.0.7. Groundfish Harvesting Engagement - HIGH

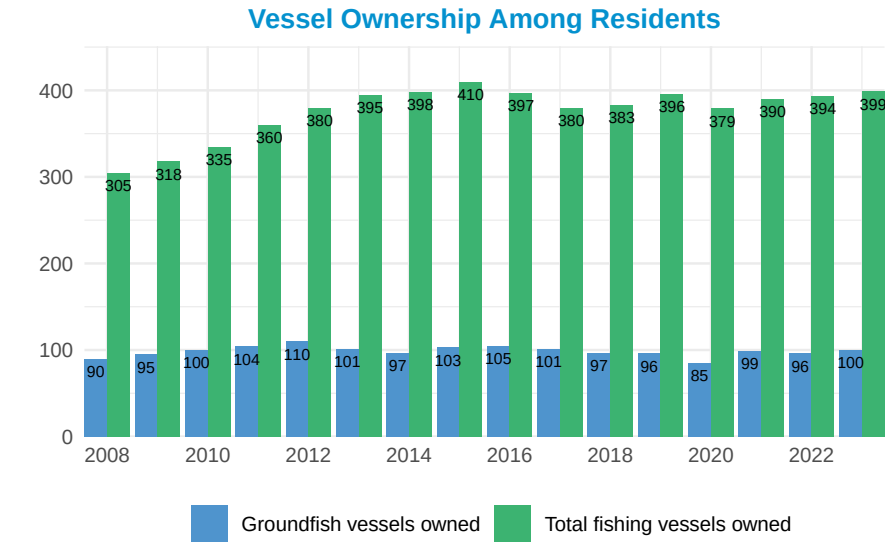


Homer fishers are diversified in commercial fisheries, including salmon, halibut, crab, groundfish, and herring. Salmon dominates the share of harvest revenue; however, a number of fishing vessels

[11]NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

use Homer as a base of fishing operations.18 In 2023, 399 (up by 5 vessels) vessels were registered to Homer residents, of which 100 (up by 4 vessels) were groundfish vessels. On average, from 2019-2023, the majority of harvest revenue came from salmon (63%) (down by 2% from last year), then halibut (17%) (up by 1%). Fishing vessels owned by Homer residents continued a slight downward trend from a peak of 410 in 2015 to 390 in 2021, then gained 4 in 2022 and 5 more in 2023 (up by 2.3% from 2021). In 2020, ownership of groundfish vessels was at its lowest across the entire 2008-2023 period, increasing in 2023 to 100 vessels. The pounds of groundfish harvested increased to 25.5 million pounds (up 10% from last year). Meanwhile, the ex-vessel value declined, bringing in $13.8 million (a decrease of 35%).

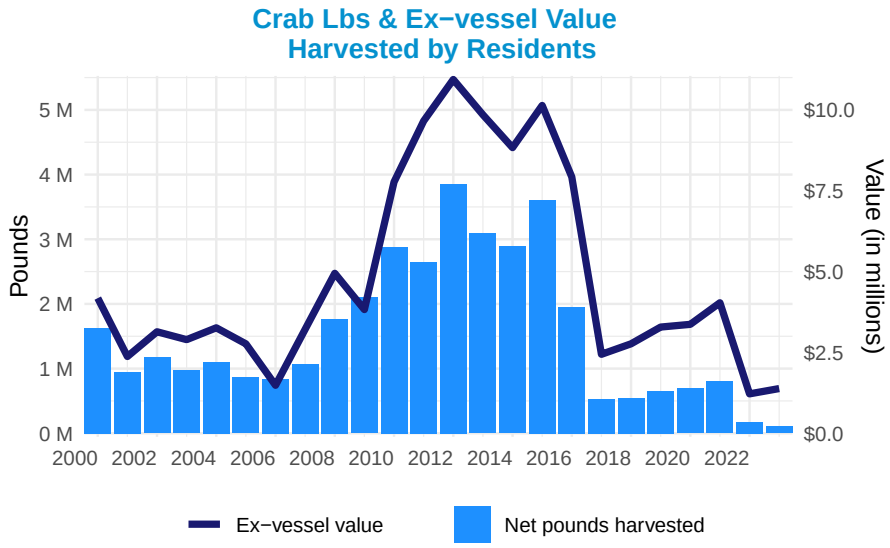


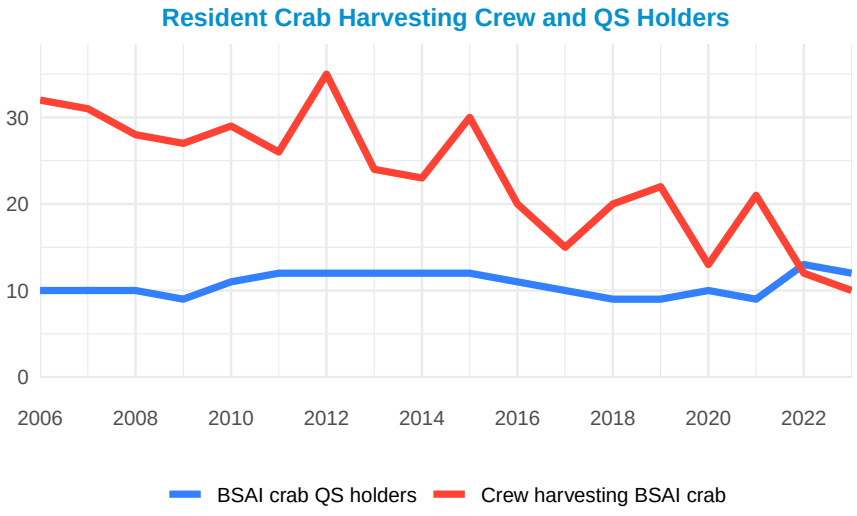


8.0.0.8. Crab Harvesting Engagement - MEDIUM

Homer's resident vessels harvesting BSAI crab fisheries saw a dramatic decline in both harvest volume and associated ex-vessel value in 2022. In 2016, BSAI harvests decreased by 1.6 million

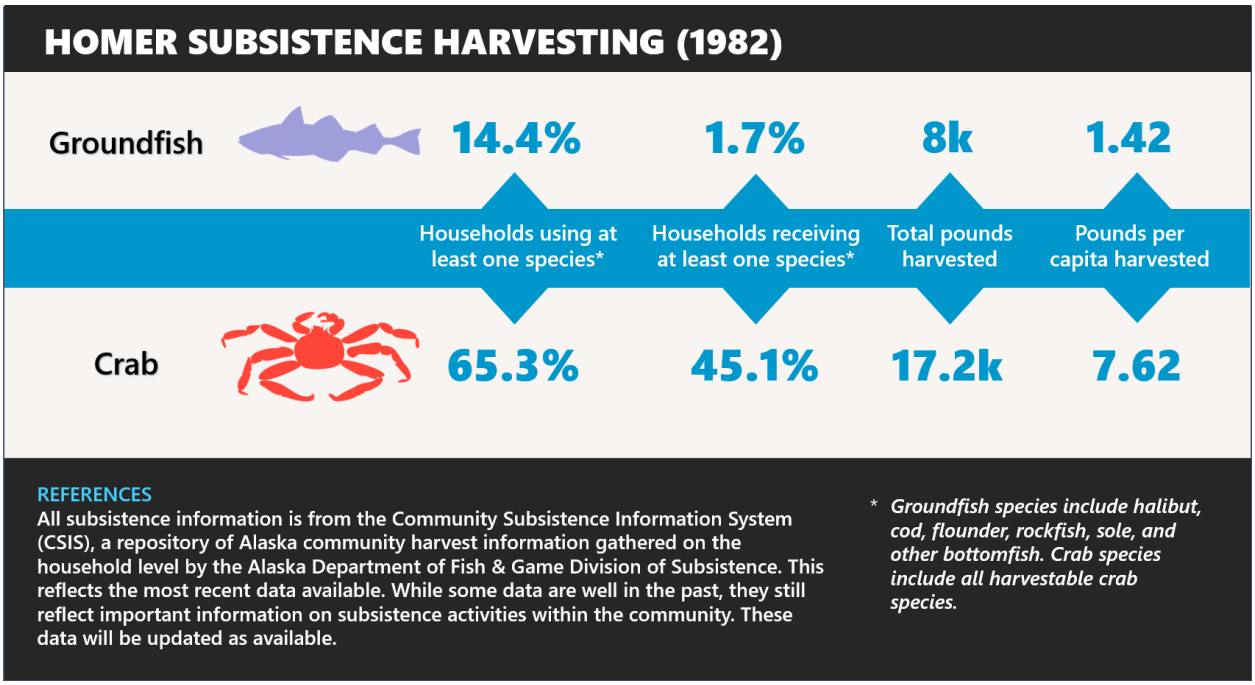
pounds (44%), and $2.2 million (22%) compared to 2015. In 2017, harvests fell again by 1.4 million pounds (73%) and $5.5 million in ex-vessel value (down 70%). BSAI crab fisheries began a gradual upward slope until 2022, when both pounds harvested and ex-vessel value plummeted further. Homer's resident vessels harvested 105K pounds (down 40% from 2022) of BSAI crab with an ex-vessel value of $1.4 million (up 13% from 2022) in 2023. Quota shareholders decreased from 13 (2022) to 12 (2023). The number of crew residing in Homer participating in FMP crab fisheries continued to fall from 12 (2022) to 10 (2023).





*Includes crew and quota holders in rationalized crab fisheries only

8.0.0.9. Subsistence Harvesting



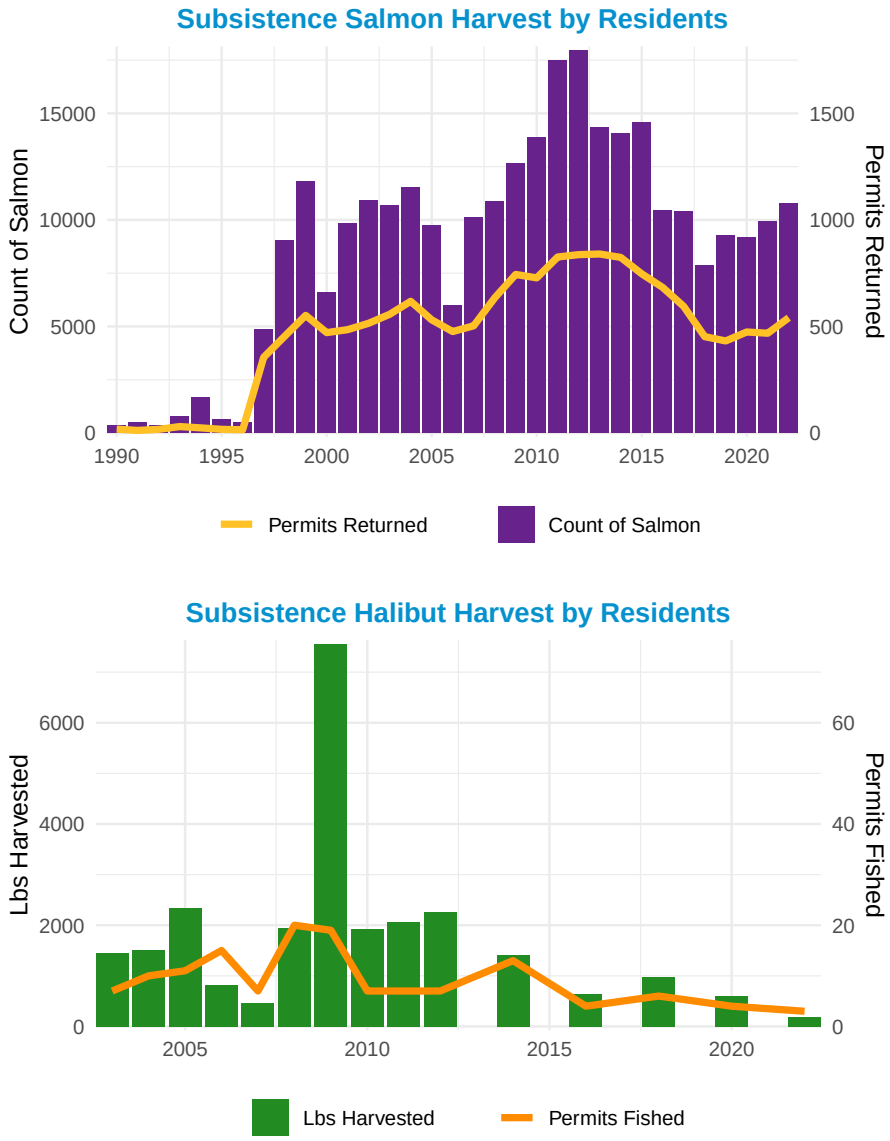
The residents of Homer take part in a wide range of subsistence hunting and fishing activities. While there is limited data on this community's subsistence engagement, with the most recent comprehensive data for Homer in the State of Alaska's Community Subsistence Information System dating from 2008, the data provides a snapshot into the historic use of these fisheries in this community. Historically, Homer residents have been highly engaged in subsistence with a widely diverse harvesting portfolio that included salmon, crab, bivalves, seabirds, and marine mammals. In 2022, the number of Alaska subsistence and personal use permits was 541 (14% increase from 2020), harvesting a total of 10.8 thousand fish across all species of salmon, with 90% sockeye salmon.[12] Many of these fishers have strong social networks in the area and participate in the subsistence economy through harvesting and sharing their catch.[13] Homer has seen an increase in salmon subsistence harvest and a decrease in subsistence halibut. In 2022, the number of Halibut subsistence permits (SHARC) issued was 3 harvesting 182 pounds of halibut (a decrease of 70% compared to 2020). This could be due to the COVID-19 pandemic, which likely affected residents' ability to participate in the fishery.[14][15]

[12] Brown, Caroline L., T. Bembenic, M. Brown, H. Cold, J. Coleman, E. Donaldson, J. Egelhoff, B. Jones, J.M. Keating, L.A. Sill, M. Urquia, C. Wilcox, and T. Barnett. 2023. Alaska Subsistence and Personal use Salmon Fisheries 2020 Annual Report. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 494, Anchorage.

[13] Brown, Caroline L., T. Bembenic, M. Brown, H. Cold, J. Coleman, E. Donaldson, J. Egelhoff, B. Jones, J.M. Keating, L.A. Sill, M. Urquia, C. Wilcox, and T. Barnett. 2023. Alaska Subsistence and Personal use Salmon Fisheries 2020 Annual Report. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 494, Anchorage.

[14] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

[15] Alaska Department of Fish and Game Division of Subsistence. 2011. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.



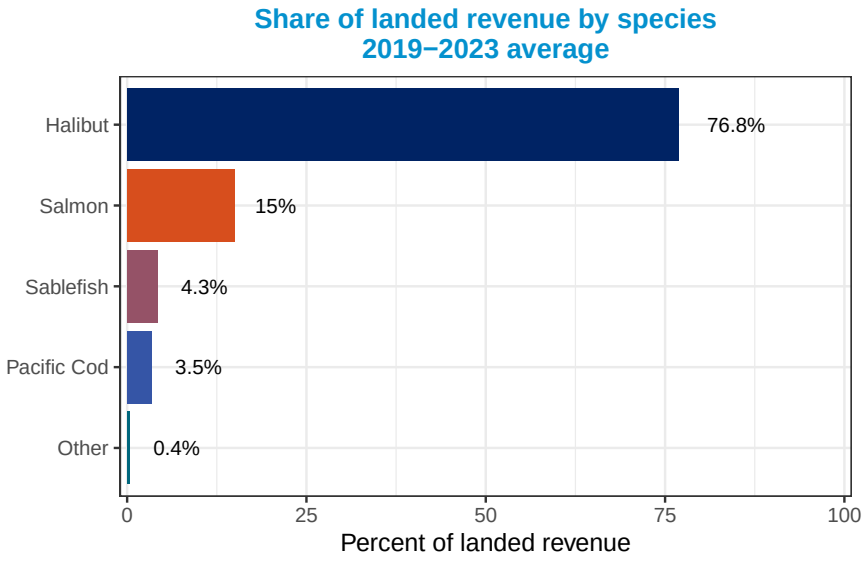
8.0.0.10. Recreational Fishing Engagement

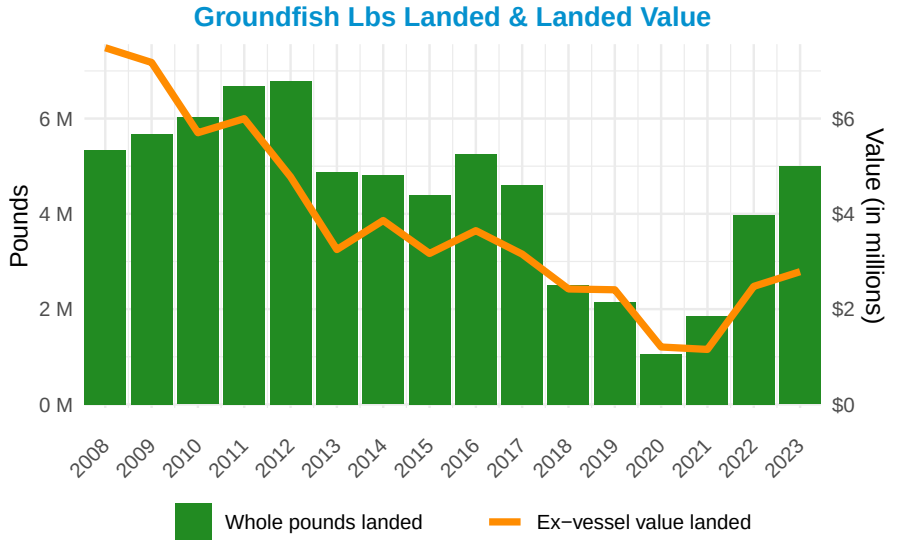
Homer is one of the four communities in Alaska that has been highly engaged in recreational fishing in all years 2004-2023 as well as highly engaged in commercial fishing (harvesting or processing), the others being Kodiak, Seward, and Sitka. Homer consistently ranked sixth or seventh highest engaged community over this period but has recently increased its engagement score to a new high in 2023.

8.0.0.11. Groundfish Processing Engagement - MEDIUM-HIGH

Although halibut dominates the processing sector (accounting for 76.8% of landed value on average from 2019-2023), Homer is one of the leading groundfish processing communities in Alaska. In 2023, Homer's processing sector processed 5 million pounds of groundfish with an associated ex-vessel

value of $2.8 million. This represents a 25% increase in pounds harvested and a 12% increase in ex-vessel value from 2022. Pollock showed the largest decline, with volume dropping 28% compared to 2022 and 64% in associated value. Sablefish also showed decreases in volume (-14% from 2022) and value (-51% from 2022). In 2023, groundfish comprised 38% of total volume processed in Homer, a 18% increase since 2021, and 10% of processing revenue, up 6% from 2021. The number of processors increased in 2023 to 91, from 71 processors in 2022.





8.0.0.12. Crab Processing Engagement - LOW

There is not a substantial amount of crab processing activity in Homer to report.

9. Akutan

9.0.0.1. Area Description & History

Akutan is located on Akutan Island, one of the Krenitzin Islands in the Fox Island group of the eastern Aleutians, 35 miles east of Unalaska and 766 miles southwest of Anchorage, with 14 square miles of land and 4.9 square miles of water. The area has been continuously inhabited by the Unangan people for at least 8,000 years.[1] Subsistence activities are essential for the year-round Unangan residents, who harvest salmon, cod, herring, and other species from local waters. Established as a fur storage and trading port in 1878 by the Western Fur & Trading Company (later acquired by the Alaska Commercial Company), Akutan gained further industry in 1912 with the Pacific Whaling Company's whale processing station across the bay. Commercial fishing started in the late 1800s, and today, Akutan hosts one of the world's largest shoreside processing plants. Crab fisheries began in 1930, accelerating in the 1950s as the Bering Sea king crab industry developed, peaking in the 1970s and early 1980s before declining.

While commercial fishing drives Akutan's formal economy, the Native Village of Akutan—geographically, demographically, and historically distinct from the processing facilities—is home to the year-round Unangan residents which is socially distinct from seafood employee residents. U.S. Census numbers the Akutan's population at 713 in 2000, 1,027 in 2010, and 1,589 in 2020; however, population fluctuates with seasonal fisheries employment. Interviews with the Traditional Council estimated permanent residents in 2000 to be only 80 individuals, and 100 in 2020. The bulk of the remaining balance of the population reside in company housing creating a divided community.[2] Incorporated as a second-class city in 1979, Akutan falls under the jurisdiction of the Aleutians East Borough. In 1992, residents successfully petitioned to join the Community Development

[1]Downs, M., & Henry, A. (2023). Baseline commercial fishing community profile updates: Akutan and Unalaska, Alaska. Prepared for the North Pacific Fishery Management Council. Wislow Research.

[2]Downs, M., & Henry, A. (2023). Baseline commercial fishing community profile updates: Akutan and Unalaska, Alaska. Prepared for the North Pacific Fishery Management Council. Wislow Research.

Quota (CDQ) program through the Aleutian Pribilof Islands Community Development Association, highlighting limited benefits from the local fishing facilities. The Akutan Corporation serves as the local ANCSA village corporation, with the Aleut Corporation as the regional corporation and the Aleutian Pribilof Islands Association as a central Native association. Akutan is located in Federal Reporting Area 519, International Pacific Halibut Commission (IPHC) Regulatory Area 4B, and the Aleutian Islands Sablefish Regulatory Area.

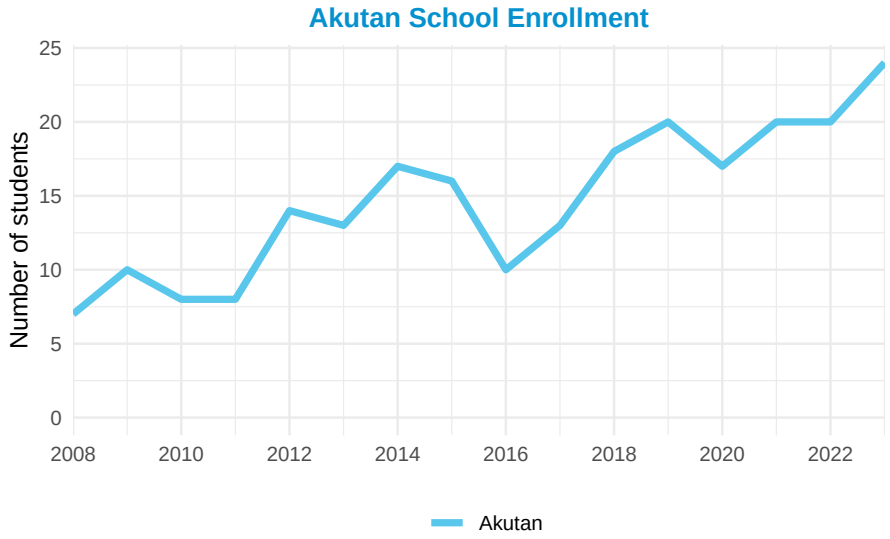
9.0.0.2. Infrastructure & Transportation

Akutan's airport, located seven miles away on Akun Island, opened in 2012 and serves the community by helicopter. The state ferry provides weekly service from May to September. Akutan has a 100-foot public dock with moorage for 58 vessels. Recently, the City of Akutan, the Aleutians East Borough, and the Army Corps of Engineers partnered to develop a new harbor, creating a 12-acre mooring basin for up to 57 large fishing vessels.[3] The project completed public review in summer of 2023. Trident Seafoods currently owns several commercial docks and processing facilities in Akutan; however in spring 2022, they began building a new processing facility in Unalaska that will eventually replace the Akutan facilities.[4] The recent Peter Pan Plan closures may temporarily increase activity at Akutan's facilities. These changes in regional processing are likely to significantly impact Akutan. Akutan's water comes from a stream and dam built in 1927, with sewage treated in a community septic tank.[5] Electricity is primarily hydro-powered with diesel backup, and heating relies on fuel oil and kerosene. There is one school in Akutan, where enrollment rose from 17–20 students in 2022 to 24 in 2023, remaining steady in 2024. Enrollment fluctuates with fisheries employment, hitting the state minimum of 10 students in 2017. A school closure would greatly impact Akutan's social fabric and reduce access to educational and community resources.[6]

Demographics	
Population	1585
Population in group housing	1476
Median household income	28,750
Housing units	67
Percentages	
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%
Hispanic or Latino	19%
Below poverty line	20.2%
High school diploma or higher	76.7%
Population under 5	1.8%
Population over 18	96.6%
Population over 65	5.6%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

9.0.0.3. Demographics



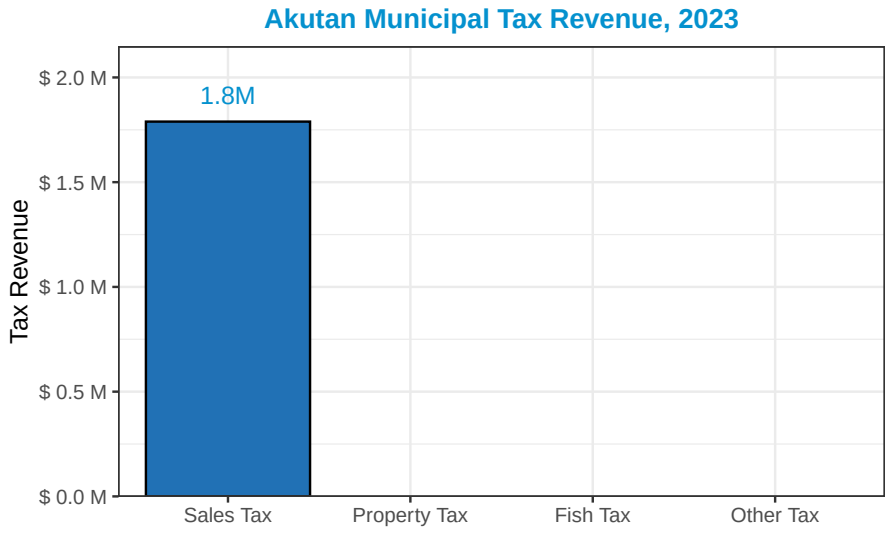
[3]APICDA. (n.d.). Akutan. Retrieved November 14, 20204 from https://www.apicda.com/communities/akutan/.
[4]Greenly, T. (2023, July 28). *Trident's new processing plant in Unalaska will be the largest in North America.* Alaska Public Media. https://alaskapublic.org/2023/07/28/tridents-new-processing-plant-in-unalaska-will-be-the-largest-in-north-america/
[5]Aleutian Pribilof Islands Association. (n.d.). Akutan. https://www.apiai.org/tribes/akutan/
[6]School enrollment statistics compiled from AK. Dept. of Education & Early Development: http://www.eed.state.ak.us/stats/

9.0.0.4. Current Economy

Akutan's economy centers on commercial fishing and subsistence harvests, which are vital for year-round residents as a source of food, social structure, and cultural identity. Trident Seafoods' Akutan plant, the largest seafood production facility in North America, has capacity to process over three million pounds daily and houses 1,400 employees during peak seasons.[7] Akutan levies a 1.5% sales tax which applies to raw seafood products and imported goods. This tax applies to all raw seafood products and imported property from outside Akutan. This generated $2,061,636 in 2022 in sales tax. During the same year, Akutan received $6,054,977 in Raw Fish Tax (at a rate of 2%).[8]

Additionally, the Alaska Fisheries Business Tax is collected on businesses that process or export fisheries resources from Alaska. The tax revenue is shared with the incorporated city or organized borough where the processing took place. The tax rate depends on the type of processor and the type of fishery resource being processed: Floating processors - 5% for established processors, 3% for developing fishery resources; Salmon canneries - 4.5% for established; Shore-based processors - 3% for established processors, 1% for developing fishery resources.[9]

In 2023, Akutan received $358,462.45 in Shared Fisheries Tax (a 25% increase from the previous year). In 2024, the amount returned to Akutan was $217,807.54 (down 65%), a substantial decline in tax revenue for the municipality.[10] These revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and well-being.

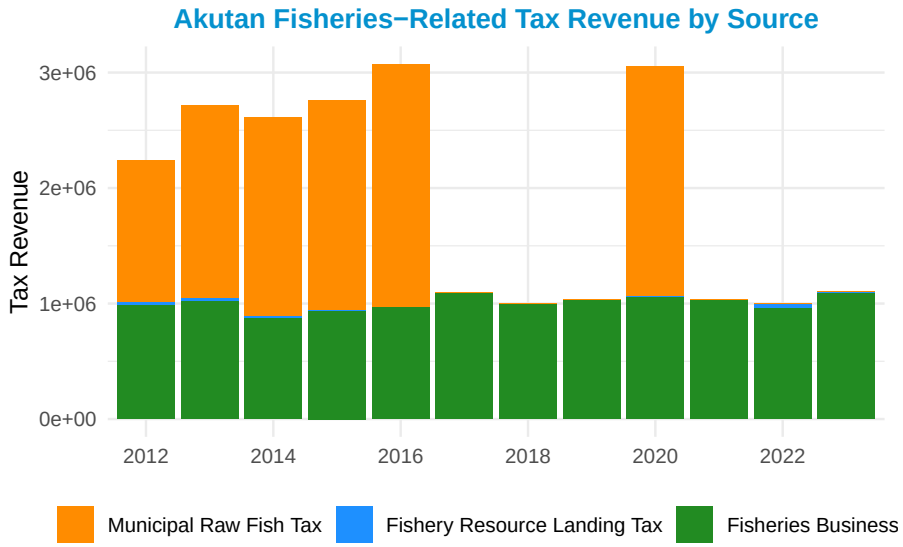


[7] Trident Seafoods. (n.d.). *Our plants.* Trident Seafoods. Retrieved November 14, 2024 from https://www.tridentseafoods.com/about-us/our-facilities-and-global-reach/our-plants

[8] Alaska Department of Commerce, Community and Economic Development, Office of the State Assessor. Alaska Taxable 2022. https://www.commerce.alaska.gov/web/Portals/4/pub/OSA/taxable%20reports/2022%20Alaska%20Taxable%20Report.pdf.

[9] Alaska Department of Commerce, Community, and Economic Development, Community and Regional Affairs. Grants & Funding Status Reports. https://www.commerce.alaska.gov/dcra/eGrantsOnline/Home

[10] Alaska Department of Commerce, Community, and Economic Development, Community and Regional Affairs. Grants & Funding Status Reports Database. 2023 Shared Fisheries Tax. https://www.commerce.alaska.gov/dcra/eGrantsOnline/Home



9.0.0.5. Climate Change Vulnerability and Adaptive Capacity

9.0.0.5.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in evaluating their vulnerability. The Aleutian islands are expected to continue experiencing increased temperatures and precipitation, and increased summer storms. In Akutan, both temperature and precipitation have increased.[11] Reduced sea ice will affect ecosystem processes and ice dependent species.[12]

9.0.0.5.2. Dependence on Fisheries Affected by Climate Change

Reliance on those fisheries resources impacted by climate change can influence community vulnerability to climate-driven disruption. As a highly engaged commercial fishing community, Akutan will be directly affected by shifts in species condition and abundance, marine safety, and storm events. In addition, key subsistence fisheries (such as salmon, halibut, and cod) are affected by changing environmental conditions, leading to nutritional impacts and subsistence practices. Akutan residents may be vulnerable to climate driven disruptions which will affect livelihoods and subsistence activities.

9.0.0.5.3. Local Adaptive Capacity

Akutan has high limitations in its adaptive capacity due to its rural location and heavy reliance on the seafood processing sector.[13] Additionally, the FEMA National Risk Index identified that

[11] Schmidt, J., & Berman, M. (2018). Adapting to Environmental and Social Change: Subsistence in Three Aleutian Communities.

[12] Aleutian & Bering Climate Vulnerability Assessment -ABCVA. Unalaska Lecture & Community Discussion Discussion-September 2014. https://legacy.aoos.org/wp wp-content/uploads/2011/05/Unalaska Unalaska-workshopworkshop-9.18.149.18.14-withwith-resultsresults-andand-notenote-3.pdf

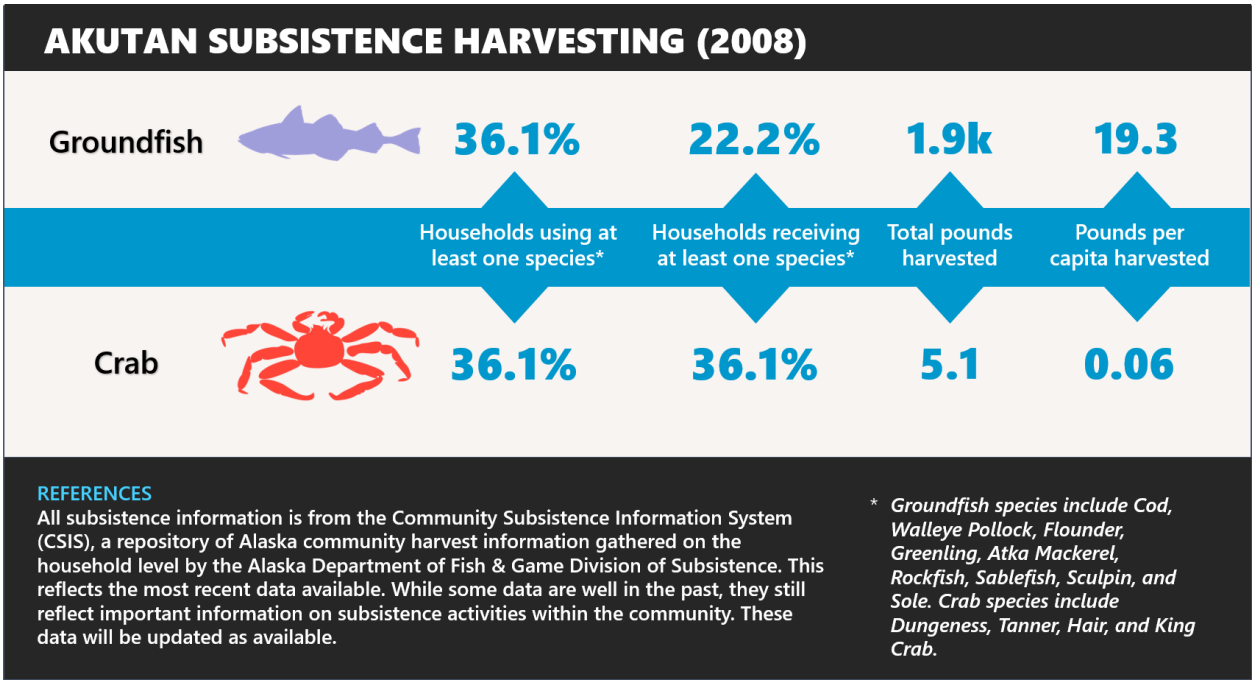
[13] Himes-Cornell, A., & Kasperski, S. (2015). Assessing climate change vulnerability in Alaska's fishing communities. Fisheries Research, 162, 1–11. https://doi.org/10.1016/j.fishres.2014.09.010

Akutan	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	HIGH
Poverty	HIGH
Population Composition	HIGH
Personal Disruption	MED-HIGH

Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

the Aleutians East region has very low levels of community resilience.[14] These ratings takes into account community characteristics which can hinder withstanding and recovering rapidly from climate-driven disruptions occur, specifically, limited housing, vulnerable community infrastructure, substantial numbers of people living under the poverty line, and community members who live or work in less stable conditions. Therefore, if Akutan residents are biophysically impacted by climate change, and when the fisheries resources they rely on are impacted, adaptive capacity is substantially limited.

9.0.0.6. Subsistence Harvesting Engagement

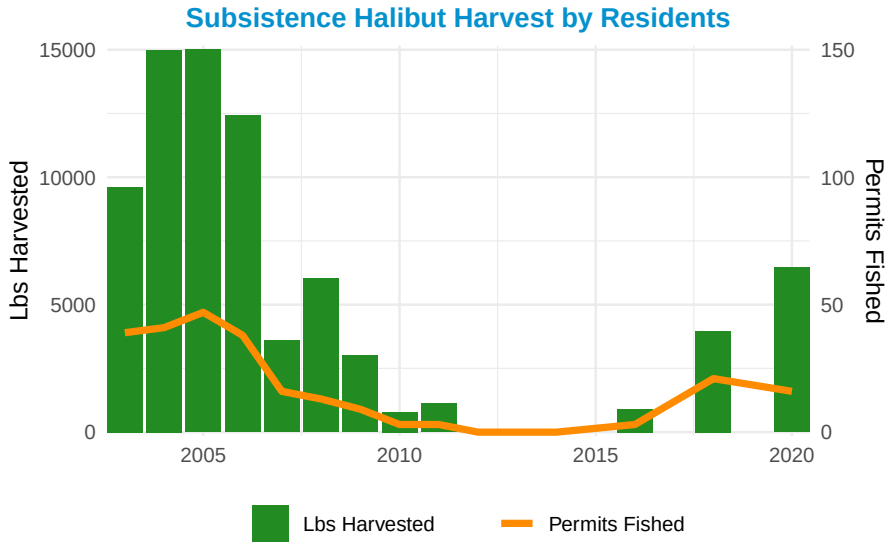


Subsistence activities are important to the Unangan community as many other residents of Akutan.[15] Permits are not required for salmon subsistence harvest in Akutan, no harvest assessment

[14]Federal Emergency Management Agency. (n.d.). *National Risk Index: Aleutians East Borough, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02013

[15]Downs, M., & Henry, A. (2023). Baseline commercial fishing community profile updates: Akutan and Unalaska, Alaska. Prepared for the North Pacific Fishery Management Council. Wislow Research.

programs are in place, and ADFG does not monitor salmon runs due to the absence of a commercial salmon fishery, creating uncertainty in subsistence harvest data.[16] The most recent available data from the Community Subsistence Information System (CSIS) is dated (2008); however it does provide some insight into subsistence use in the community. According to CSIS data, 100% of households in Akutan use subsistence species, fish being the largest resource group (94%); of which salmon comprises 89%. Akutan harvests all five species of salmon, which together makes up the largest component of Akutan subsistence harvest (estimated to be 12,023 pounds in 2008). Other top marine species include seabirds and eggs, marine mammals, char, and halibut. The most common species of groundfish harvested are cod and rockfish.[17] There is scarce data available for subsistence salmon harvests. Those data available are limited due to confidentiality guidelines. In 2020, there were 50 SHARC card holders who reported an estimated total of 157 whole fish and 6,458 pounds of halibut caught for subsistence purposes. In 2022, only one active SHARC card holder was reported.[18]



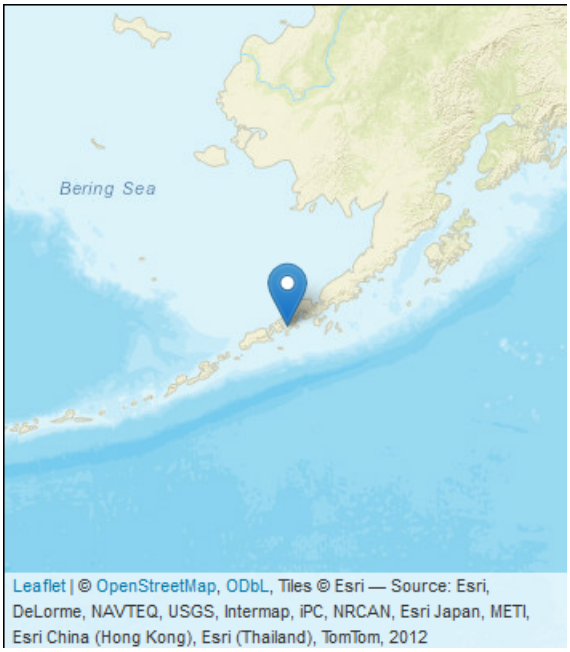
[16] Downs, M., & Henry, A. (2023). Baseline commercial fishing community profile updates: Akutan and Unalaska, Alaska. Prepared for the North Pacific Fishery Management Council. Wislow Research.

[17] Alaska Department of Fish and Game. Community Subsistence Information System: CSIS. https://www.adfg.alaska.gov/sb/CSIS/

[18] Sill, L.A. and D. Koster. 2022. Subsistence Harvests of Pacific Halibut in Alaska, 2020. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 485, Anchorage.

10. King Cove

10.0.0.1. Area Description & History



King Cove (also known as Agdaaĝuxˆin Aleut) is located on the south side of the Alaska Peninsula, 18 miles southeast of Cold Bay and 625 miles southwest of Anchorage. It is located in the midst of a storm corridor, which often brings extreme fog and high winds. Historically, the Aleut people, the original inhabitants of the island, harvested salmon, cod, herring, and other species around King Cove. Subsistence harvest continues to be important among the island's Native population today. Unangam tunuu was the language traditionally spoken, however, today only about 109 individuals speak this language.[1] In 1911, Pacific American Fisheries built a salmon cannery, and in 1949, the city of King Cove was incorporated. The first settlers were Scandinavian, European, and Unangan fishermen. Year round residents are largely Aleutic, with a large influx of temporary workers in March and again in June and July, driven by seafood processing employment. King Cove was included under the Alaska Native Claims Settlement Act (ANCSA), and is federally recognized as a Native Village. The Agdaaĝuxˆ Aleutian Pribilof Islands Association is the main Native Association active there today.

10.0.0.2. Infrastructure & 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 operates monthly between May and October, and uses one of three available docks. A deep water dock is also operational. The North Harbor provides moorage for 90 boats, and is ice-free all year. A new harbor and breakwater is under construction by the Corps of Engineers and Aleutians East Borough. Once completed, a new harbor will be operated by the City, and will provide additional moorage for 60 to 150 vessels.[2] According to the municipality,

[1] APICDA. (n.d.). Aleut Culture. Retrieved November 8, 2024 from https://www.apicda.com/communities/aleutculture/

[2] City of King Cove. (n.d.). About King Cove Alaska. Retrieved November 14, 2024 from https://cityofkingcove.com/about-king-cove-alaska/.

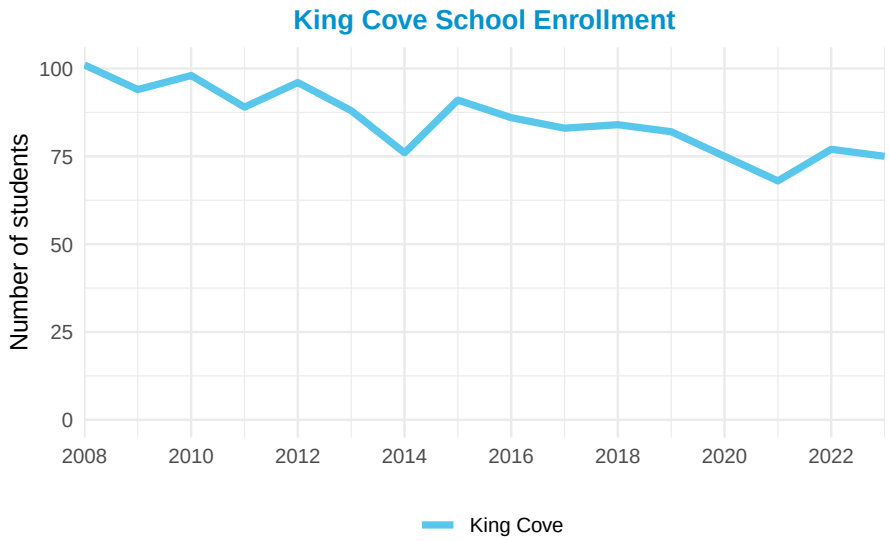
10. King Cove

Demographics	
Population	874
Population in group housing	452
Median household income	79,844
Housing units	395
Percentages	
Male	58.8%
Female	41.2%
White	12.6%
American Indian or Alaska Native	49.3%
Black or African American	0.3%
Asian	23%
Native Hawaiian or Pacific Islander	0%
Hispanic or Latino	4.8%
Below poverty line	12.8%
High school diploma or higher	82.9%
Population under 5	3.3%
Population over 18	81.4%
Population over 65	11.8%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

all King Cove residents are connected to a water pipeline supplied by Ram Creek. King Cove is one of the leaders of renewable energy in rural Alaska, and 2020 marked 25 years of hydroelectric power for King Cove hydroelectric facilities on the Delta Creek and more recently, the Waterfall Creek hydro facility coming online in 2017. The landfill is nearing capacity with plans to expand solid waste infrastructure from a USDA grant announced in 2018.[3] The landfill is nearing capacity with plans to expand solid waste infrastructure from a USDA grant announced in 2018.[4] There is one local health clinic. There is one school in King Cove and enrollment has decreased by 32.7% from 2008-2021, but increased in 2022 to 77 students (up by 12% from the previous year). In 2023, enrollment dropped slightly (3%).

10.0.0.3. Demographics



[3]Chase, J. (2023, January 23). *Small hydro reduces diesel dependence in Alaska.* National Hydropower Association. Retrieved November 8, 2024, from https://www.hydro.org/powerhouse/article/small-hydro-reduces-diesel-dependence-in-alaska/

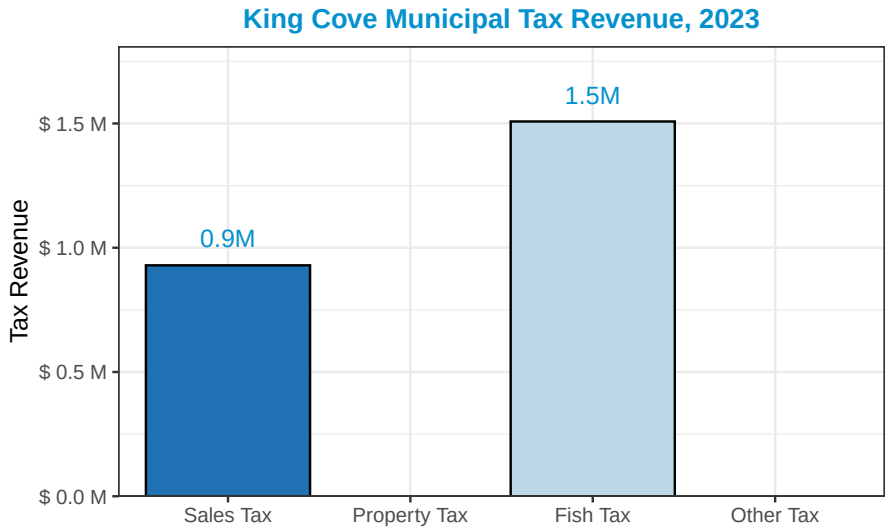
[4]Huff, Jessie. (2018). USDA Helps Improve Solid Waste Infrastructure for the City of King Cove. USDA Rural Development. U. S. Department of Agriculture. https://www.rd.usda.gov/newsroom/news-release/usda-helps-improve-solid-waste-infrastructure

10.0.0.4. Current Economy

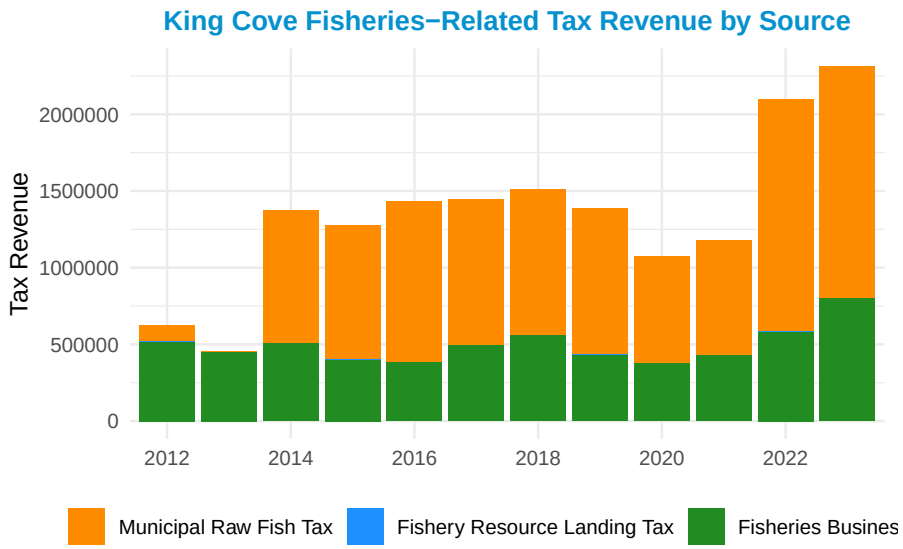
King Cove's economy has depended almost entirely upon year round fishing and seafood processing. It is home to Peter Pan's largest processing facility, which has historically processed king crab, bairdi and opilio tanner crab, pollock, cod, salmon, halibut and black cod. After announcing partial seasonal closure, Peter Pan Seafoods announced in January 2024 that it would close its King Cove facility for the 2024 fishing season. The company cited cost and cash flow problems, including inflation, rising interest rates, high fuel costs, and financing challenges.[5] The plant was the main employer in the community, employing around 500 employees year round. The municipality's general fund relied heavily on fish taxes and sales taxes relating to fisheries. The facility also provided some city services including heating fuel for residents.

King Cove generated $805,169 in Fisheries Business Tax in 2023 (the most recent available data). This represents a stepwise yearly increase since 2020 (for a total increase of 53% in the past four years); however these data do not reflect the 2024 tax year. According to Shared Fish Tax reports, there was an increase in tax from 2022 to 2023 by 16%. With King Cove's seafood facility closing in 2024, reported shared fish taxes dropped from $41,386 in 2023 to $19,190 in 2024 (down 116%).

These revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and wellbeing.



[5] McDermott, C. (2024, January 12). *Peter Pan's King Cove plant will stay shut this winter.* KDLG. https://www.kdlg.org/fisheries/2024-01-12/peter-pans-king-cove-plant-will-stay-shut-this-winter



10.0.0.5. Climate Change Vulnerability and Adaptive Capacity

10.0.0.5.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in evaluating their vulnerability. The Aleutian islands are expected to experience increased temperatures and precipitation, and increased summer storm events. Similar to other Alaskan communities, they will be impacted by reduced seasonal sea ice coverage as well.[6]

In summer of 2023, the Knik Tribe found high levels of paralytic shellfish toxins (PSTs) in shellfish collected from King Cove, Sand Point, and Chignik Lagoon. Harmful Algal Blooms (HABs) are increasing in Alaska and are thought to be linked to a changing climate. Several HABs have been detected since. PSP toxins measured in blue mussels, snails, and butter clams collected from King Cove, Sand Point, and Unalaska were frequently above the FDA limit for safe consumption, sometimes as much as 100 times.[7] The Agdaagux Tribe of King Cove has their own shellfish monitoring system to reduce the risk associated with HABs and shellfish harvests.[8]

10.0.0.5.2. Dependence on Fisheries Affected by Climate Change

[6]Markon, C., S. Gray, M. Berman, L. Eerkes-Medrano, T. Hennessy, H. Huntington, J. Littell, M. McCammon, R. Thoman, and S. Trainor, 2018: Alaska. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 1185–1241. doi: 10.7930/NCA4.2018.CH26.

[7]National Centers for Coastal Ocean Science. (2020, November 2). *NCCOS supports Alaska Native efforts to detect paralytic shellfish toxins in Aleutian Islands and Alaska Peninsula.* NOAA. Retrieved November 8, 2024, from https://coastalscience.noaa.gov/news/nccos-supports-alaska-native-efforts-to-detect-paralytic-shellfish-toxins-in-aleutian-islands-and-alaska-peninsula/

[8]Alaska Native Tribal Health Consortium. (n.d.) *Climate Change.* Retrieved November 8, 2024 from https://www.anthc.org/wp-content/uploads/2015/12/11ClimateChange_2012-2.pdf.

King Cove	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED-HIGH
Poverty	MED
Population Composition	HIGH
Personal Disruption	MED

Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

Reliance on fisheries resources affected by climate change can determine how vulnerable a community is to disruption from climate change. Historically, King Cove has been highly engaged with commercial processing within the groundfish and crab fisheries; however the plant closure in 2024 will dramatically affect the community.

Climate-related factors such as warming oceans and changing weather patterns have been noted by residents as affecting their harvests of salmon in particular.[9]

As climate driven effects on fisheries continue, King Cove residents will be vulnerable to disruptions in livelihoods and subsistence activities. Climate effects on fisheries may cause broader social disruption given the community's high reliance on commercial fishing and subsistence activity.

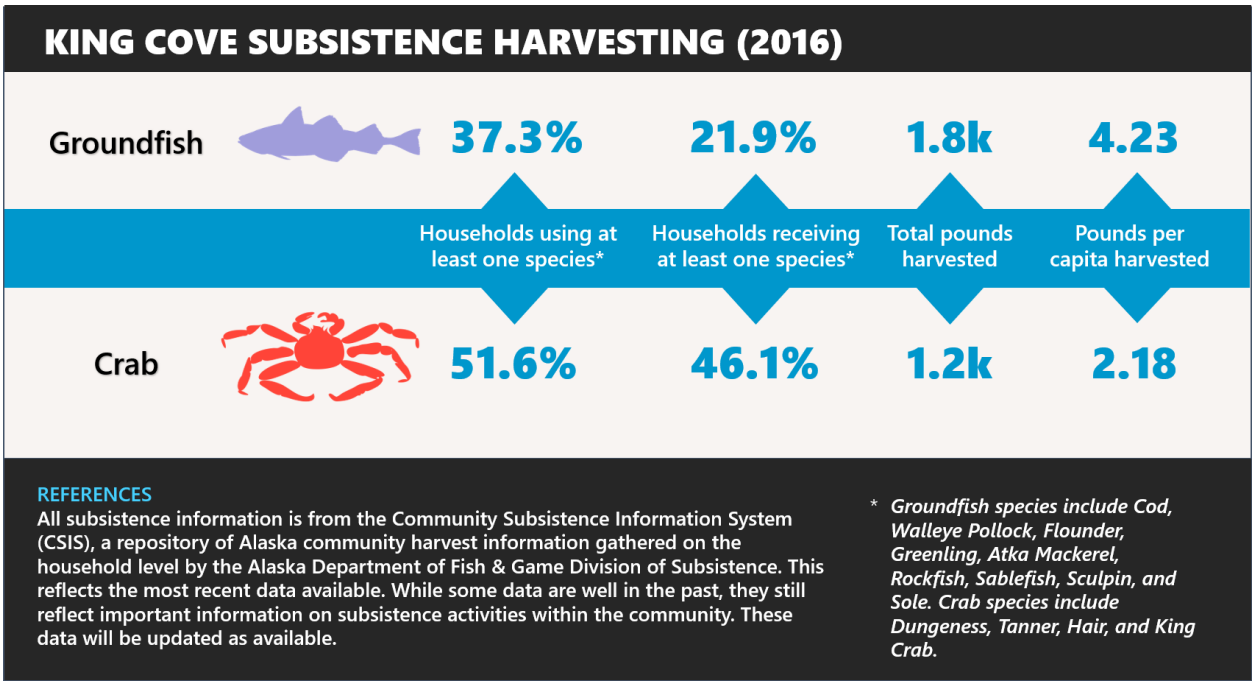
10.0.0.5.3. Local Adaptive Capacity

King Cove overall has very high limitations on its adaptive capacity. This rating accounts for factors in the community which can make it more difficult to adapt to climate driven disruptions. King Cove's high rating is due to housing and infrastructure being moderately to highly vulnerable, medium poverty levels, a portion of the population who are more vulnerable to shocks and disasters. In addition, the FEMA National Risk Index identified that the Aleutians East region has very low levels of community resilience.[10] King Cove residents have limited capacity to adapt to climate risks and recover rapidly.

[9] Aleutian & Bering Climate Vulnerability Assessment. https://legacy.aoos.org/wp-content/uploads/2011/05/Unalaska-workshop-9.18.14-with-results-and-note-3.pdf

[10] Federal Emergency Management Agency. (n.d.). *National Risk Index: Aleutians East Borough, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02013

10.0.0.6. Subsistence Harvesting Engagement



Historically, subsistence harvesting engagement is high in King Cove (salmon and shellfish in particular), and moderately high for groundfish and crab species. Residents gather foods like clams, mussels, sea urchins, chitons, seaweeds, greens, and herbs from the intertidal zones.[11] Reliance on subsistence may increase to support food security concerns with the closure of commercial seafood processing; however, recent years have shown declines in key subsistence fisheries. Subsistence halibut shows a steady decline in both the number of fish harvested and the number of active SHARC permits since 2004. Salmon subsistence (in all species) shows a decline in both active subsistence permits and the estimated number of salmon harvested.

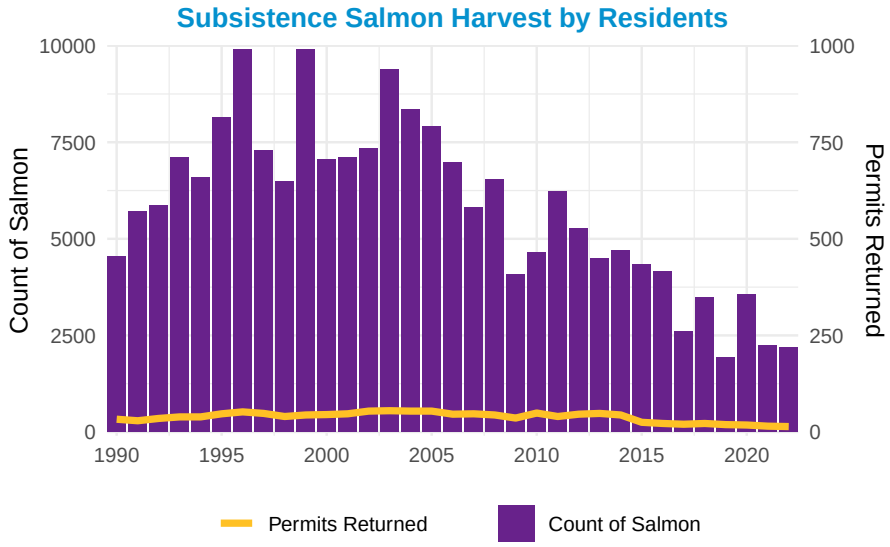
Overall, subsistence activities play a very important role in cultural characteristics and food security.Residents of King Cove are engaged in halibut and salmon subsistence fishing. A study conducted by the Alaska Sustainable Salmon Fund in 2016 showed that the harvesting, processing, sharing and consumption of salmon, especially sockeye, was culturally essential for King Cove residents.[12] While many residents still used traditional subsistence methods, many households also met their subsistence needs by removing salmon for home use from their commercial harvests. In King Cove, nearly all households (91%) were found to use salmon, with 75% attempting to harvest and 59% receiving salmon from others.[13] Overall, it was the most widely utilized wild resource

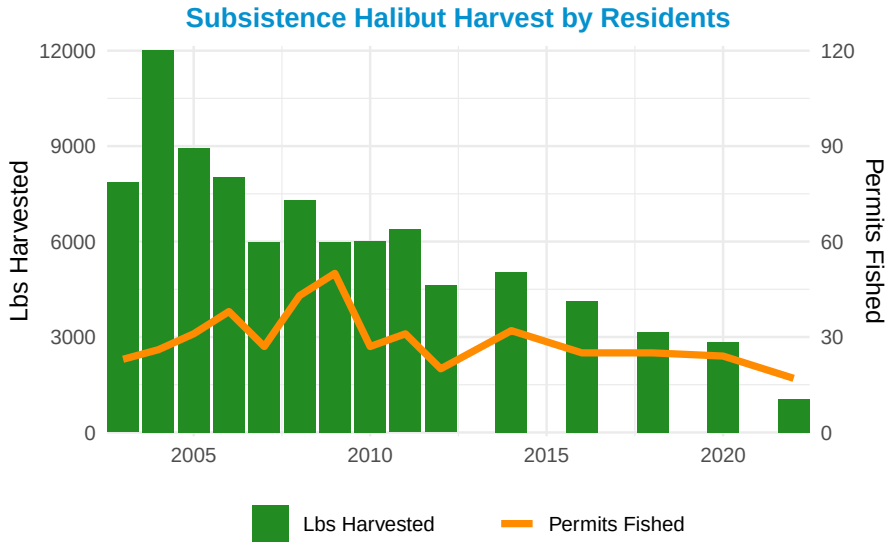
[11] Bureau of Indian Affairs. (n.d.). *Alaska subsistence program.* U.S. Department of the Interior. Retrieved November 8, 2024, from https://www.bia.gov/service/alaska-subsistence-program#:~=The%20Branch%20of%20Fisheries%2C%20Wildlife,natural%20resources%20for%20subsistence%20uses.

[12] Alaska Sustainable Salmon Fund. (n.d.). *Subsistence Salmon Fishery Harvest Monitoring in Cold Bay, King Cove, and Sand Point.* Retrieved November 8, 2024, from http://akssf.org/default.aspx?id=3444#:~:text=Point%2C%20March%202017-,Subsistence%20Salmon%20Fishery%20Harvest%20Monitoring%20in%20Cold%20Bay%2C%20King%20Cove,in%20the%20Alaska%20Peninsula%20Area

[13] Alaska Sustainable Salmon Fund. (n.d.). *Subsistence Salmon Fishery Harvest Monitoring in Cold Bay, King Cove, and Sand Point.* Retrieved November 8, 2024, from http://akssf.org/default.aspx?id=3444#:

by harvested weight. Changes and weather patterns, rising sea levels, and warming oceans were some of the environmental factors which had recently impacted residents' ability to harvest salmon. However, economic and social factors, such as access to funds to buy equipment and the influence of local canneries, also affected residents' harvest patterns.[14]



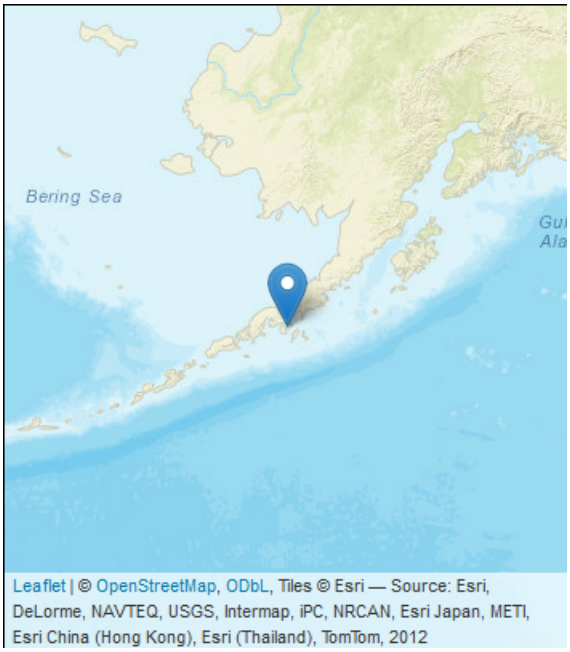


~:text=Point%2C%20March%202017-,Subsistence%20Salmon%20Fishery%20Harvest%20Monitoring%20in%20Cold%20Bay%2C%20King%20Cove,in%20the%20Alaska%20Peninsula%20Area

[14] Alaska Sustainable Salmon Fund. (n.d.). Subsistence Salmon Fishery Harvest Monitoring in Cold Bay, King Cove, and Sand Point. Retrieved November 8, 2024, from http://akssf.org/default.aspx?id=3444#:~:text=Point%2C%20March%202017-,Subsistence%20Salmon%20Fishery%20Harvest%20Monitoring%20in%20Cold%20Bay%2C%20King%20Cove,in%20the%20Alaska%20Peninsula%20Area

11. Sand Point

11.0.0.1. Area Description & History



Sand Point, also known as Qagun Tayagungin, is situated on Popof Island, off the southern coast of the Alaska Peninsula. Prior to the arrival of Europeans, the population of Aleuts in the region is estimated to have ranged between 12,000-20,000 people. Historically, the Aleut people harvested salmon, cod, herring, and other species around Sand Point. Following arrival, the population of Aleuts declined by 80-90% as a result of disease, warfare, malnutrition, and forced labor as sea otter hunters. The Aleut people traditionally spoke Unangam tunuu; however today fewer than 100 individuals speak this language.[1] The settlement of Sand Point was founded in 1898 as a cod fishing outpost and incorporated in 1946. Sand Point is home to one of the largest fishing fleets in the Aleutian Chain. Fisheries employs a number of seasonal workers each year. Included under the Alaska Native Claims Settlement Act (ANCSA), Sand Point has three native tribes: The Qagan Tayagungin Tribe of Sand Point Village, the Native Village of Unga, and Pauloff Harbor Village. The main Native Associations and Corporations active in the area include: Qagan Tayagungin Tribe, Unga Tribe, Pauloff Harbor Tribe, Shumagin Corporation, Unga Corp., and Sanak Corp.

11.0.0.2. Infrastructure & Transportation

Sand Point has an airport with a 5,200 feet paved runway and daily flights to Anchorage. Marine facilities include a 25-acre boat harbor with four docks, 134 boat slips, a harbormaster office, barge off-loading area, and a 150-ton lift. Regular barge services supply the community. The state ferry operates between Sand Point and Unalaska, Akutan, False Pass, Cold Bay, and King Cove between May and October. Medical services are provided by the Sand Point Community Health Clinic. In August 2024, RavnAir suspended services to the Sand Point, Unalaska, and Cold Bay leaving only one passenger airline to service those communities.

[1] University of Alaska Fairbanks, Alaska Native Language Center. (n.d.). *Aleut (Unangam Tunuu).* Retrieved November 13, 2024, from https://www.uaf.edu/anlc/languages-move/aleut.php

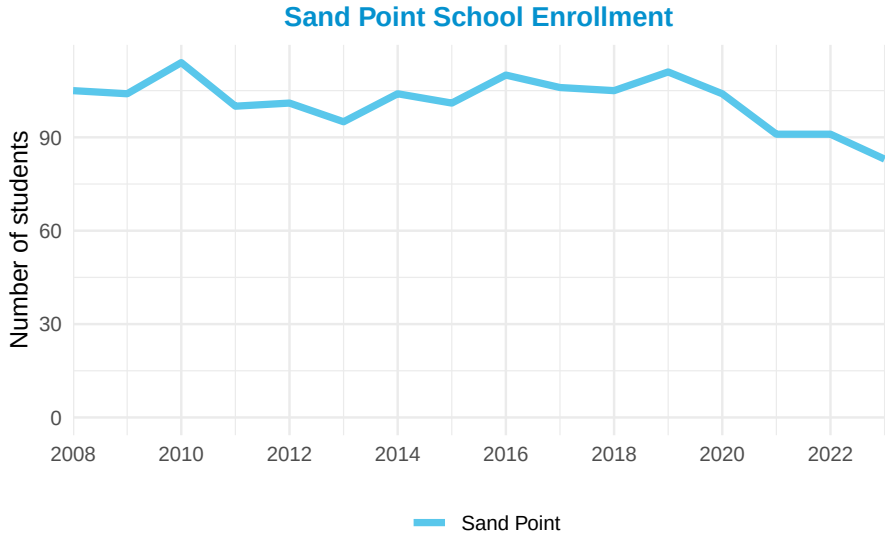
Demographics	
Population	607
Population in group housing	128
Median household income	79,922
Housing units	396
Percentages	
Male	55.3%
Female	44.7%
White	12.9%
American Indian or Alaska Native	40%
Black or African American	2.8%
Asian	20.6%
Native Hawaiian or Pacific Islander	0.7%
Hispanic or Latino	11.9%
Below poverty line	8.9%
High school diploma or higher	81%
Population under 5	2.2%
Population over 18	88.1%
Population over 65	17%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

At the Aleutians East Borough Schools located in Sand Point, student enrollment decreased by 21% since 2008, with a peak in 2010 of 114 students. Since 2019, enrollment has declined with 83 students in 2023.[2]

11.0.0.3. Demographics

11.0.0.4.

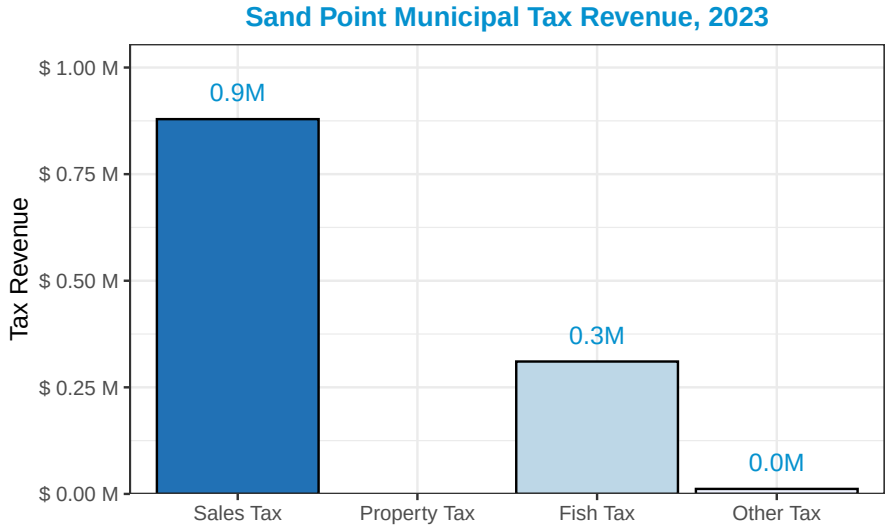


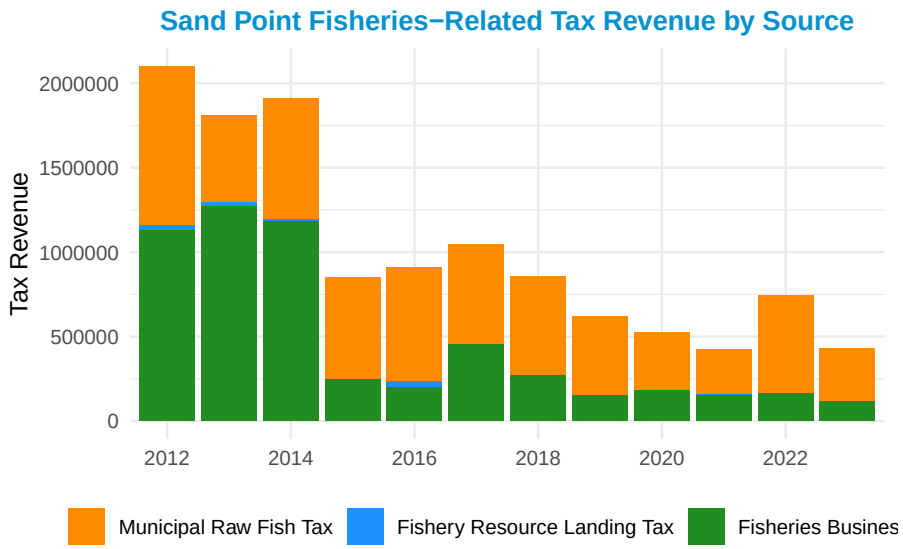
[2]School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retrieved November 14, 2024 from http://www.eed.state.ak.us/stats/

11.0.0.5. Current Economy

Sand Point's economy is primarily based on commercial fishing and processing, with Trident Seafoods being a top employer. In February, 2024 there was a major fire at the Peter Pan seafoods stockroom. There were no injuries; however the building was destroyed. The Aleutians East Borough communities, including Sand Point have been deeply affected by fluctuations in the seafood industry resulting from low prices and higher costs. In addition to the seafood industry, local employers in Sand Point include the Aleutians East Borough School District, local government offices, the Shumagin Corporation, Peninsula Airways, and the State of Alaska.

In 2021, Sand Point generated $422,759 in Shared Fish tax. The overall amount of total fish taxes collected in 2021 decreased by 32.1% from 2019.3 These revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and wellbeing. In 2020, per capita income in Sand Point was estimated to be $37,722,4 and the median household income was estimated to be $85,833.4 This represents a 16.9% increase and a 27% increase in these measures respectively compared to 2018.4 However, the percentage of the population living below the poverty line has decreased by 5% since 2018.4





11.0.0.6. Climate Change Vulnerability and Adaptive Capacity

11.0.0.6.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in determining their vulnerability. The Aleutian islands are expected to experience increased temperatures and precipitation, and increased summer storminess. Similar to other Alaskan communities, they will be impacted by reduced sea ice as well.5 However, overall compared to other communities in Alaska, Sand Point is at a relatively low risk of exposure to the biophysical effects of climate change.

11.0.0.6.2. Dependence on Fisheries Affected by Climate Change

Reliance on fisheries resources which are being impacted by climate change can determine how vulnerable a community is to disruption from climate change. Sand Point, according to the indices in this report, is highly engaged with commercial processing within the groundfish and crab fisheries. In addition, their subsistence harvesting engagement is also high, with 61% of residents utilizing at least one groundfish species, and 53% utilizing at least one crab species. They also heavily rely on harvests of salmon for subsistence and cultural purposes. However, residents have noted how changes in the climate have recently impacted their ability to harvest salmon. This is reflected in a 84% decrease in salmon harvests in Sand Point since 2015.[3]

Given these measures, Sand Point is overall highly dependent on fisheries resources which will be impacted by climate change. As these fisheries continue to respond to a changing climate, Sand Point residents are vulnerable to disruptions which will affect their livelihoods and subsistence activities. For instance, in 2022, the sablefish fishery in the Aleutian Islands state waters closed early in August.[4] While it is unclear to what extent this closure impacted Sand Point residents, it

[3] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

[4] Aleutian Islands State State-Waters Sablefish Fishery Closure Emergency Order # 4 4-GF -14 -22. (2022). ADFG. https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1423374391.pdf

Sand Point	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED-HIGH
Poverty	MED
Population Composition	HIGH
Personal Disruption	MED

Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

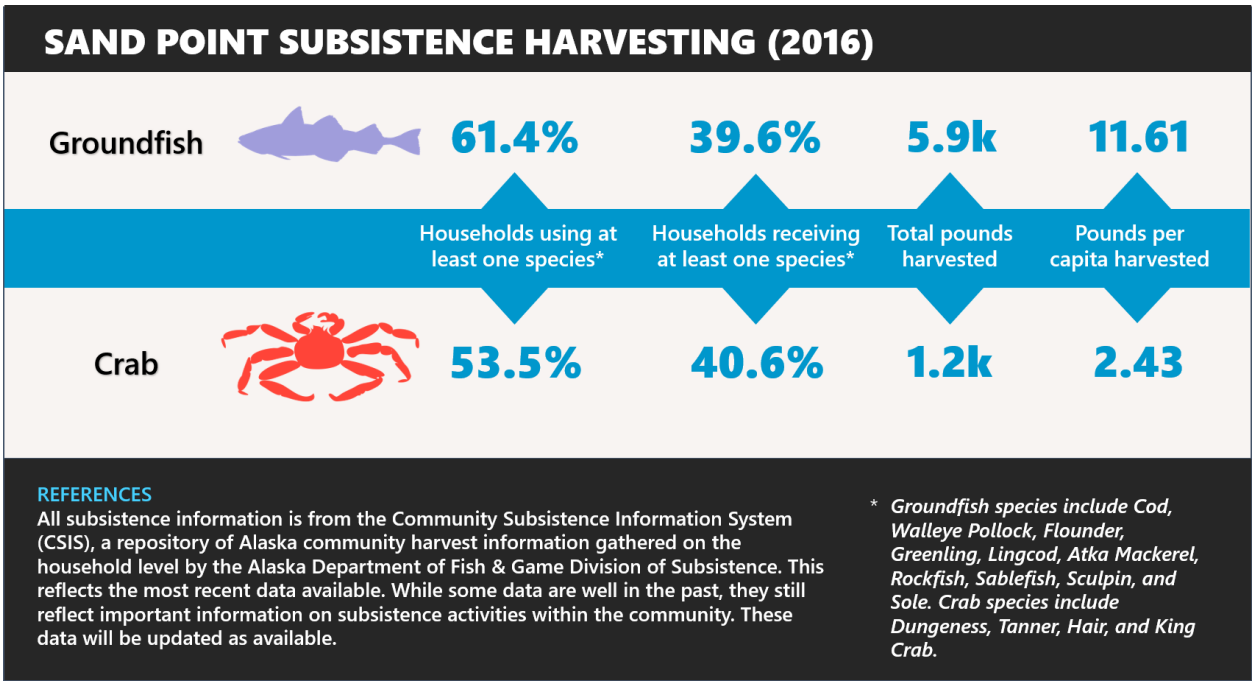
is important to be aware of recent closures that could cause impacts given the community's high reliance on commercial fishing.

11.0.0.6.3. Local Adaptive Capacity

Sand Point overall has very high limits to its adaptive capacity. This rating takes into account factors in the community which can make it harder to adapt when disruptions occur such as: poverty level, age of the population, unemployment rates, English language proficiency, and education level. Sand Point received a high rating because housing and infrastructure are moderately to highly vulnerable to natural disasters and a population that contains many individuals who are more vulnerable to shocks and disasters, and many individuals who live or work in less stable conditions. In addition, the FEMA National Risk Index identified that the Aleutians East region has very low levels of community resilience.[5] Therefore, if Sand Point residents are biophysically impacted by climate change, their capacity to adapt to these changes and recover rapidly is limited.

[5]Federal Emergency Management Agency. (n.d.). *National Risk Index: Aleutians East Borough, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02013

11.0.0.7. Subsistence Harvesting Engagement



Residents of Sand Point rely heavily on subsistence, including salmon, cod, rockfish, and Dungeness and king crab. According to Alaska Dept. of Fish and Game data, their subsistence harvests of halibut have increased since 2012, while their harvests of salmon have decreased.[6][7] This is concerning, given that a study conducted by the Alaska Sustainable Salmon Fund in 2016 showed that the harvesting, processing, sharing and consumption of salmon, especially sockeye, was culturally essential for Sand Point residents. Many households reported meeting their subsistence needs by removing salmon from their commercial harvests for home use. This same study showed 97% of Sand Point households used salmon, with 68% of households attempting to harvest and 66% receiving salmon from others.

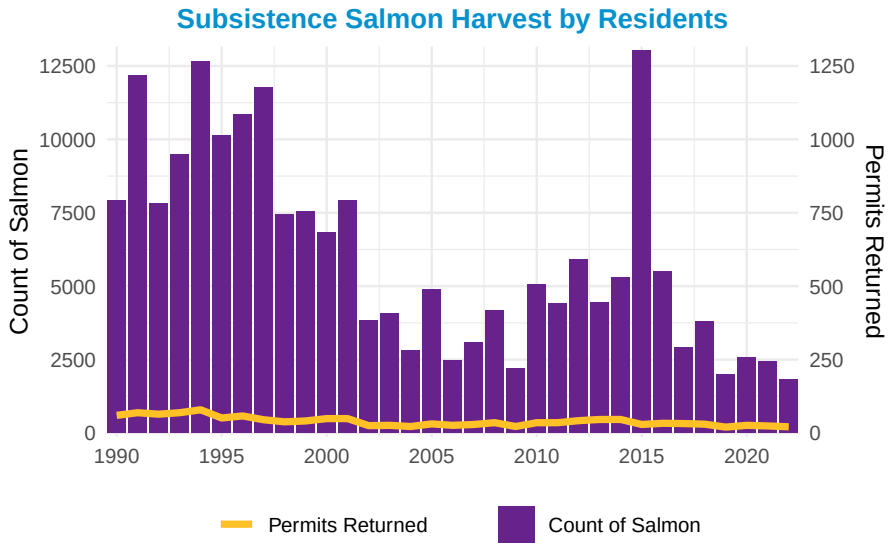
In recent years, changes in weather patterns, rising sea levels, and warming oceans have affected residents' ability to harvest salmon.[8] Economic and social factors, such as access to funds to buy equipment and the influence of local canneries, also affected residents' harvest patterns.[9]

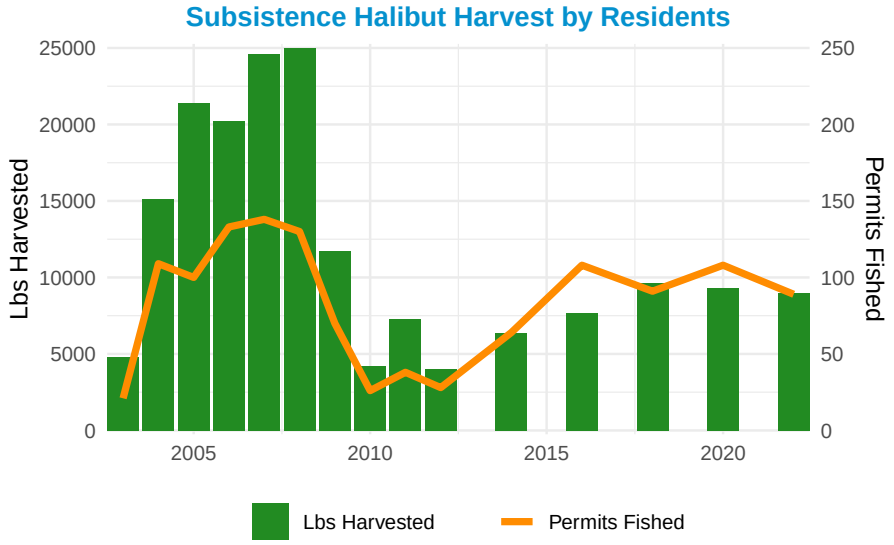
[6] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

[7] Alaska Department of Fish and Game Division of Subsistence. 2021. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.

[8] Hutchinson-Scarbrough, Lisa. (2019). Subsistence Salmon Fishery Harvest Monitoring in Cold Bay, King Cove, and Sand Point. Alaska Sustainable Salmon Fund June 2019 Completion Report. ADF&G, Division of Subsistence. https://s3-us-west-1.amazonaws.com/akssfapm/APM_Uploads/2015/44210/.pdf/CR_6_2019.pdf

[9] Hutchinson-Scarbrough, Lisa. (2019). Subsistence Salmon Fishery Harvest Monitoring in Cold Bay, King Cove, and Sand Point. Alaska Sustainable Salmon Fund June 2019 Completion Report. ADF&G, Division of Subsistence. https://s3-us-west-1.amazonaws.com/akssfapm/APM_Uploads/2015/44210/.pdf/CR_6_2019.pdf

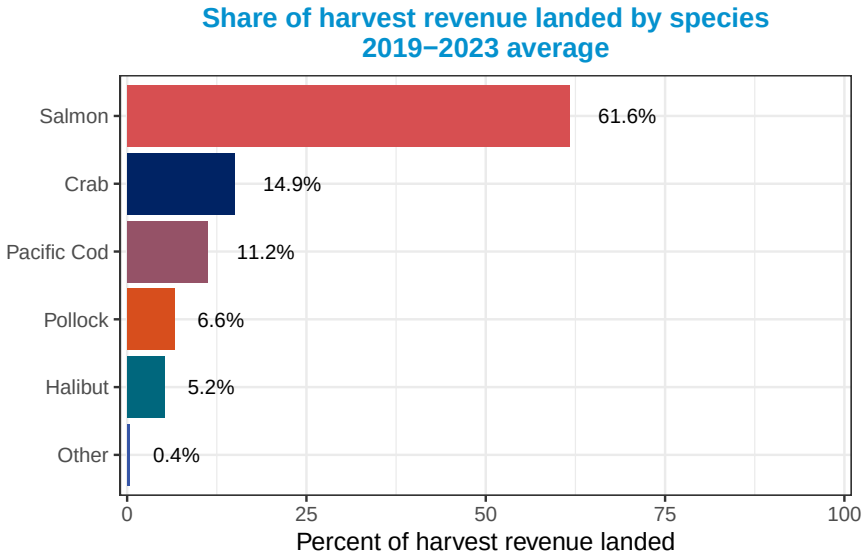

Subsistence Salmon Harvest by Residents
Count of Salmon
Permits Returned
12500
10000
7500
5000
2500
0
1250
1000
750
500
250
0
1990
1995
2000
2005
2010
2015
2020
Permits Returned
Count of Salmon


Subsistence Halibut Harvest by Residents
Lbs Harvested
Permits Fished
25000
20000
15000
10000
5000
0
250
200
150
100
50
0
2005
2010
2015
2020
Lbs Harvested
Permits Fished

12. Akutan/King Cove/Sand Point Fishery Engagement

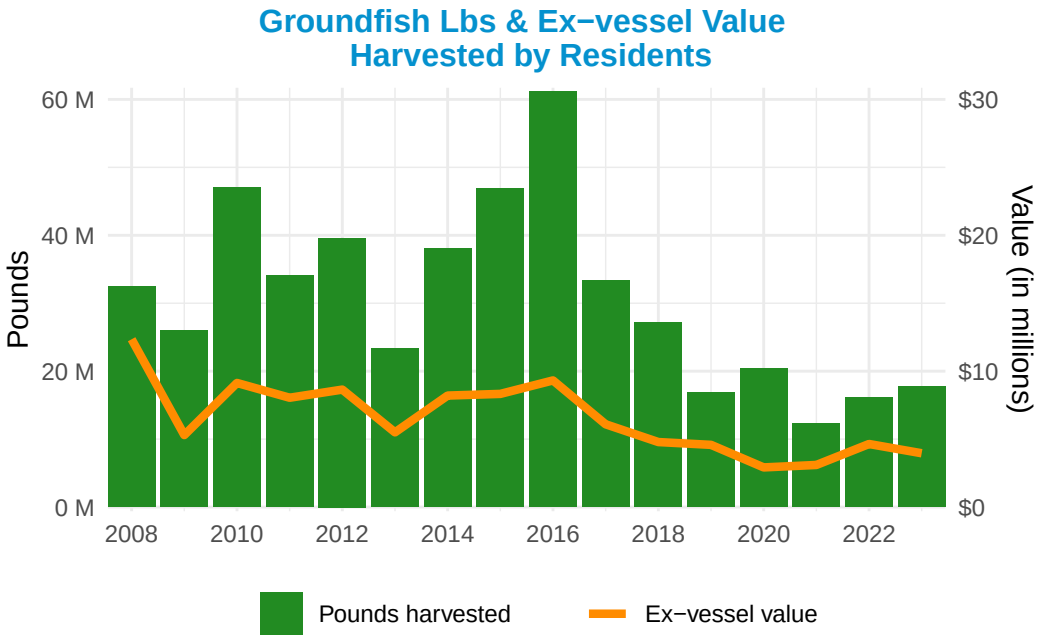
Due to the low number of processors in Akutan, King Cove, and Sand Point, we present groundfish and crab fishery engagement data aggregated across all three communities.

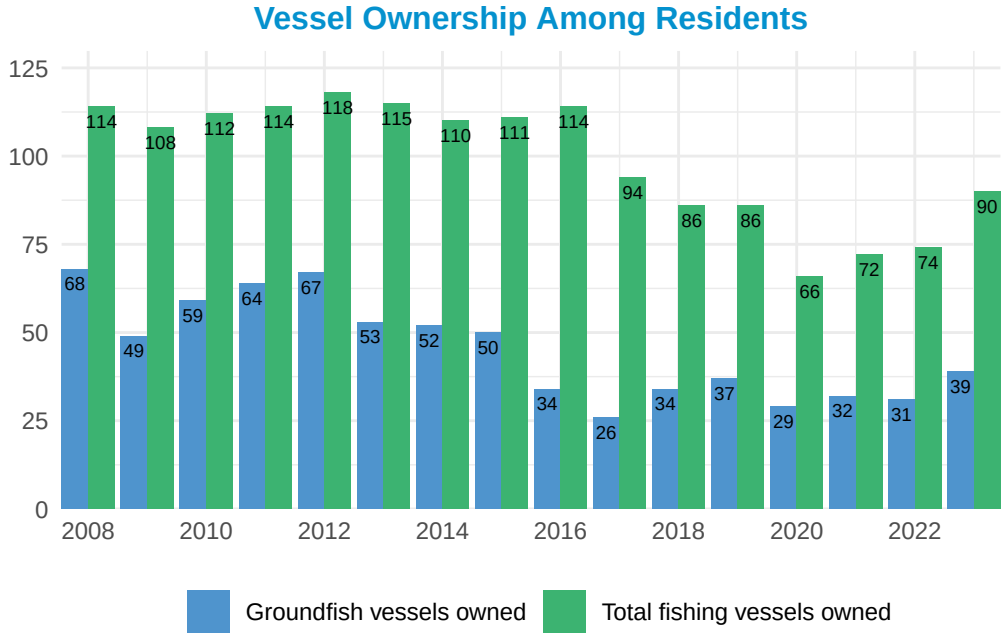
12.0.0.1. Groundfish Harvesting Engagement - LOW



Due to the small number of participants, some data are considered confidential. For this reason, data were aggregated to include adjacent communities within the Aleutians East Borough (AEB): Akutan, Sand Point, and King Cove communities. With the closure of the Peter Pan facility in King Cove in 2024, this may require a different community aggregation going forward to maintain confidentiality.

Commercial salmon harvest dominates the area's fisheries; however groundfish harvest accounted for an average of 20% of the total value landed over the past five years for these three communities. In 2023, groundfish harvests were 22% of the total ex-vessel value landed in these communities, landing 17.8.2 million whole pounds, with an ex-vessel value of $3.96 million. The number of groundfish vessels owned by residents in 2023 was 39 (up from 31 the previous year). The number of resident owned vessels in all fisheries has increased to 90 vessels (up 22%).

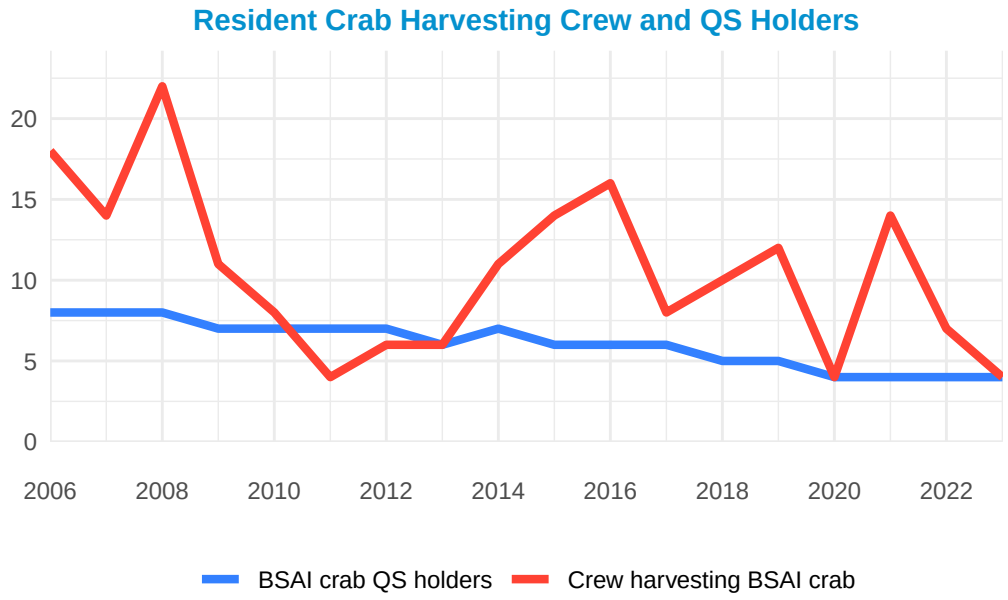




12.0.0.2. Crab Harvesting Engagement - LOW

In 2023, 1,968,178 whole pounds of BSAI crab were harvested across Akutan, Sand Point, and King Cove, with an ex-vessel value of $4.8 million.

A number of hired crew resides in these communities and residents continue to own crab licenses and quota shares, although participation has fluctuated. In 2023, there were 4 crew members working in the BSAI crab industry (down from 7 in the previous year), and 4 BSAI crab QS holders.

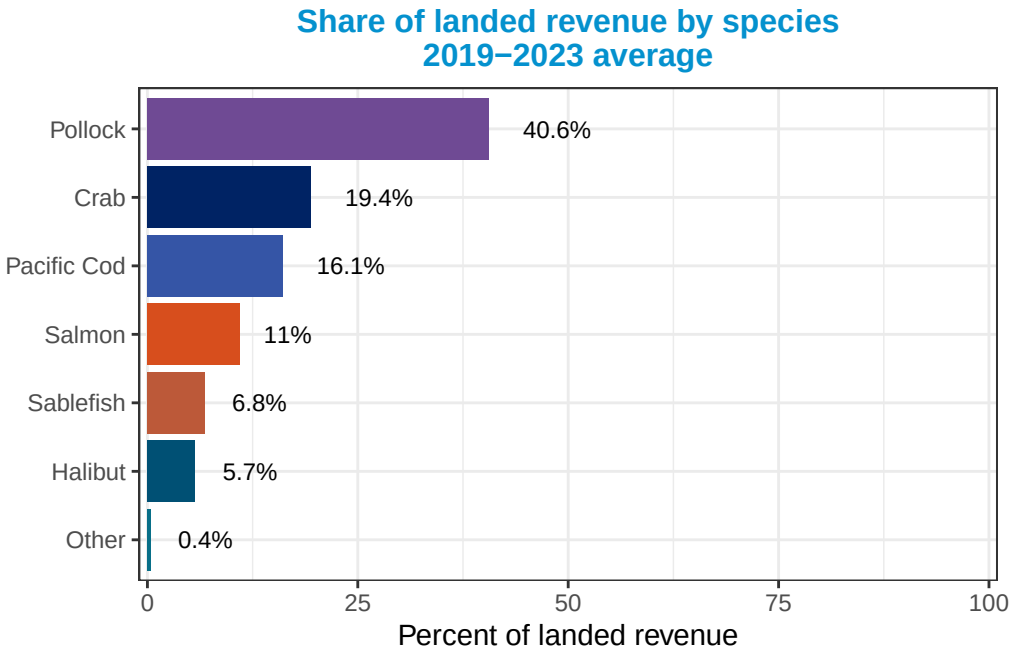


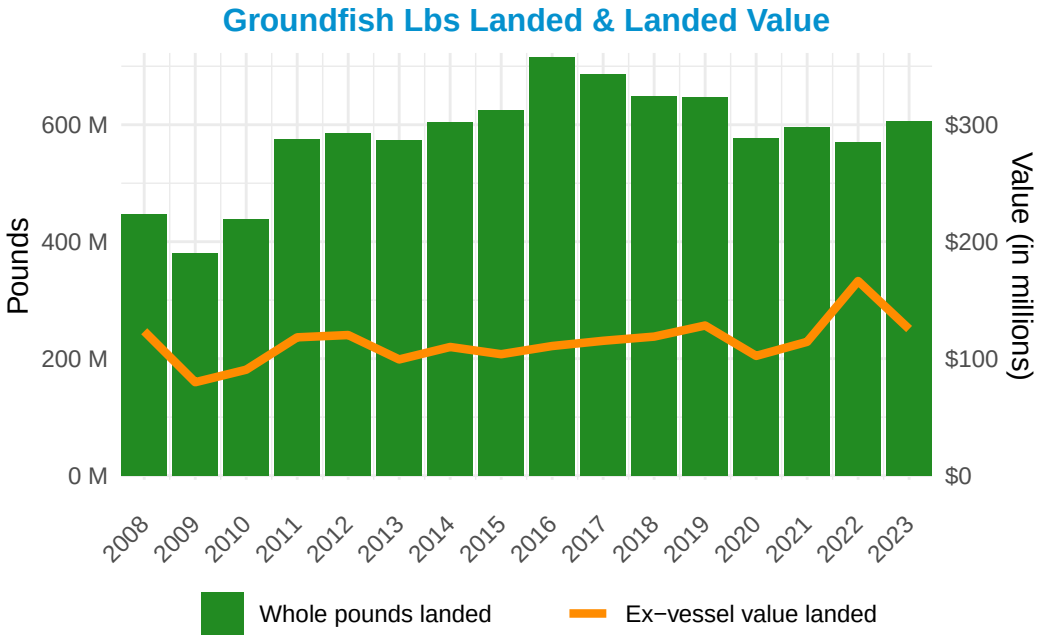
*Includes crew and quota holders in rationalized crab fisheries only

12.0.0.3. Groundfish Processing Engagement - HIGH

Over the last five years, pollock and Pacific cod have accounted for a slightly higher percentage of the average community catch, 40.6% and 16.1% respectively, of the landed value within the processing sector in Akutan, King Cove, and Sand Point. Meanwhile, the 5-year average share of landed salmon has decreased slightly to 11%.

In 2023, the number of processing facilities decreased to 4 , processing 606 million pounds of groundfish with an ex-vessel value of $125 million in 2023. Compared to 2022, the landings volume showed a slight increase in pounds landed (up 6%); however the ex-vessel value dropped by 25% illustrating the drop in market value for most species, particularly salmon. In 2023, although the Pacific cod fishery decreased by 4.5% in volume and 22% in ex-vessel value compared to 2022, the portion of total landings held by Pacific cod in the three communities increased slightly. Pollock showed an 8% increase in pounds , with a 22% decrease in landed value since 2022. Despite the fall in value, the portion of total landings held by pollock increased to 44%.

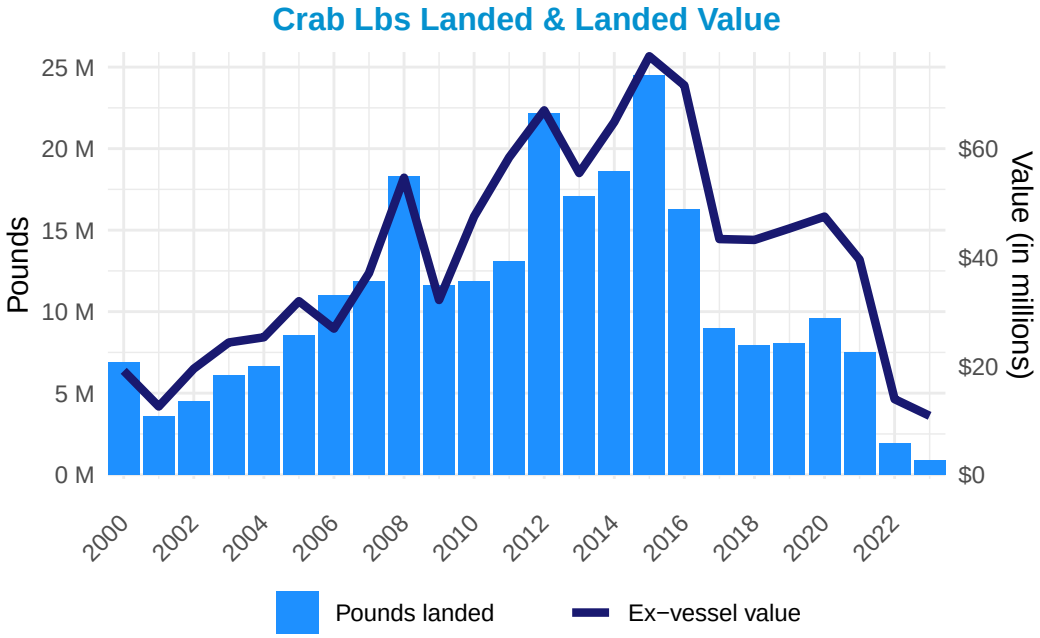




12.0.0.4. Crab Processing Engagement - HIGH

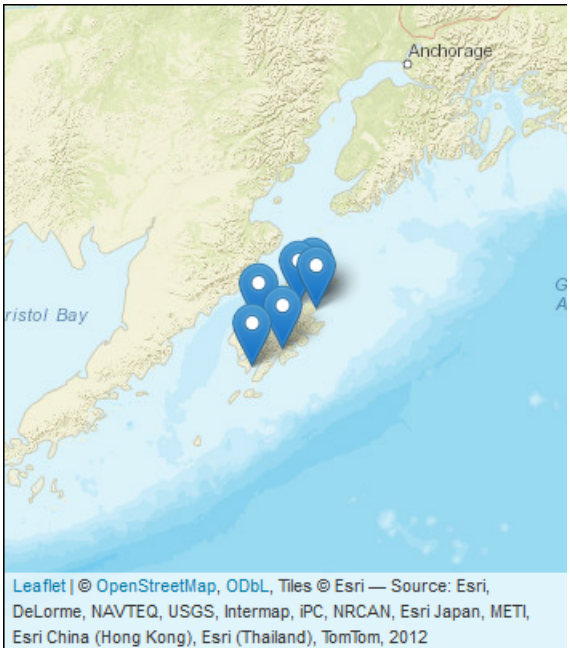
Due to confidentiality concerns, Akutan, King Cove, and Sand Point processing activities are aggregated. These communities have been highly engaged in the crab processing sector; however the declines in crab fisheries have affected these communities.In 2023, these communities processed 887,209 thousand net pounds of crab with an associated ex-vessel value of $10.8 million - a substantial decrease from previous years. Compared to the previous year, the volume decreased by 54% and ex-vessel value by 22%.The amount of BSAI crab processed in the region reached a

peak of 24.5 million pounds in 2015, quickly dropping to 16.3 million pounds the following year (down 33%), and continuing to fall. Comparatively, the associated value dropped from $77 million in 2015, to $43.4 million in 2017. Both volume and landed value have continued to decline since.



13. Kodiak Island Borough

13.0.0.1. Area Description & History



The largest island in the Gulf of Alaska, Kodiak Island is 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 peoples who traditionally harvested fish, marine invertebrates, and marine mammals on the Island. A majority of the Alaska Native population living in Kodiak today are Alutiiq. Their language is Alutiiq, which is one of the "Esk-Aleut" languages and is closely related to Central Yup'ik.[1] Russians established a fur trading settlement at Chiniak Bay in the late 1700s. In 1882 a fish cannery opened in Karluk spit, sparking further commercial development. Today, Kodiak communities are highly reliant on both commercial and subsistence fishing. The majority of commercial vessels and seafood processing plants are in Kodiak City, which is Alaska's second largest commercial fishing port in volume of seafood landed. There are two main harbors in Kodiak City: St. Paul Harbor and St. Herman Harbor which is the larger of the two. While the majority of the population of Kodiak Island live in Kodiak City, there are seven other island communities including Akhiok, Port Lions, Larsen Bay, Old Harbor, Karluk and Ouzinkie. Kodiak Island communities are administered under the Kodiak Island Borough. Native Associations active in the area include the Natives of Kodiak, Inc., Koniag, Inc., and the Kodiak Area Native Association. Kodiak is located in Federal Statistical and Reporting Area 630, Pacific Halibut Fishery Regulatory Area 3A, and Central Gulf of Alaska Sablefish Regulatory Area

13.0.0.2. Infrastructure & Transportation

Kodiak Island is accessible by air and sea, however accessibility varies drastically among communities. Kodiak City has two small airports, which have several daily flights. Air taxi services provide flights to five remote villages; however, weather conditions often restrict travel. City-owned

[1] Alutiiq Museum. (n.d.). *Alutiiq and other Alaskan languages.* Retrieved November 19, 2024, from https://alutiiqmuseum.org/alutiiq-people/language/lessons/alutiiq-and-other-alaskan-languages/

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. The Port of Kodiak has two boat harbors with 600 boat slips. Three deep-draft piers accommodate ferries, cruise ships, container ships, military vessels, and a variety of large commercial fishing vessels. Approximately 140 miles of state roads connect island communities on the east side of the island. However, island communities have limited access to basic services, including medical services, and residents must travel to Kodiak City or Anchorage for treatment.

13.0.0.3. Demographics

Kodiak Island Borough has experienced substantial declines in population since the early 2000s.[2] While this trend holds for Kodiak City itself, the population declines in Kodiak Island communities have led to concerns over school enrollment and stability. Total K-12 school enrollment for Kodiak Island communities has decreased by 15.5% since 2008. Larsen Bay School closed in 2018, and Karluk school closed in 2019 due to low enrollment.

The loss of fisheries access and participation for Kodiak City and Island communities over the last three decades has profoundly affected the economic underpinning of these communities and ways of life that existed for thousands of years.[3][4][5] These losses have compounded across multiple generations, who have lost connection to these resources and knowledge of harvesting practices.[6][7][8] In the face of increasing climate-driven changes and other stressors, the lack of fisheries access and diversification that these losses represent may fundamentally undermine Kodiak City and Island communities.

[2]Alaska Department of Labor and Workforce Development. (2024). *Alaska Historical Population Estimates by Place, 2000-2010 and 2010-2020.* Retrieved from https://live.laborstats.alaska.gov/pop/index.cfm

[3]Carothers, C. (2010). Tragedy of commodification: Displacements in Alutiiq fishing communities in the Gulf of Alaska. Mast, 9(2), 95-120.

[4]Carothers, Courtney. "Fisheries privatization, social transitions, and well-being in Kodiak, Alaska." Marine Policy 61 (2015): 313-322.

[5]Ringer, D., Carothers, C., Donkersloot, R., Coleman, J., & Cullenberg, P. (2018). For generations to come? The privatization paradigm and shifting social baselines in Kodiak, Alaska's commercial fisheries. Marine Policy, 98, 97-103.

[6]Carothers, C. (2010). Tragedy of commodification: Displacements in Alutiiq fishing communities in the Gulf of Alaska. Mast, 9(2), 95-120.

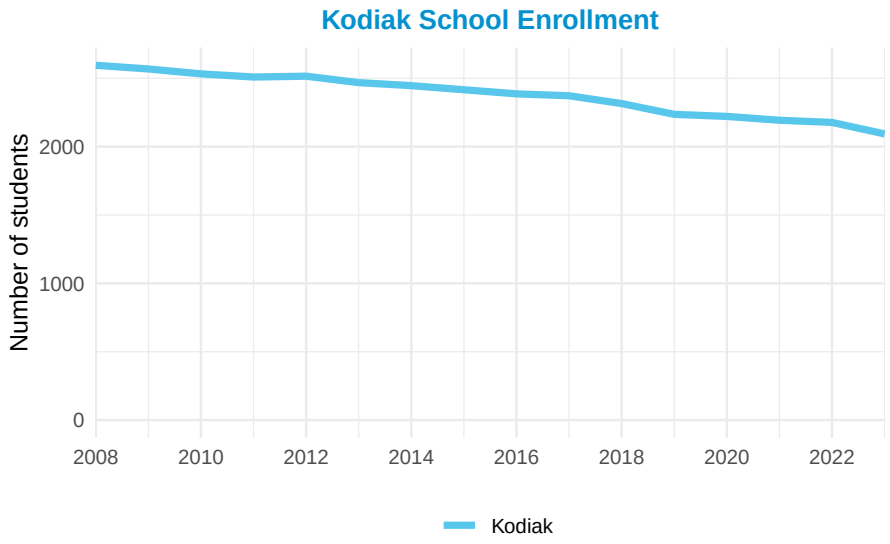
[7]Carothers, Courtney. "Fisheries privatization, social transitions, and well-being in Kodiak, Alaska." Marine Policy 61 (2015): 313-322.

[8]Ringer, D., Carothers, C., Donkersloot, R., Coleman, J., & Cullenberg, P. (2018). For generations to come? The privatization paradigm and shifting social baselines in Kodiak, Alaska's commercial fisheries. Marine Policy, 98, 97-103.

	Kodiak	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
Demographics							
Population	61	28	5384	37	206	112	165
Population in group housing	0	0	165	0	0	0	0
Median household income	69,750	NA	76,765	77,500	40,156	53,750	50,000
Housing units	34	27	2,129	83	128	68	122
Percentages							
Male	65.3%	66.7%	53.3%	58.7%	54.8%	48.9%	45.2%
Female	34.7%	33.3%	46.7%	41.3%	45.2%	51.1%	54.8%
White	0%	0%	38.4%	43.5%	18.7%	4.4%	37.9%
American Indian or Alaska Native	90.8%	81.5%	4.1%	23.9%	63.2%	46.7%	43.5%
Black or African American	0%	0%	0%	4.3%	0%	0%	0%
Asian	0%	0%	47.9%	15.2%	0%	0%	0%
Native Hawaiian or Pacific Islander	0%	0%	0%	0%	1.3%	0%	0%
Hispanic or Latino	0%	0%	6.1%	4.3%	0%	0%	0%
Below poverty line	4.1%	0%	9%	15.2%	44.5%	11.1%	4%
High school diploma or higher	46.2%	100%	86.5%	92.1%	83.7%	83.6%	93.9%
Population under 5	3.1%	0%	4.5%	4.3%	9.7%	1.1%	1.6%
Population over 18	91.8%	100%	80.8%	87%	76.8%	83.3%	88.7%
Population over 65	3.1%	18.5%	16.2%	26.1%	9.7%	22.2%	29.8%

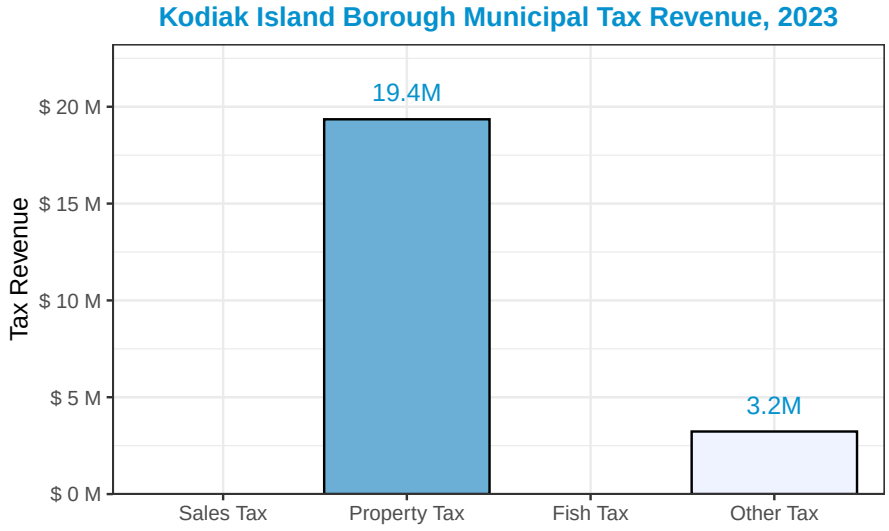
Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

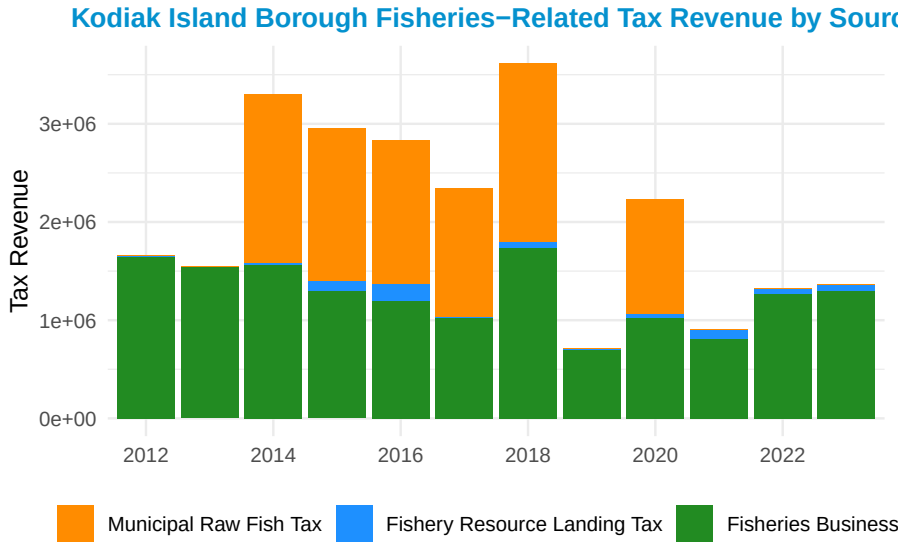
13.0.0.4.



13.0.0.5. Current Economy

Commercial fishing, seafood processing, and commercial fishing support services are the major industries contributing to the local economy in Kodiak. The U.S. Coast Guard station and hospital are also significant employers. Other industries include retail services and government. Tourism is growing, including with increasing sport fishing and hunting, hiking, and kayaking. In 2023, the Kodiak Island Borough collected $22.58 million in tax revenue, the vast majority of which ($19.35M) was from property taxes. Fisheries-related tax revenues for the Kodiak Island Borough amounted to $1.36 million in 2023. These revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and wellbeing.





13.0.0.6. Climate Change Vulnerability and Adaptive Capacity

13.0.0.6.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in determining their vulnerability. Biophysical risks to the Gulf of Alaska as a whole include sea level rise, coastal erosion, extreme weather events, changes in precipitation (rates, timing, and snowpack), increasing landslides and avalanches, and increased storm severity. In its 2018 hazard management plan, the Kodiak Island Borough explicitly chose not to evaluate the potential hazards posed by climate change, noting "The Borough and City of Kodiak do not want to include climate change as a potential hazard affecting the island". Nevertheless, the hazard management plan identifies a number of hazards that could affect the Borough–riverine erosion, landslides, wildland fire, severe weather–which could be exacerbated by increasing extreme weather events due to climate change. The Borough is currently updating its hazard management plan.[9]

13.0.0.6.2. Dependence on Fisheries Affected by Climate Change

Kodiak Island is overall highly dependent on a large variety of fisheries resources which will be impacted by climate change. Residents are highly engaged in harvesting and processing within the groundfish fishery, and moderately engaged in harvesting and highly engaged in processing within the crab fishery. Marine heatwaves, ocean acidification, species migrations, and smaller fish which are affecting the Gulf of Alaska will likely impact the ability of commercial fishers on the Island to operate as they have been.[10] There are already numerous examples of climate impacts on the local fleet. The decline of Pacific cod following the 2014 to 2016 marine heatwave and the ultimate closure of the fishery had a devastating impact on the local jig fleet that is highly reliant on Pacific cod. Increased volatility across numerous salmon species and runs, mostly recently with a significantly lower than expected pink salmon return, have also greatly undermined the gillnet and seine salmon fleets on the Island. In 2024, the closure of the processing facility in Larsen Bay and the sale of the Trident processing facility in Kodiak further compounded this volatility, leaving many fishermen without a buyer for their fish and the community of Larsen Bay without an important revenue source.

In addition, the island is highly reliant on recreational fishing and tourism related to recreational fishing for their current economy. Kodiak Island communities are also significantly engaged in subsistence fishing, particularly of crab species and certain groundfish species. They also harvest salmon and halibut for subsistence purposes. Their combined use of several fisheries for subsistence makes them reliant on these resources which likely support household food security, particularly in smaller communities where pounds harvested per capita are high. Finally, there are several subsistence and sport salmon fishing closures active around Kodiak Island including one that spans the marine waters near the outlet of the Buskin River and one in the marine waters of Afognak Bay.[11] These closures are likely to impact the highly fishing-reliant population of Kodiak Island. Residents were also impacted by the 2022 closure of both the Snow crab fishery and the Bristol Bay Red King crab fisheries due to concerns over population levels which have struggled due to warming

[9]Kodiak Island Borough. (2024). 2024 Hazard Mitigation Plan update. https://www.kodiakak.us/757/2024-Hazard-Mitigation-Plan-Update

[10]Markon, C., Gray, S., Berman, M., Eerkes Eerkes-Medrano, L., Hennessy, T., Huntington, H. P., Littell, J., McCammon, M., Thoman, R., & Trainor, S. F. (2018). Chapter 26: Alaska. Impacts, Risks, and Adaptation in the United States: The Fourth National Climate Assessment, Volume II . U.S. Global Change Research. https://doi.org/10.7930/NCA4.2018.CH26

[11]U.S. Department of the Interior. (2023, June 15). SUBSISTENCE FISHING CLOSURE IN WOMANS (WOMENS) BAY TO CONSERVE BUSKIN RIVER ORIGIN SOCKEYE SALMON. Emergency Special Action No: 9-RS-01-23. https://www.doi.gov/sites/doi.gov/files/sa-9-rs-01-23-kod-508-final.pdf

	Kodiak	*Akhiok*	*Karluk*	*Larsen Bay*	*Old Harbor*	*Ouzinkie*	*Port Lions*
Social Indicators for Fishing Communities*							
Labor Force	LOW	MED-HIGH	LOW	MED-HIGH	LOW	LOW	MED
Housing Characteristics	MED-HIGH	NA	NA	NA	HIGH	NA	NA
Poverty	MED	LOW	NA	LOW	HIGH	HIGH	LOW
Population Composition	HIGH	MED	MED	LOW	MED-HIGH	MED-HIGH	MED
Personal Disruption	LOW	HIGH	HIGH	HIGH	HIGH	HIGH	MED

Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

oceans.[12][13] Most recently, in September of 2024, NMFS closed the pollock fishery in the Central Gulf Regulatory Area due to Chinook salmon bycatch exceeding the total allowed for the fleet, which is primarily based in Kodiak. This compounded ongoing struggles for this fleet associated with impacts from tariffs, the COVID pandemic, and market issues.

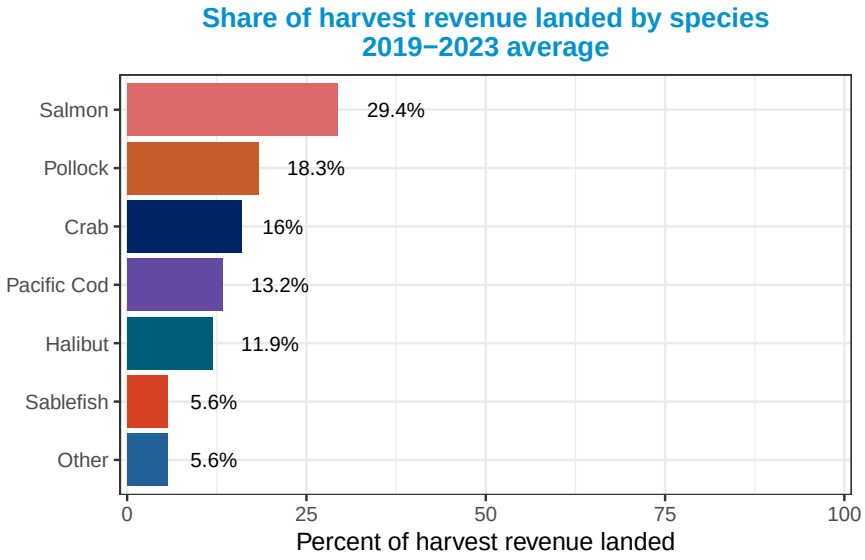
13.0.0.6.3. Local Adaptive Capacity

Kodiak Island communities face foundational issues of social vulnerability. Multiple island communities rank medium-high to high on multiple social vulnerability indicators–labor force, housing characteristics, poverty, population composition, and personal disruption–which are intended to provide information about adaptive capacity in the face of various stressors. This is important to consider when shaping management strategies for the fisheries Kodiak Island in which residents are most engaged. Drastic shifts in policy or ones that do not account for the ability of residents to adapt to changing fishery conditions could hinder the community's ability to stay highly engaged in a particular fishery.

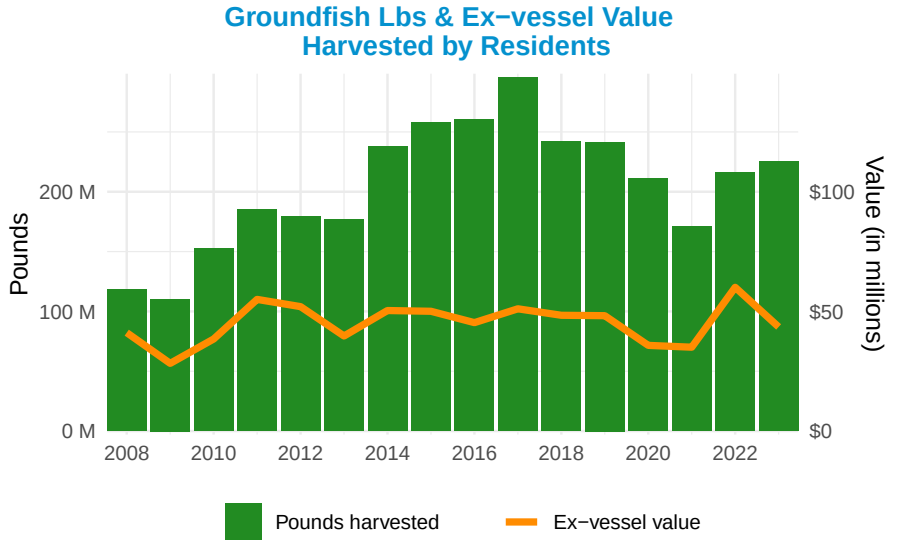
[12] Szuwalski, C. S., Aydin, K. Y., Fedewa, E. J., Garber-Yonts, B., Litzow, M. A., & Palof, K. J. (2023). The collapse of eastern Bering Sea snow crab. *Science, 382*(6668), 306–310. https://doi.org/10.1126/science.adf6035

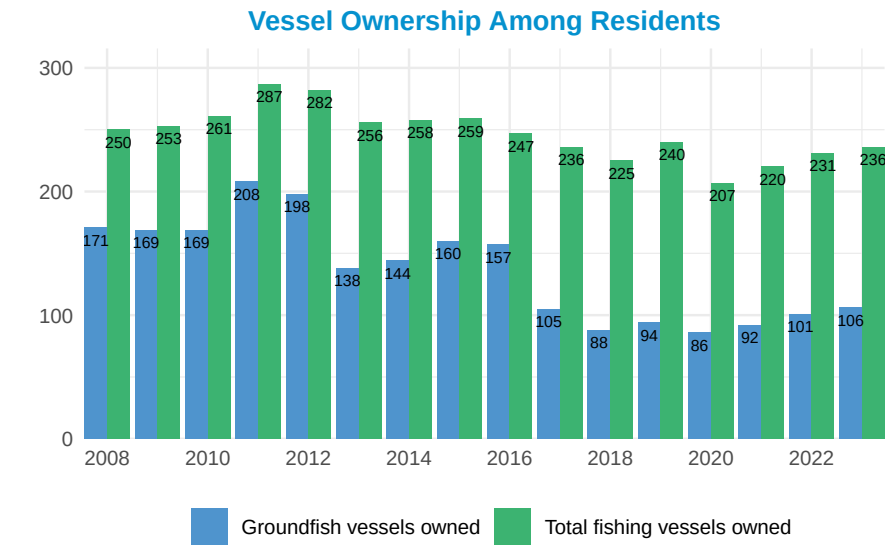
[13] Alaska Department of Fish and Game. (2022, October 10). *2022/23 Bristol Bay red king crab season closed.* Retrieved November 20, 2024, from https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1441166194.pdf

13.0.0.7. Groundfish Harvesting Engagement - HIGH



Kodiak Island has a diversified fisheries profile, with groundfish making up about 37% of total fisheries harvest. In 2023, the volume of groundfish harvest was 225.3 million pounds with an associated ex-vessel value of $43 million. Compared to 2022, the harvest volume for groundfish increased by 9.4 million pounds (or 4%) but values declined by $16.5 million (down 28%). Resident ownership of fishing vessels increased by 19 vessels in 2023 from 2022, while groundfish fishing vessels owned by Kodiak Island residents decreased by 6. Smaller communities on Kodiak Island are often most severely impacted by shifts in fisheries participation since there are relatively few participants remaining in these communities and additional losses can mean the difference between a connection to commercial fisheries or the lack thereof.



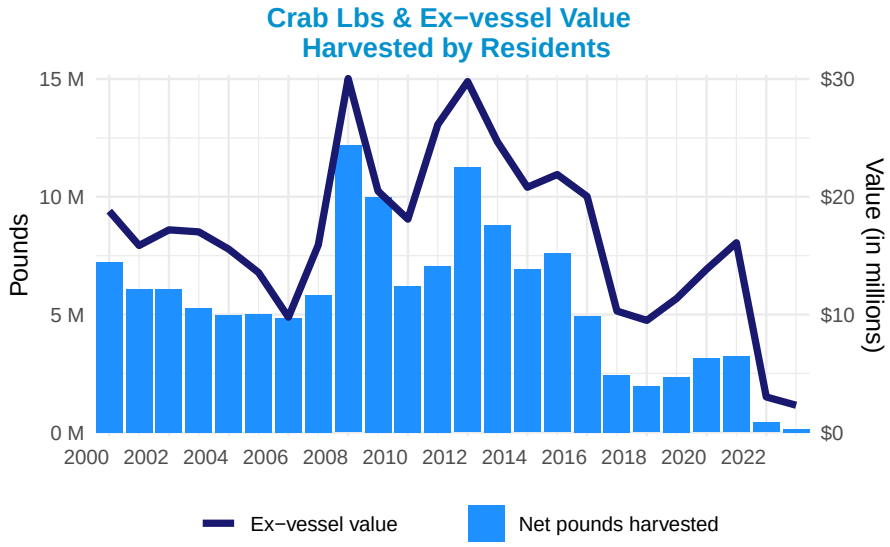


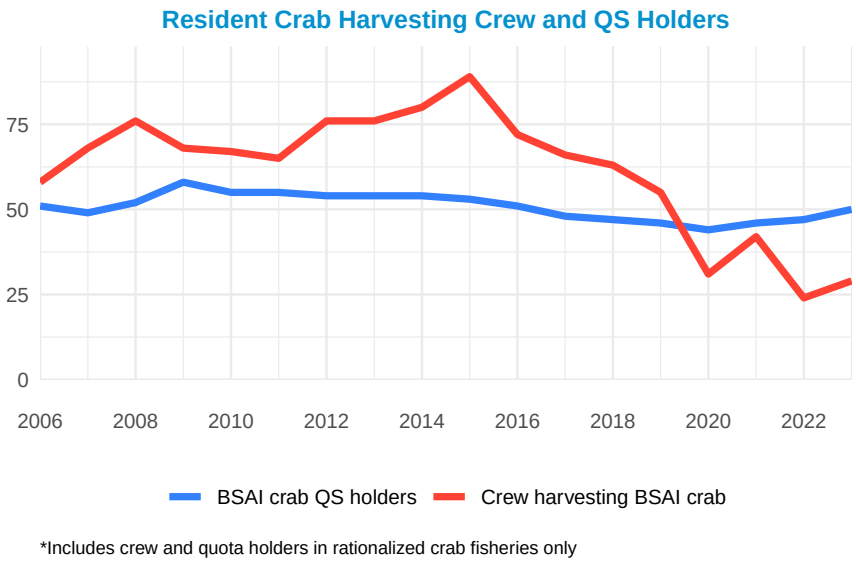
13.0.0.8. Crab Harvesting Engagement - MEDIUM-HIGH

Kodiak Island's resident vessels harvesting BSAI crab fisheries have seen drastic declines since 2012. After a slight increase in pounds harvested and values for Kodiak fishermen from 2018 to 2021, the closure of the Bering Sea snow crab fishery precipitated near zero volumes and values for Kodiak crab fishermen.

Within the BSAI crab fisheries, the number of crew living in Kodiak Island communities has declined significantly since 2015 (from a peak of 89 in 2015 to a low of 24 in 2022), with some interannual variation over the last several years.

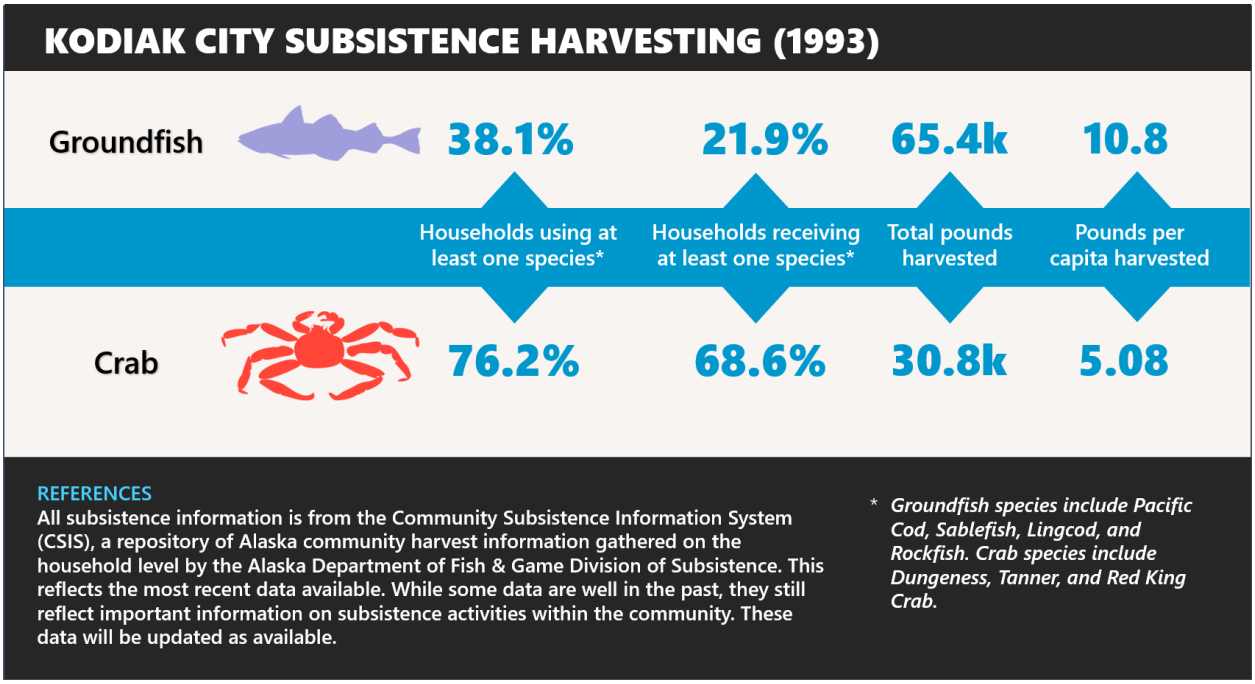
As of 2023, there were 50 quota share holders residing in Kodiak Island communities. This number is nearly equivalent to the number of Kodiak quota shareholders in 2015 when this value started to decrease.





*Includes crew and quota holders in rationalized crab fisheries only

13.0.0.9. Subsistence Harvesting Engagement

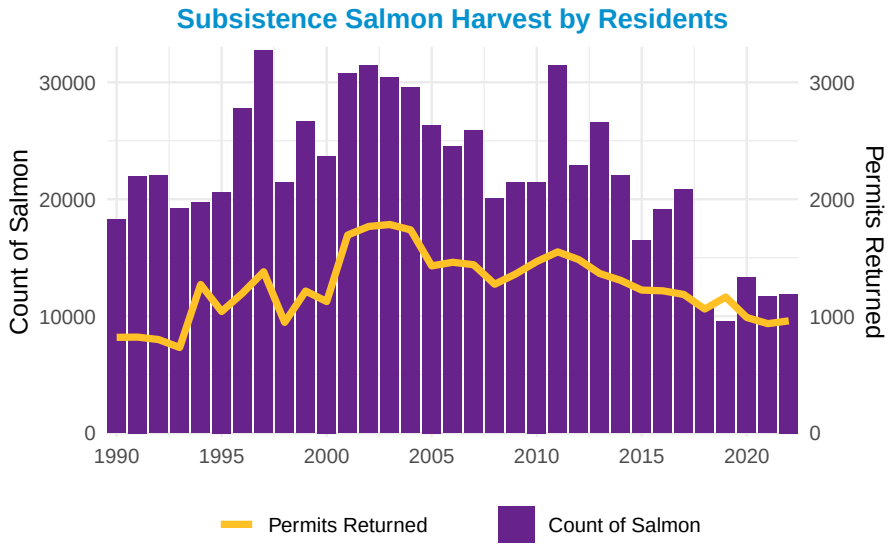


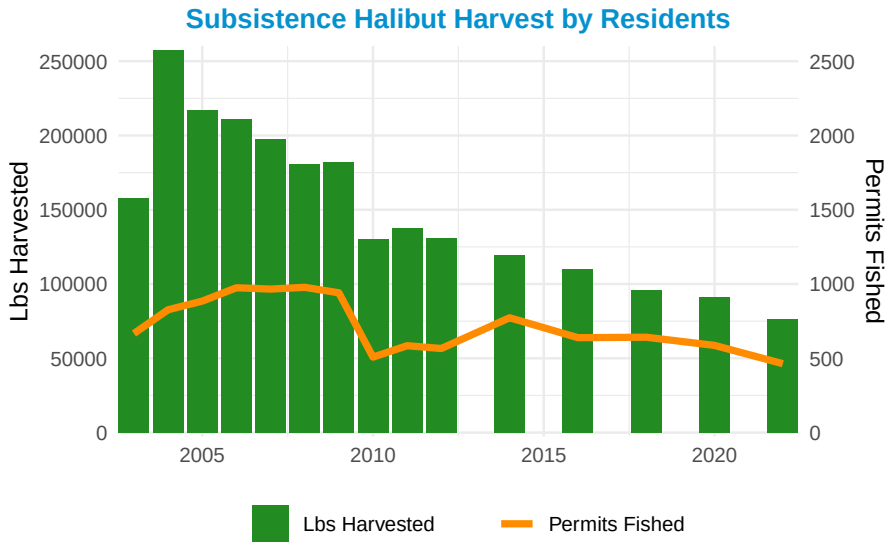
Subsistence hunting and fishing are an important part of people's recreation and livelihoods on Kodiak Island. All communities there are significantly reliant on groundfish and crab fisheries for subsistence purposes, with 18%-75% of households using at least one species of groundfish, and 15-90% of households using at least one species of crab. The most popular species across all communities are species of crab followed by cod, rockfish, lingcod, and sablefish.

While data on subsistence fishing from these communities were collected during different years ranging from 1991 through 2018, and therefore cannot be compared, the data offer glimpses into

potential trends across and within each community. For instance, in 2018 the community of Akhiok was particularly reliant on crab resources with 90% of households using this resource and 73% receiving it from others. Similarly, in 2003, 75% of households in Ouzinkie used a variety of groundfish species including cod, 37% used lingcod, and 59% used rockfish. In 2018, residents of Akhiok harvested 7.86 pounds of crab per capita, and in 2003, the community of Port Lions harvested 7.4 pounds of cod per capita. Overall, the community of Karluk, with data from 1991, had the lowest use rates compared to other communities in different years.[14]

Kodiak Island communities also participate in salmon and halibut subsistence harvests. Trends across all communities from 2015-2022 indicate that harvests of halibut have decreased in recent years, while salmon harvests have declined with interannual variability.





[14] Alaska Department of Fish & Game Division of Subsistence. (2024). 2018 Akhiok Harvest Data, 2003 Ouzinkie Harvest Data, 1991 Karluk Harvest Data. Community Subsistence Information System, Subsistence Community Profile Dashboard. Retrieved November 14, 2024 from https://adfg.maps.arcgis.com/apps/dashboards/c5a783dd9f9049efb6489cce9fc38319

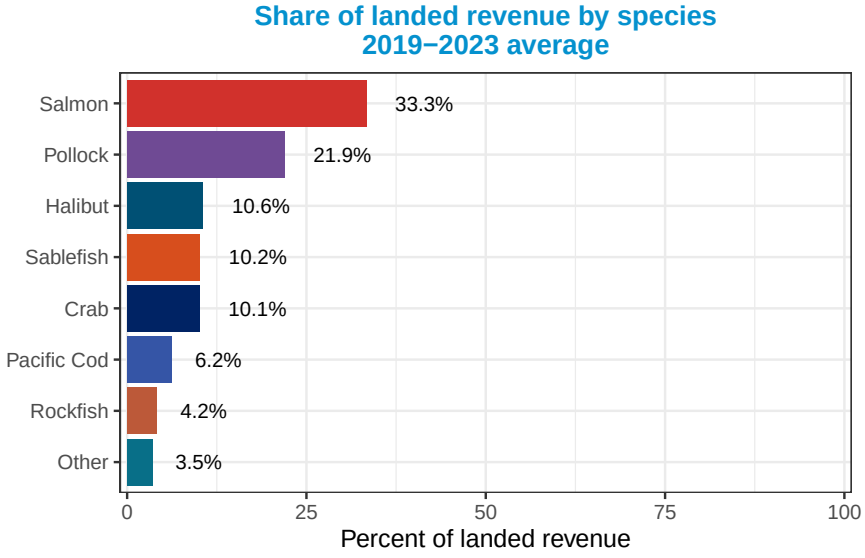
13.0.0.10. Recreational Fishing Engagement

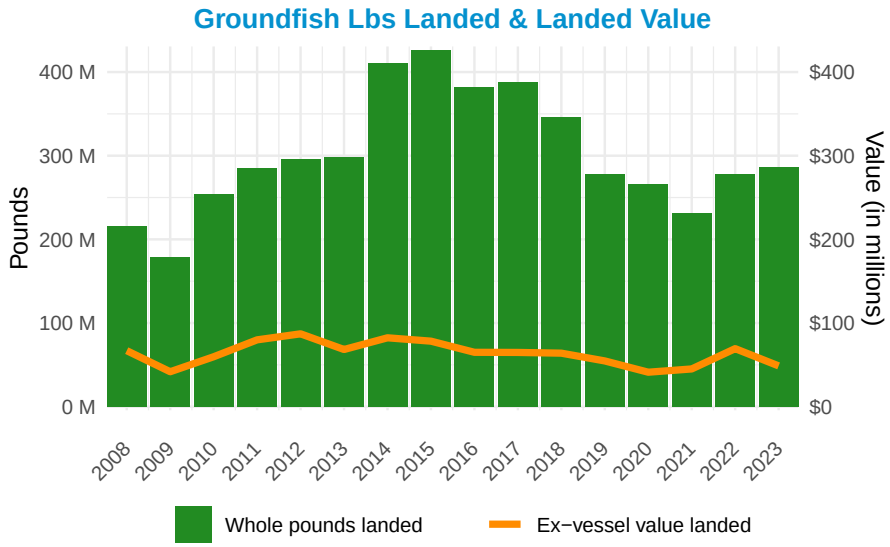
Kodiak is one of the four communities in Alaska that has been highly engaged in recreational fishing in all years 2004-2023 as well as highly engaged in commercial fishing (harvesting or processing), the others being Homer, Seward, and Sitka. Kodiak's recreational fishing engagement score has been relatively constant over this period but has been increasing recently with 2023 being near its highest engagement score and a 15% increase over the prior 5-year period.

13.0.0.11. Groundfish Processing Engagement - HIGH

Overall, Kodiak facilities processed 286 million whole pounds of groundfish worth $48.8 million in 2023. When compared to 2022, the volume of groundfish landings increased by 8.61 million pounds (3%) but the value decreased by $20.6 million (30%). The disconnect between volume and value reflects the state of the seafood market.

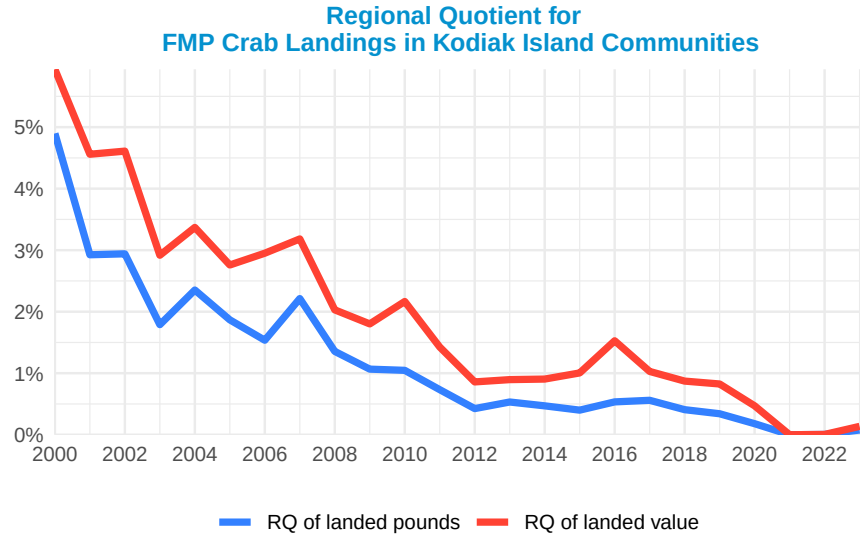
Several multi species processors operate in Kodiak City. Over the past five years, groundfish made up an average of 42.5% of the total ex-vessel value of all species landed. In 2023, groundfish processing accounted for 71% of total fish landed. Although the bulk of processing occurs in Kodiak City, smaller Kodiak communities are involved in seafood processing as well. Salmon holds the majority share of revenue landed in Kodiak Island Borough over the last five years at 33.3%, followed by pollock at 21.9%.





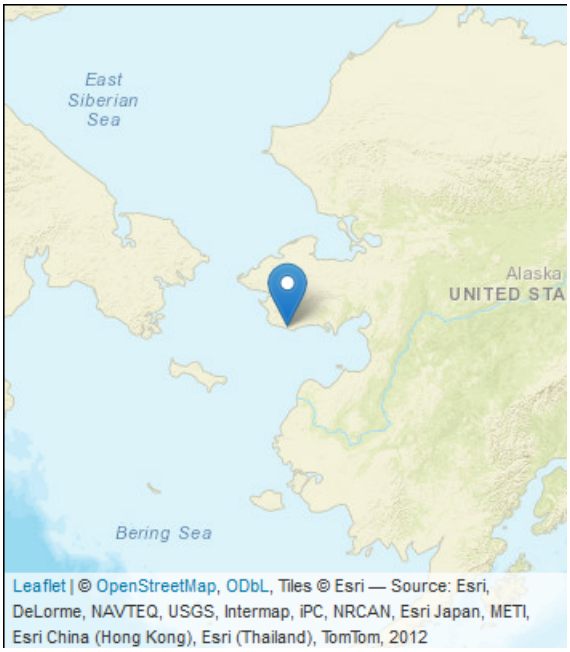
13.0.0.12. Crab Processing Engagement - MEDIUM

Due to confidentiality concerns, some processing data are restricted and therefore can only be shown as general trends. In order to show the general processing trends for crab FMP, the processing regional quotient (RQ) is presented here. The RQ for pounds and revenue landed in Kodiak show a steady decline over the past two decades, indicating a decrease in participating in the crab processing sector, and in recent years the closure of the snow crab fishery.



14. Nome

14.0.0.1. Area Description & History



Nome is located on the south coast of the Seward Peninsula. Historically, Malemiut, Kauweramiut, and Unalikmiut Iñupiat have occupied the area for thousands of years. Nome was a supply center for Russian whaling and trading in the mid 1800s; its population exploded during the Nome gold rush in 1898. The City of Nome was incorporated in 1901. Commercial exploitation of halibut and groundfish first extended into the Bering Sea region in 1928. King crab fisheries began in the 1950s, and Norton Sound is one of the fisheries historical centers. Nome is located in Pacific Halibut Fishery Regulatory Area 4E and the Bering Sea Sablefish Regulatory Area. Nome serves as a regional center of supply, services, and transportation in the Norton Sound and Bering Strait region, and many government offices are located there. Nome was included under the Alaska Native Claims Settlement Act (ANCSA) and is federally recognized as a Native village. Four federally-recognized Tribes are located within the City of Nome: the Nome Eskimo Community, Solomon Tribal Council, King Island Native Community, and Council Traditional Council. Two Native Corporations are active in the area, including Bering Straits Native Corporation and Sitnasuak Native Corporation.

14.0.0.2. Infrastructure & Transportation

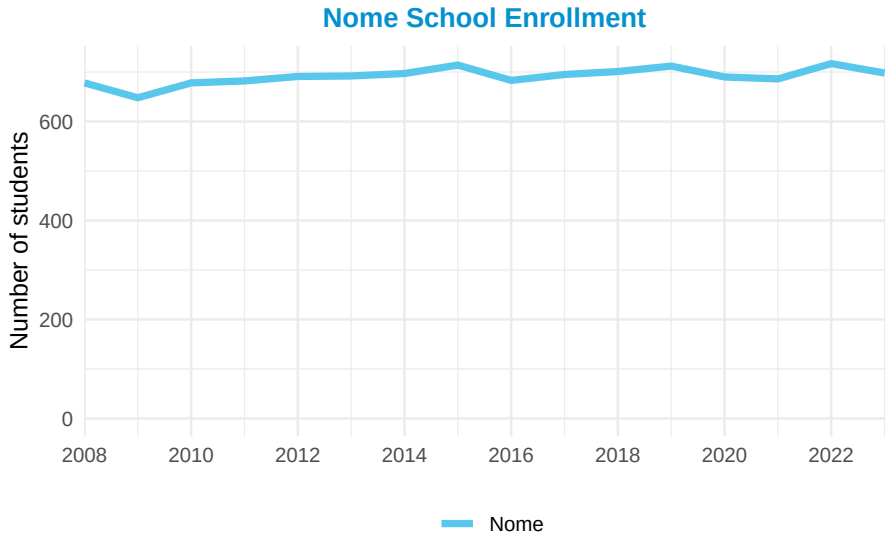
Nome is accessible by air and sea with two state operated airports. There are two health facilities: Nome Health Center and the Norton Sound Regional Hospital, both operated by the Norton Sound Health Corporation. The hospital is a qualified Acute Care facility and offers Medevac Service. Additional facilities include: state and local government, US Coast Guard facilities, Northwest Campus-UA, Fairbanks, the Katirvik Cultural Center, public library, and maritime support services. A recent major infrastructural development in Nome was the announcement of a port expansion project in 2023. As the Arctic gateway, Nome plans to develop a deep water port that has substantial implications for Nome and the broader nation, including national security, emergency

preparedness, and employment.[1] Nome has three schools; enrollment has remained fairly stable over the past decade, with a 3% decrease in school enrollment between 2022 and 2023.

Nome was the most populous city in Alaska at the turn of the century but the community shrunk after the conclusion of the Nome gold rush in 1909. More recently, Nome's population has been steadily declining since 2011 and reached a 20-year low of 3,469 in 2022. The population in Nome is majority Native and Nome is considered a hub community for Alaska Native villages. Longer range population forecasts estimate that Nome's population will continue decreasing over the next 30 years. Local government has argued that the announced port expansion may help stabilize this population decline.

14.0.0.3. Demographics

Nome was the most populous city in Alaska at the turn of the century but the community shrunk after the conclusion of its gold rush in 1909. More recently, Nome's population has been steadily declining since 2011 and reached a 20-year low of 3,506 in 2023. The population in Nome is majority Native and Nome is considered a hub community for Alaska Native villages. Longer range population forecasts estimate that Nome's population will continue decreasing over the next 30 years. Local government has argued that the announced port expansion may help stabilize this population decline.[2] Recent changes in fisheries participation due to crab fisheries closures in particular have greatly affected community members and may be linked to recent lows in population levels.



[1] Port of Nome. (2024). Strategic Development Plan Update - Phase A Background & Engagement. https://www.nomealaska.org/sites/default/files/fileattachments/port_of_nome/page/12402/2024-05-13_pon_strategic_plan_update_-_phase_a_final.pdf

[2] Port of Nome. (2024). Strategic Development Plan Update - Phase A Background & Engagement. https://www.nomealaska.org/sites/default/files/fileattachments/port_of_nome/page/12402/2024-05-13_pon_strategic_plan_update_-_phase_a_final.pdf

Demographics	
Population	3506
Population in group housing	227
Median household income	103,542
Housing units	1,495
Percentages	
Male	50.1%
Female	49.9%
White	26.8%
American Indian or Alaska Native	53.6%
Black or African American	1.8%
Asian	3%
Native Hawaiian or Pacific Islander	0%
Hispanic or Latino	1.9%
Below poverty line	6.1%
High school diploma or higher	92.5%
Population under 5	9.1%
Population over 18	69.6%
Population over 65	6.3%

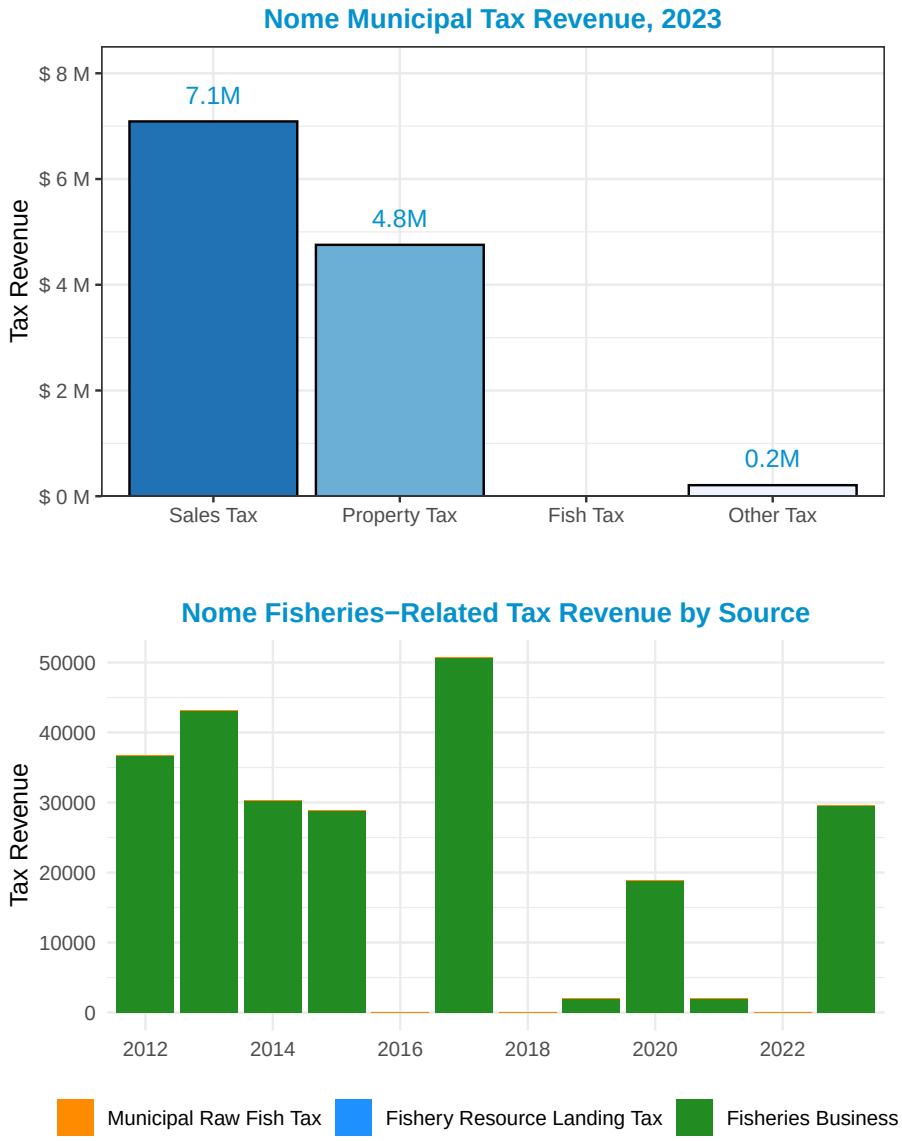
Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

14.0.0.4. Current Economy

Nome's economy is based on public administration, fishing, and other public sector jobs. Nome is home to Kawerak, Inc., the Native non-profit organization serving the Bering Strait region and the Norton Sound Economic Development Corporation. Many residents engage in commercial fishing and subsistence activities. In 2023, Nome reported $29,630 in total fishery related taxes (including shared and municipal). 2 This represents a return of total fish tax value to historically comparable levels. By contrast, fishery related tax revenue was $0 in 2022 and $1,977 in 2021. In 2022, per capita income in Nome was estimated to be $41,722 (up 17% since 2019), and the median household income was $103,542 (up 22% since 2019).[3] The percentage of the population living below the poverty line has decreased by 1.4% since 2019.[4]

[3]U.S. Census Bureau. (2023). *American Community Survey 5-Year Estimates, 2018-2022*. U.S. Department of Commerce. Retrieved from https://www.census.gov/data

[4]U.S. Census Bureau. (2023). *American Community Survey 5-Year Estimates, 2018-2022*. U.S. Department of Commerce. Retrieved from https://www.census.gov/data



14.0.0.5. Climate Change Vulnerability and Adaptive Capacity

14.0.0.5.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in determining their vulnerability. Observed climate change impacts in the city of Nome include warmer temperatures, increased storminess, changes in sea ice, less snow and more rain in the winter, rainier summers, shallower creeks, and permafrost thaw. These changes pose several risks relating to public health and safety, subsistence, infrastructure, and have led to increased shipping in the area.[5] Due to the remoteness of this community and its vulnerable location, it has a relatively high risk of exposure to the biophysical effects of climate change. This was further evidenced by the impacts of Typhoon Merbok

[5]Federal Emergency Management Agency. (n.d.). *National Risk Index: Nome Census Area, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02180

on Nome in September 2022, which caused near-record high water levels and extreme flooding.[6] Amid increasingly volatile conditions,Nome residents are grappling with the complex impacts of climate change, highlighted by the combination of infrastructural damage caused by Typhoon Merbok and the ongoing port expansion project aimed at maximizing benefits from changes in Arctic maritime traffic and commerce.

14.0.0.5.2. Dependence on Fisheries Affected by Climate Change

Reliance on fisheries resources which are being impacted by climate change can determine how vulnerable a community is to disruption from climate change. Overall, the city of Nome is moderately engaged in harvesting within the crab fishery, but highly engaged in processing. In addition, while recreational fishing is not as important to the economy or lifestyle of residents, this is offset by its particularly high reliance on subsistence fishing. The majority of the Alaska Native population in Nome depends heavily on local wild food resources as important nutritional sources in their diets, particularly salmon, tomcod, crab, and seal. In addition, the subsistence way of life plays an integral role in the cultural and traditional values of tribal members living in the Nome area.[7] They rely heavily on salmon in particular for subsistence purposes. Their ability to harvest and preserve salmon and other subsistence species has been negatively impacted by climate-induced changes in recent years, particularly warming trends which often make it harder to preserve salmon, and changes in sea ice, which may make it harder to access subsistence harvesting areas.[8] Considering all three of these measures, Nome overall is moderately dependent on fisheries resources which will be impacted by climate change.

Subsistence fishing is an important part of Nome's fisheries, particularly salmon and crab fisheries.[9] While many residents have economic alternatives to subsistence fish harvests, subsistence foods offer residents cultural benefits, increased fishery options, and are often cited as one of the main attractions to living in the area. One recent example of these impacts is the dramatic decline of BSAI snow crab fisheries and resulting closures. Federal and state fisheries closures have affected Nome residents: in 2020, both the summer and winter Norton Sound Red King Crab (RKC) fisheries were closed due to low stock. In 2021, the Norton Sound Seafood Products ceased purchasing Norton Sound RKC in an effort to bolster the stock.[10] In 2022, subsistence salmon fishing was closed in the southern Norton Sound.[11] These closures and others have adversely affected subsistence fishers in Nome.[12]

[6]Flood waters receding after storm batters western Alaska. (2022). CTV News. https://www.ctvnews.ca/climate-and-environment/flood-waters-receding-after-storm-batters-western-alaska-1.6074038?utm_medium=email&utm_source=govdelivery

[7]Wolfe, R.J., J.A. Fall, V. Fay, S. Georgette, J. Magdanz, S. Pedersen, M. Pete and J. Schichnes. 1986. The role of fish and wildlife in the economies of Barrow, Bethel, Dillingham, Kotzebue, and Nome. ADF&G, Div. of Subsistence Tech. Paper No. 154. Juneau, AK.

[8]Federal Emergency Management Agency. (n.d.). *National Risk Index: Nome Census Area, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02180

[9]Menard, J., J. M. Leon, J. Bell, L. Neff, and K. Clark. 2022. 2021 Annual management report Norton Sound Sound–Port Clarence Area and Arctic –Kotzebue management area s. Alaska Department of Fish and Game, Fishery Management Report No. 22 22-27, Anchorage.

[10]Norton Sound Economic Development Corporation. (2022). NSEDC TO RESUME PURCHASING RED KING CRAB THIS SUMMER. https://www.nsedc.com/nsedc-to-resume-purchasing-red-king-crab-this-summer/

[11]Alaska Department of Fish & BGame. SOUTHERN NORTON SOUND SUBSISTENCE SALMON FISHING TO CLOSE. (2022). https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1387559806.pdf

[12]Warren, C. A. (2024, July 25). First ever subsistence fishery closure at Port Clarence causes hardship at Teller, Brevig. The Nome Nugget. http://nomenugget.com/news/first-ever-subsistence-fishery-closure-port-clarence-causes-hardship-teller-brevig

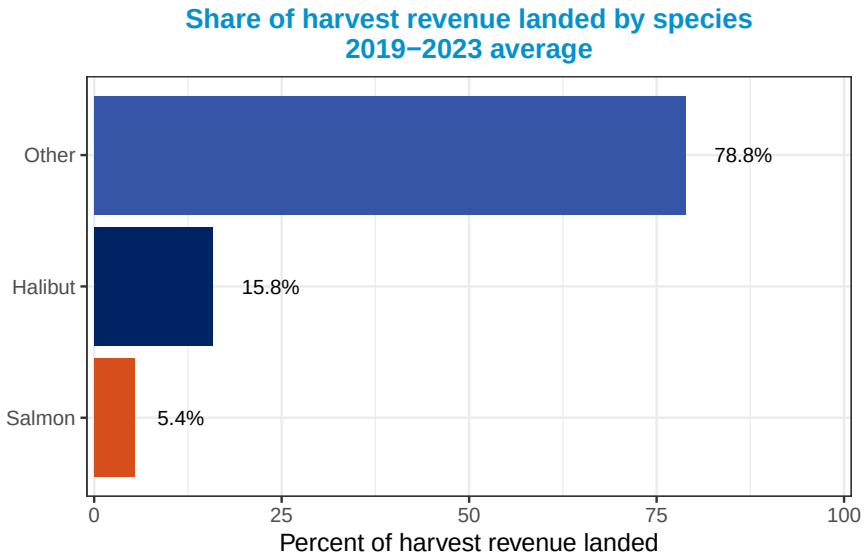
Nome	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED
Poverty	LOW
Population Composition	MED-HIGH
Personal Disruption	MED

Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

14.0.0.5.3. Local Adaptive Capacity

Nome has moderate limitations on its adaptive capacity. This rating takes into account factors in the community which can make it harder to adapt when disruptions occur. Nome received a moderate rating due to social indicators such as their population composition, which comprises individuals with medium to higher levels of vulnerability, and moderate levels of personal disruption. In addition, according to the National Risk Index, Nome has a very high susceptibility to the adverse impacts of natural hazards and a very low ability to prepare for or adapt to changing conditions.[13] This is important to consider when designing management policies for the fisheries resources this community depends on because drastic shifts may hinder their ability to stay highly engaged in a particular fishery. For example, there are indications that Nome residents shifted from targeting Norton Sound red king crab to Pacific cod in response to fisheries closures in 2020, although further research is needed to examine this potential shift in target species.

14.0.0.6. Groundfish Harvesting Engagement - LOW

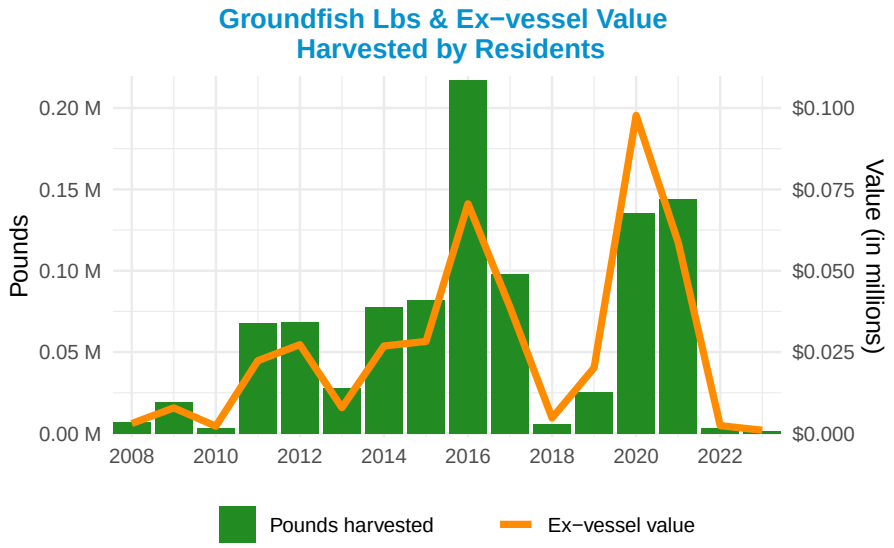


Among commercial fisheries in Nome, groundfish engagement has changed significantly over the 5-year period. In 2020 and 2021, Pacific cod accounted for a much higher percentage of pounds

[13]Federal Emergency Management Agency. (n.d.). *National Risk Index: Nome Census Area, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02180

harvested (40% in 2020, 74% in 2021) and harvest revenue (17% in 2020, 34% in 2021) than in previous years. During these years, the same metrics fell significantly for crab and halibut, a likely consequence of the Red King Crab fishery closure in 2020. In 2022 and 2023, this trend reversed, and Pacific cod production dropped significantly, accounting for a much smaller percentage of pounds harvested (just 1% in 2022, 0.4% in 2023) and harvest revenue (0.08% in 2022, 0.05% in 2023). The associated figure of harvest revenue by species has been aggregated for confidentiality reasons.

Nome king crab fishermen hold both state-issued king crab permits, as well as permits in the Community Development Quota fishery. Norton Sound Seafood Products was established in 1995 and processes red king crab, salmon, and halibut.



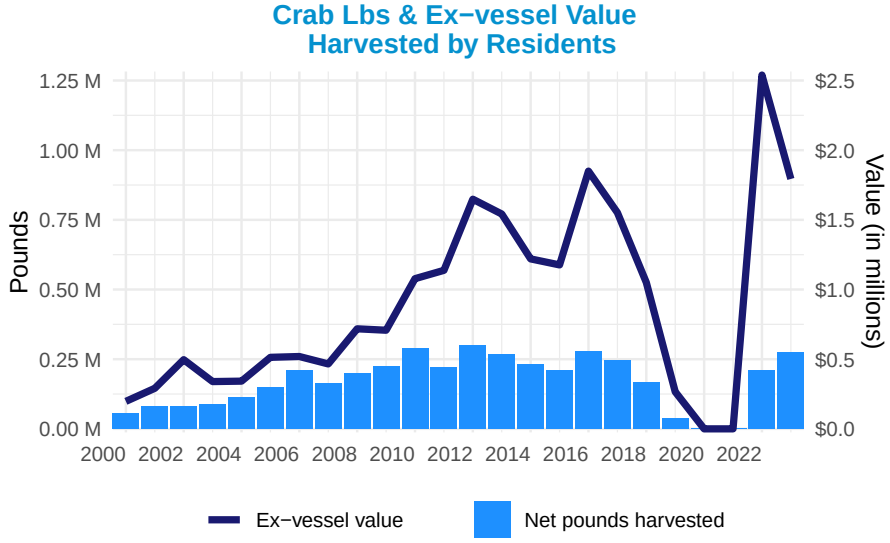
14.0.0.7. Crab Harvesting Engagement - HIGH

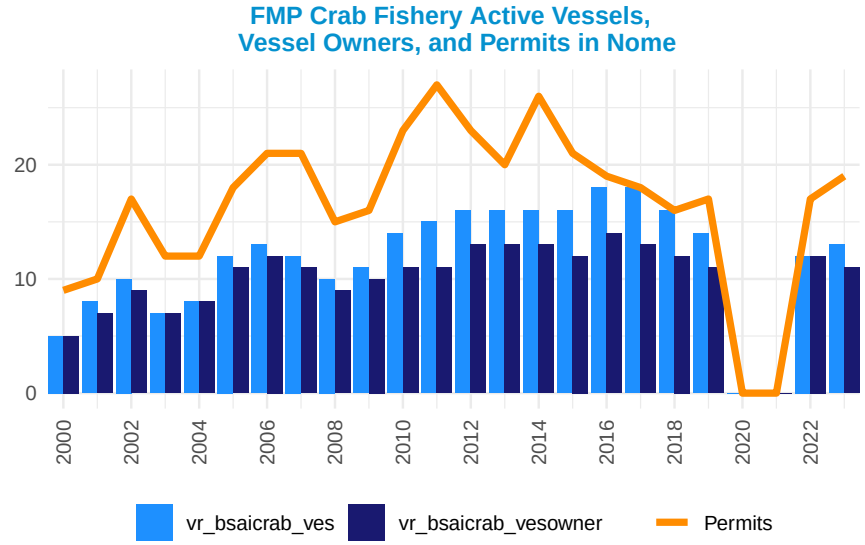
Alaska FMP crab fisheries have struggled with extreme volatility in recent years: hitting a peak in 2016 in both harvested volume and associated ex-vessel value, then beginning a steep decline. Bering Sea snow crab, Bristol Bay and Norton Sound Red King Crab have faced closures, late starts to the season, and reduced catch limits. This has affected Nome's engagement in these fisheries. In 2021, crab vessels registered in Nome harvested just 684 pounds of BSAI crab, a 98% decrease from 2019. The associated ex-vessel value in 2019 was $286,858, then down to $15,267 in 2021 (a decrease of 95%). Opposite to the trend in groundfish engagement, drastic increases in crab harvesting engagement occurred in 2022 and 2023. In 2022, the number of crab vessels registered in Nome returned to levels seen in previous years and increased both pounds harvested and ex-vessel value by 99% compared to 2021. In 2023, this upward trend continued, with crab vessels harvesting with crab vessels harvesting 280 thousand pounds of BSAI crab with an associated ex-vessel value of $1.8 million.

Due to confidentiality concerns, only select data are available.

In 2020, both the summer and winter Norton Sound red king crab (RKC) fisheries were closed due to low stock. To support rebuilding the stock, the Norton Sound Economic Development Corporation initially ceased purchasing RKC in 2020 and 2021. This is reflected in the data which shows crab

harvests and ex-vessel value decreasing to zero in 2020 and 2021, as well as lack of active vessels and permits. Given simultaneous increases in harvests of Pacific cod during these two years, it is possible Nome fishermen attempted to compensate for the crab declines by engaging more in the groundfish fishery. Crab landings and permits in Nome have recently increased to historical levels in 2022 and 2023. Additional social science research with commercial fishing fleets could illuminate decision-making processes under the dynamic conditions and stressors observed since 2020.





Due to confidentiality concerns, only select data are available.

In 2020, both the summer and winter Norton Sound red king crab (RKC) fisheries were closed due to low stock. To support rebuilding the stock, the Norton Sound Economic Development Corporation ceased purchasing RKC. This is reflected in the data which shows crab harvests and ex-vessel value decreased to zero in 2020, as well as lack of vessels and permits. Given simultaneous increases in harvests of Pacific cod during these two years, it is possible Nome fishermen attempted to compensate for the crab declines by engaging more in the groundfish fishery. Additional social

science research with commercial fishing fleets could illuminate decision-making processes under such stressors.

14.0.0.8. Subsistence Harvesting Engagement

The majority of the Alaska Native population in Nome depends heavily on local wild food resources such as salmon, tomcod, crab, and seal as important nutritional sources in their diets. The subsistence way of life plays an integral role in the cultural and traditional values of tribal members living in the Nome area.[14] While groundfish and crab subsistence harvesting data were not available for Nome through CSIS as they were for other communities, Nome residents' extensive use of other resources, particularly salmon, indicate that they likely rely on these fisheries as well. This also highlights the severe need for subsistence harvesting data for this community so we can better understand to what extent they engage with and rely on subsistence fishing of different species.

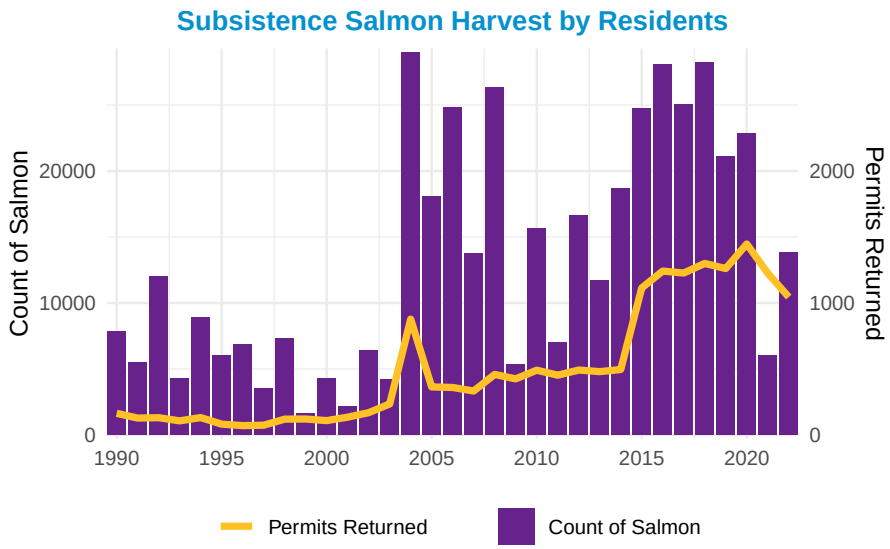
According to ADF&G data, subsistence harvests of halibut have fluctuated since 2008 while subsistence harvests of salmon have remained relatively constant at a high level. In recent years however, all-time lows in subsistence harvests for both species were observed in 2021 for salmon and in 2022 for halibut.[15][16] Declines in salmon stocks have been found to affect Nome residents, who have often turned to less regulated areas to subsistence fish when severe salmon fishing restrictions have been instituted.9 The importance of this species in particular to their culture and livelihood cannot be overstated. Recent data from the Norton Sound show that from 2016-2020 there was an overall average of 2,873 pounds of red king crab caught for subsistence during the summer season and 8,844 pounds in the winter season. In the summer, an average of 40 subsistence harvesting permits were issued, and in the winter 121. These numbers decreased in 2021 to just 1,723 pounds harvested in the summer and 6,941 pounds in the winter. Summer permits increased to 42, but winter permits decreased to just 103.[17]

[14] Kettle, N., J. Martin, and M. Sloan. 2017. Nome Tribal Climate Center for Climate Assessment and Policy. Fairbanks, AK. https://adaptalaska.org/wp-content/uploads/2020/01/Nome-Tribal-Climate-Adaptation-Plan-Final-LowRes.pdf

[15] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

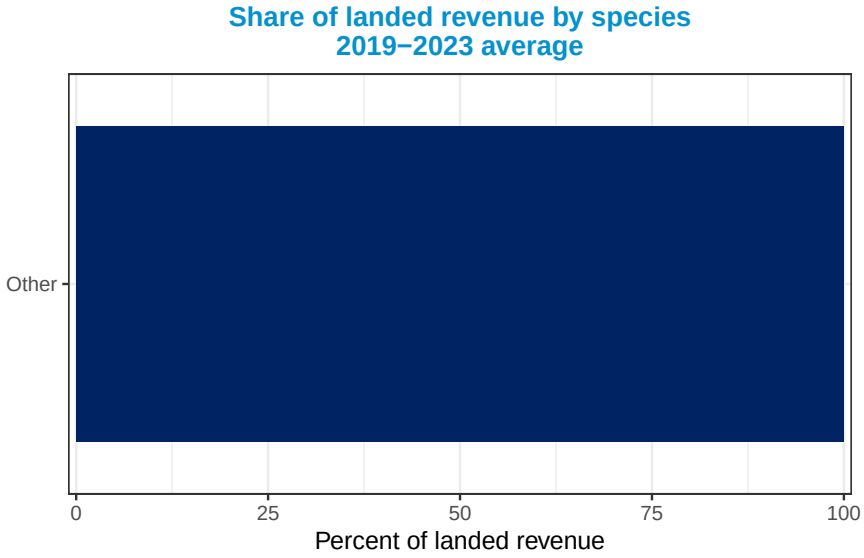
[16] Alaska Department of Fish and Game Division of Subsistence. 2011. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.

[17] Menard, J., J. M. Leon, J. Bell, L. Neff, and K. Clark. 2022. 2021 Annual management report Norton Sound Sound–Port Clarence Area and Arctic –Kotzebue management area s. Alaska Department of Fish and Game, Fishery Management Report No. 22 22-27, Anchorage.



14.0.0.9. Groundfish Processing Engagement - LOW

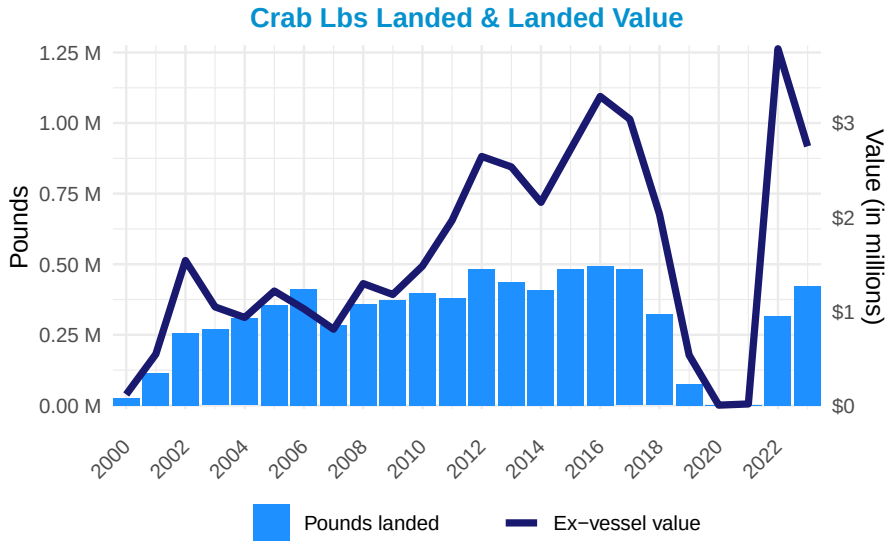
In 2021, significantly more pounds of Pacific cod were landed than in previous years (an increase of 584% since 2019). There was also a corresponding 230% increase in landed value. In 2022 and 2023, landings of Pacific cod returned to historically average levels. During this time period, groundfish processing engagement remained low. The associated figure of landed revenue has been aggregated for confidentiality reasons.

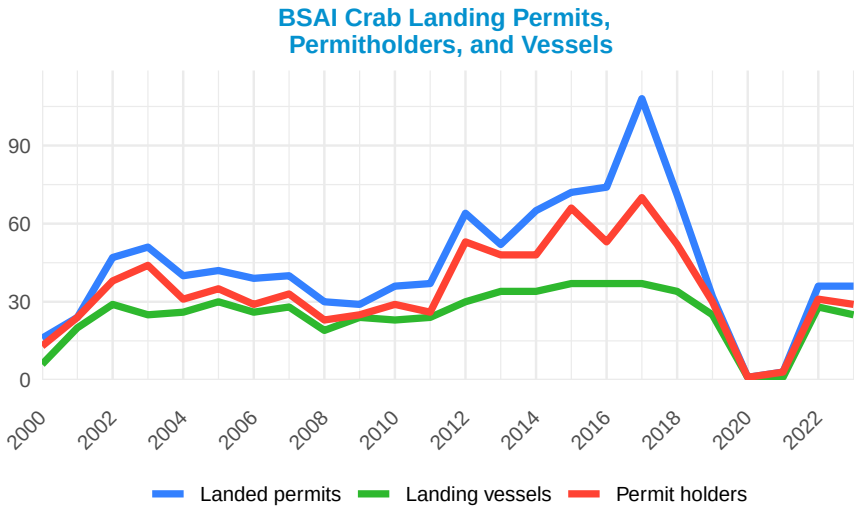


14.0.0.10. Crab Processing Engagement - HIGH

Nome is highly engaged in the crab processing sector, although processors have been affected by uncertainty in crab production over the 5-year period. The number of crab buyers in the region dropped from 8 to 3 in 2019, remaining low until 2022, when buyers returned to pre-closure

levels (28 in 2022 and 25 in 2023). In 2023, Nome processed 424 thousand net pounds of crab with an associated value of $2.8 million.

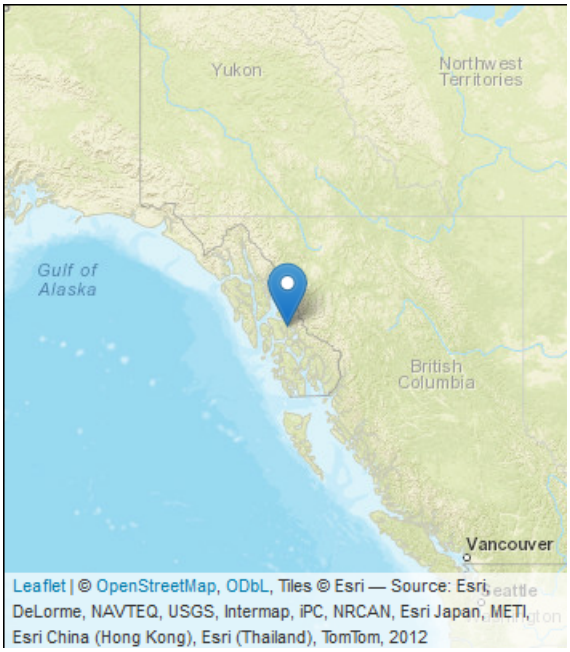




*Permits counted are CFEC gear operator permits

15. Petersburg

15.0.0.1. Area Description & History



Historically utilized by Tlingits as a fish camp, Petersburg is located on the northwest end of Mitkof Island. In the 1800s, Norwegian immigrants settled in the area and built a cannery, sawmill, and dock by 1900. Alaska's first shrimp processor, Alaska Glacier Seafoods, was founded in 1916. In 2013 the City and Borough of Petersburg was incorporated.[1] The community maintains a mixture of Tlingit and Scandinavian history. It is known as "Little Norway" for its history and annual Little Norway Festival during May. As in many Alaskan communities, subsistence harvest, particularly of salmon, halibut, shrimp, and crab, is important. Petersburg has participated in commercial fisheries since the late 1800s. Commercial harvest of salmon began in the late 1870s and soon after, a commercial fishery began for halibut, with sablefish targeted as a secondary fishery. Although salmon continues to be a vitally important fishery, Petersburg has a diversified fleet that participates across numerous State and Federal fisheries. The number of Petersburg City residents living in group quarters is approximately 183,[2] although this is not directly associated with fisheries. Petersburg is located in Pacific Halibut Fishery Regulatory Area 2C and Federal Statistical and Reporting Area 659. Petersburg is in House District 35, Senate District R. Native Associations and Corporations active there today include the Petersburg Indian Association.

15.0.0.2. Infrastructure & Transportation

Petersburg is accessible by air and water. The community is serviced twice daily by Alaska Airlines with flights to Juneau and Seattle as well as charter services, and seaplanes. The Alaska Marine Highway provides regular ferry service. Petersburg is on the mainline route which connects

[1] City and Borough of Petersburg. (n.d.). Boundary Map and Boundary Description. Retrieved November 15, 2024 from https://www.petersburgak.gov/comdev/page/borough-map-and-boundary-description

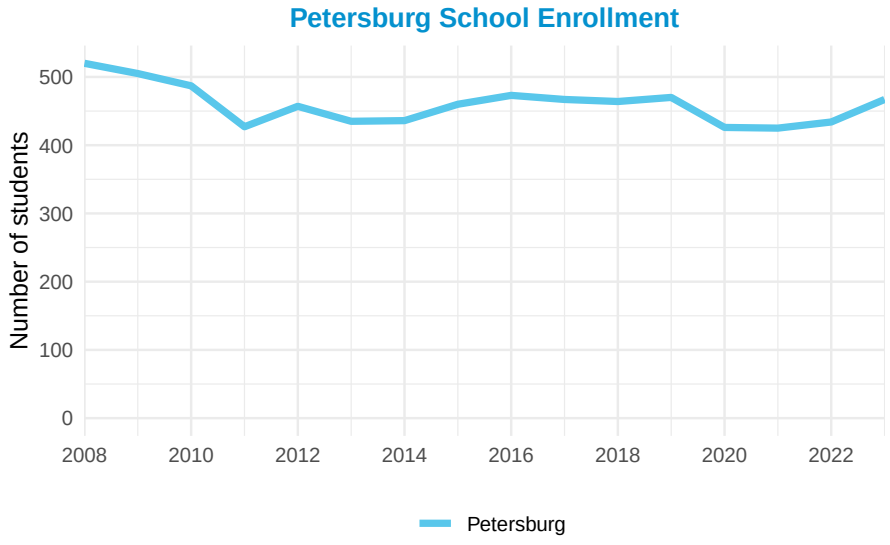
[2] Alaska Department of Labor. (2023). Alaska Population Estimates: Cities and Census Designated Places (CDPs), 2020 to 2023. https://live.laborstats.alaska.gov/data-pages/alaska-population-estimates

Bellingham to Southeast Alaska. Harbor facilities include a petroleum wharf, barge terminals, three harbors with moorage for 700 boats, a launch, and haul-out. There is no deep-water dock for large ships such as cruise ships. Water in Petersburg is sourced from a 200-million gallon water reservoir. There are three schools; overall student enrollment has decreased by 10% in this district since 2008. Enrollment reached a historic low in 2021, which likely occurred due to the COVID pandemic.[3] Since 2021, school enrollment increased year-over-year, up 10% from 2021 levels, with an additional 42 students.

15.0.0.3. Demographics

Petersburg's population declined by 16% in 2014. Since, the population has steadily increased year-over-year to 3,023 (5% increase from 2014). With slight increases in population between 2014 and 2022, the proportion of the population over 65 has more than doubled during the same time period, suggesting that older individuals are moving to Petersburg while the proportion of younger individuals (under 5 years) is declining. Approximately 68%of the population, on average, identified as white between 2018 and 2022, down 5% from the 2010 to 2014 average, while approximately 7% of the population identifies as American Indian or Alaskan Native, down 4% from the 2010 to 2014 average.

The percentage of the population with a high school diploma (or equivalent) or higher has decreased since 2010. Between 2018 and 2022, an average of 86.7% of the population 25 and older stated that they had a high school diploma or higher, down 6% from the 2010 to 2014 average. Additionally, the median household income (in 2022 USD) has decreased from 2010 (~$82,000) to 2022 (~$78,000). Within this time period the percentage of the population that lives below the poverty line has decreased from 10% in 2010 to 8% in 2022.



[3]School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retrieved November 14, 2024 from http://www.eed.state.ak.us/stats/

Demographics	
Population	3023
Population in group housing	183
Median household income	77,670
Housing units	1,475
Percentages	
Male	49.5%
Female	50.5%
White	57%
American Indian or Alaska Native	8.1%
Black or African American	1.2%
Asian	18.1%
Native Hawaiian or Pacific Islander	0.5%
Hispanic or Latino	5%
Below poverty line	4.7%
High school diploma or higher	86.7%
Population under 5	4.5%
Population over 18	81.7%
Population over 65	24.8%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

15.0.0.4. Current Economy

Historically, Petersburg's economy was based on commercial fishing and timber. Today, Petersburg is one of the top-ranking fishing ports in the U.S. In 2021, Petersburg collected $855,021 in total fishery related taxes, a 14% increase from 2019.[4] These revenues support basic city services such as education, sanitation, transportation, and other services.

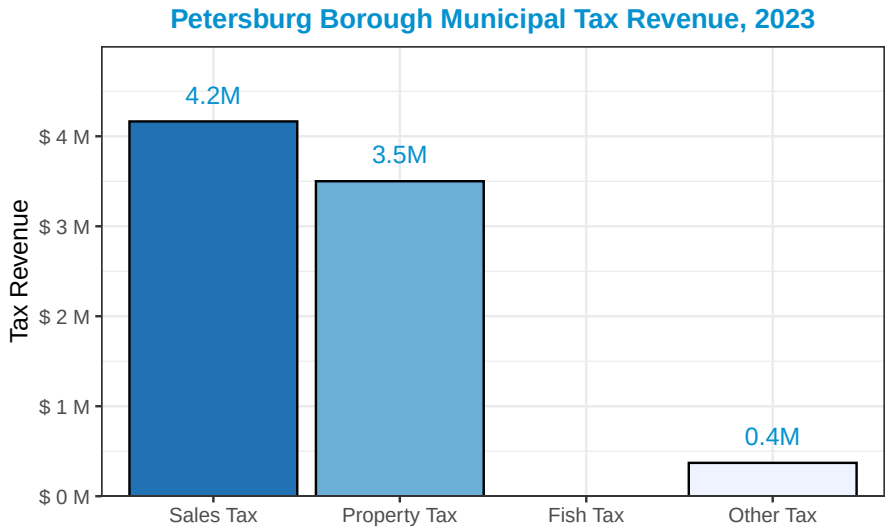
In 2020, per capita income in Petersburg was estimated at $34,009 (up 2% since 2018),[5] and the median household income $68,667 up 8% since 2018).[6] The percentage of the population living below the poverty line has decreased (~4%) since 2018.[7] These measures are important for understanding the current economic wellbeing of residents and indicate potential social and economic changes. Additionally, these factors contribute to the community's ability to adapt to stressors such as food security and climate change.

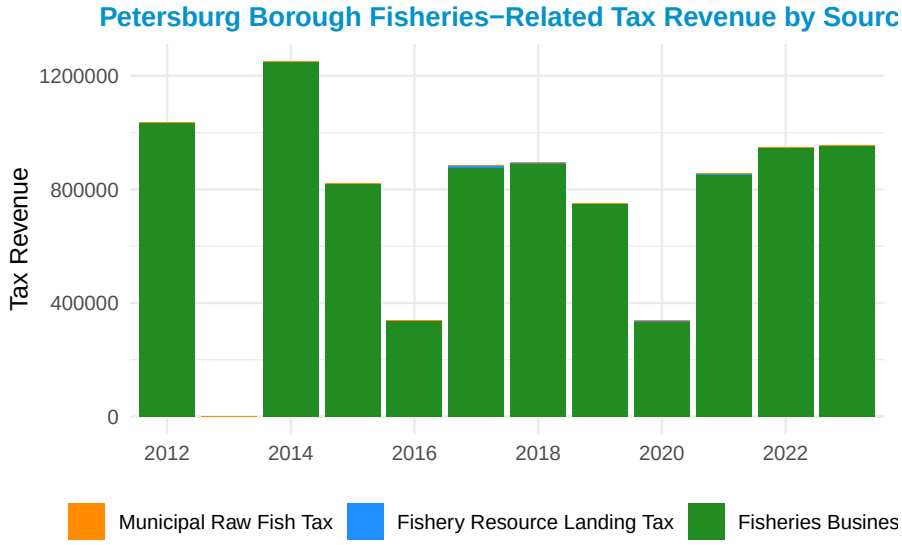
[4]Tax data from AK. Dept. of Revenue, Annual Reports 2008 2008-2021. Retr.' 06/30/2022 from http://tax.alaska.gov/programs/sourcebook/index.aspx aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.'10/2022 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx

[5]U.S. Census Bureau. (2021). Petersburg Borough. Retrieved from https://www.census.gov/quickfacts/ petersburgboroughalaska

[6]U.S. Census Bureau. (2021). Petersburg Borough. Retrieved from https://www.census.gov/quickfacts/ petersburgboroughalaska

[7]U.S. Census Bureau. (2021). Petersburg Borough. Retrieved from https://www.census.gov/quickfacts/ petersburgboroughalaska





15.0.0.5. Climate Change Vulnerability and Adaptive Capacity

15.0.0.5.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, can determine their vulnerability. Biophysical risks to the Gulf of Alaska as a whole include sea level rise, coastal erosion, extreme weather events, changes in precipitation (rates, timing, and snowpack), increasing landslides and avalanches, and increased storm severity. Similar to other areas of Alaska, Southeast Alaska is already experiencing increasing temperatures and changes in precipitation patterns, including receiving less snow and more rain. Changes have also been observed in forest habitats, including declines of yellow cedar trees, and marine habitats, ocean acidification and increased prevalence of

invasive species. These impacts are currently and will continue to impact human health in various ways.[8]

In 2018, the community of Petersburg integrated climate change as a hazard to the community within its hazard management plan, noting that "climate change has the potential to aggravate natural disasters along the coastline and rivers, particularly flooding and erosion." The plan further details other local concerns around climate change including sea level rise, impacts on king salmon, more fog and rain, new species migrating to the community while other species leave.

15.0.0.5.2. Dependence on Fisheries Affected by Climate Change

Reliance on fisheries resources, impacted by climate change, influence how vulnerable a community is to climate driven disruption. Petersburg is highly engaged in harvesting and moderately to highly engaged in processing in the groundfish fishery. Petersburg fishermen also participate in diverse State fisheries including salmon and crab, making them susceptible to recent volatility in salmon returns and long-term implications of ocean acidification on crab.

Tourism for recreational fishing is also a substantial part of the local economy. The community is also highly engaged in subsistence fishing, particularly for salmon and crab species, but also for certain species of groundfish including rockfish, sablefish and cod. Given this, Petersburg is overall highly dependent on fisheries resources that will be impacted by climate change. Therefore, as this community is impacted by a changing marine environment, their ability to fish for commercial, recreational, and subsistence purposes will be affected. Residents are highly concerned about impacts to several key species, including salmon, shellfish, eulachon, herring and halibut.[9] Community residents are also concerned about the potential implications of invasive European green crab on marine habitat and native crab species, as this species is now present in Southeast Alaska waters.[10]

15.0.0.5.3. Local Adaptive Capacity

Petersburg has moderate vulnerability associated with its housing and infrastructure, as well as a population which is moderately composed of higher risk individuals. FEMA's National Risk Index also rates Petersburg as having very low community resilience,[11] meaning they have a very low ability to adapt to changing conditions and withstand and recover rapidly from disruptions. Other social indicators–labor force, poverty, and personal disruption–are ranked as being of low vulnerability for the community.

[8] Central Council of the Tlingit & Haida Indian Tribes of Alaska. (n.d.). Climate Change Adaptation Plan. Retrieved from https://www.ccthita.org/services/community/environmental/documents/T&HClimateChangeAdaptationPlan.pdf

[9] Central Council of the Tlingit & Haida Indian Tribes of Alaska. (n.d.). Climate Change Adaptation Plan. Retrieved from https://www.ccthita.org/services/community/environmental/documents/T&HClimateChangeAdaptationPlan.pdf

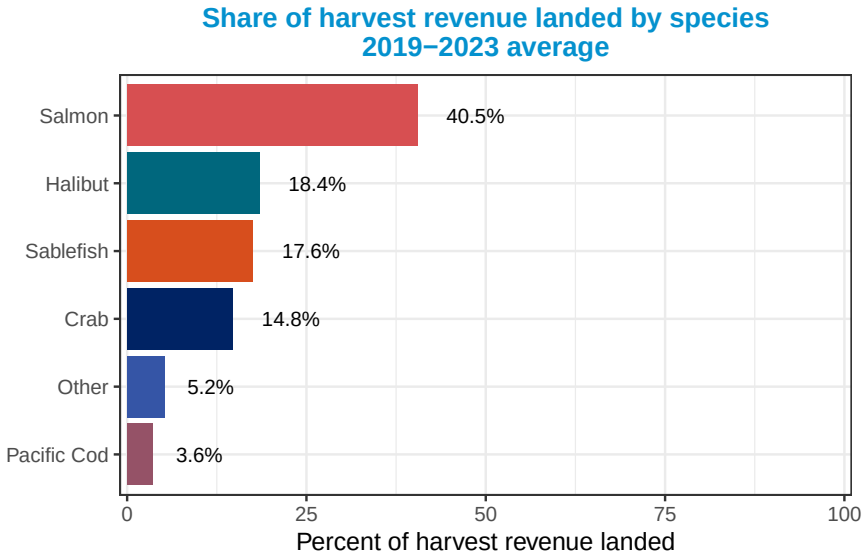
[10] KFSK. (2024, August 26). Petersburg mobilizes against invasive green crabs on Alaska's shores. https://www.kfsk.org/2024/08/26/petersburg-mobilizes-against-invasive-green-crabs-on-alaskas-shores/

[11] Federal Emergency Management Agency. (n.d.). *National Risk Index: Petersburg Borough, Alaska*. Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02195

Petersburg	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED-HIGH
Poverty	LOW
Population Composition	MED
Personal Disruption	LOW

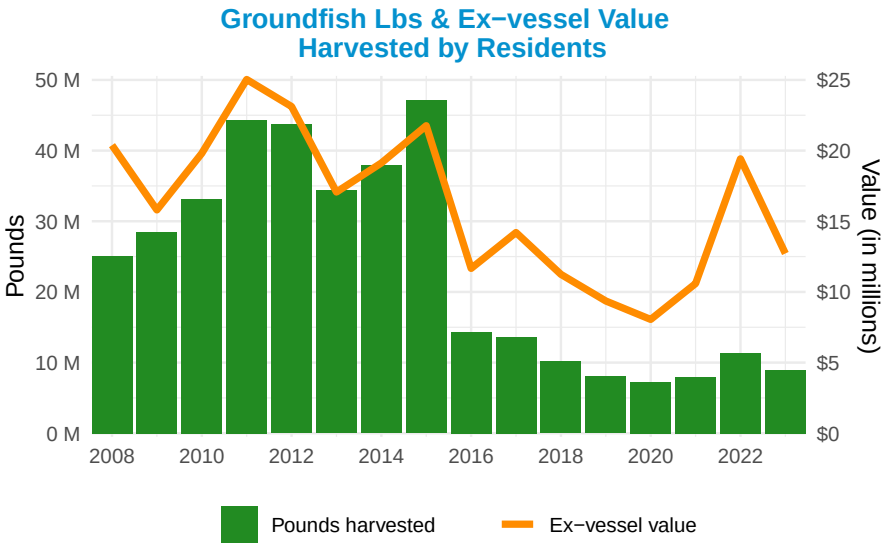
Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

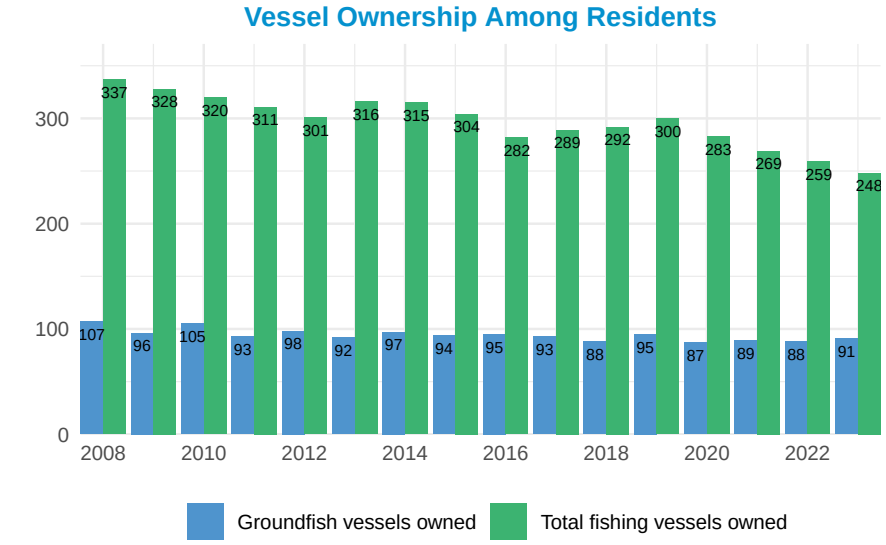
15.0.0.6. Groundfish Harvesting Engagement - HIGH



While highly engaged in groundfish fisheries, Petersburg brings harvest revenue from a diverse range of fisheries including 41% of revenue from commercial salmon harvest, 18% from halibut, and 15% from federal crab fisheries. The volume of groundfish harvested in 2023 was 8.9 million pounds with an associated revenue of $12.7 million. When compared to 2021, the 2023 harvest shows an increase of 12% in pounds harvested and a 20% increase in associated value. Since 2008, groundfish harvested by Petersburg vessels have decreased 64% in volume and 38% in associated revenue. Pacific cod harvests decreased slightly in 2023 compared to 2022, from 6.6 million to 4.4 million; however this marks a 43% increase from a low of 3 million in 2020.

The number of fishing vessels owned by Petersburg residents decreased by 21 vessels from 2021 to 2023 (down 8%). During the same time period, the total number of groundfish vessels registered to Petersburg residents also increased from 89 to 91 (up 2%), up from a low of 87 in 2020.



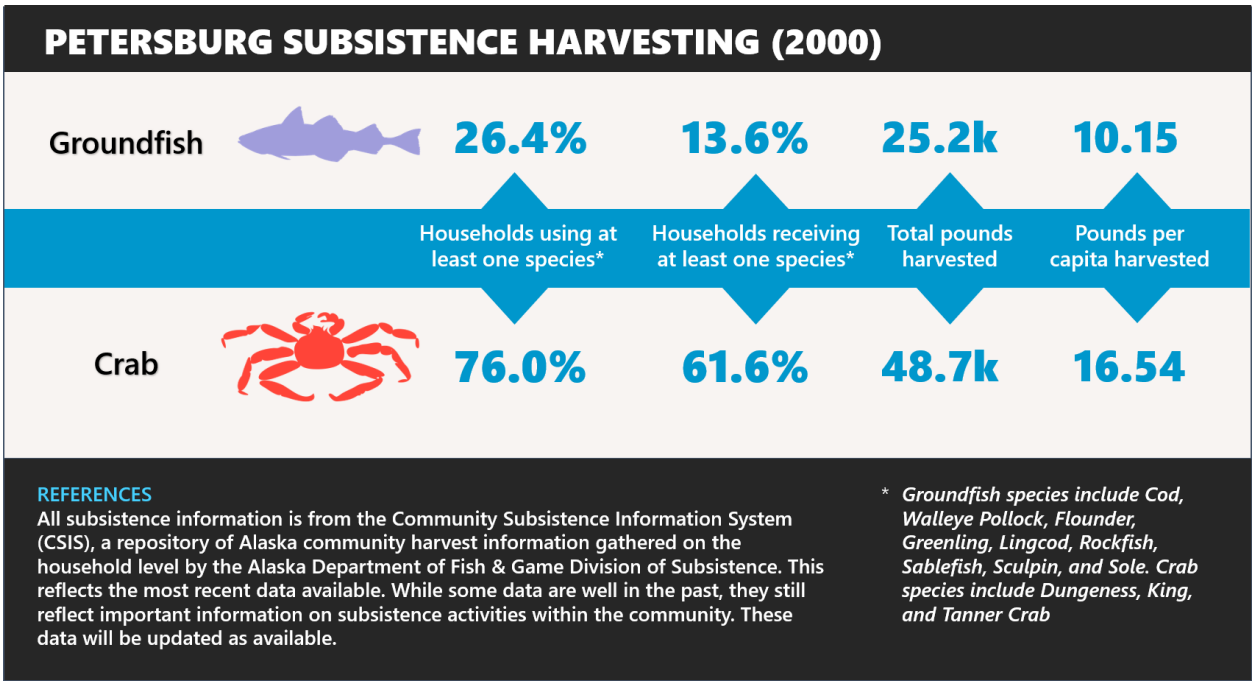


15.0.0.7. Crab Harvesting Engagement - LOW

There is not a substantial amount of crab harvesting activity in Petersburg to report.

Due to confidentiality concerns, only select data are available.

15.0.0.8. Subsistence Harvesting Engagement



Residents of Petersburg are moderately to highly engaged in subsistence harvesting, with 76% of residents utilizing at least one species of crab for subsistence.[12] Rockfish, sablefish and cod are the most utilized groundfish species, according to the most recent data from 2000, and Dungeness, Tanner and Red King Crab are the most widely utilized crab species. Salmon and halibut are also both very important to the community for subsistence and cultural purposes. Traditionally, salmon provided the foundation for almost all aspects of cultural life for the Tlingit and Haida peoples living in the region.[13] Today, it continues to represent an important tribal cultural connection to their homeland and provides a valuable economic and nutritional resource for residents.[14] In 2018, harvests of King salmon were restricted by the Alaska Dept. of Fish and Game, and in 2019, Petersburg saw a significant decline in the number of salmon harvested.[15] This is concerning for residents who rely heavily on this resource. Finally, halibut is also a key subsistence resource for residents, and harvests have remained consistent in recent years.[16] However, concern exists

[12] Alaska Department of Fish & Game Division of Subsistence. (2024). 2000 Petersburg Harvest Data. Community Subsistence Information System, Subsistence Community Profile Dashboard. Retrieved November 14, 2024 from https://adfg.maps.arcgis.com/apps/dashboards/c5a783dd9f9049efb6489cce9fc38319.

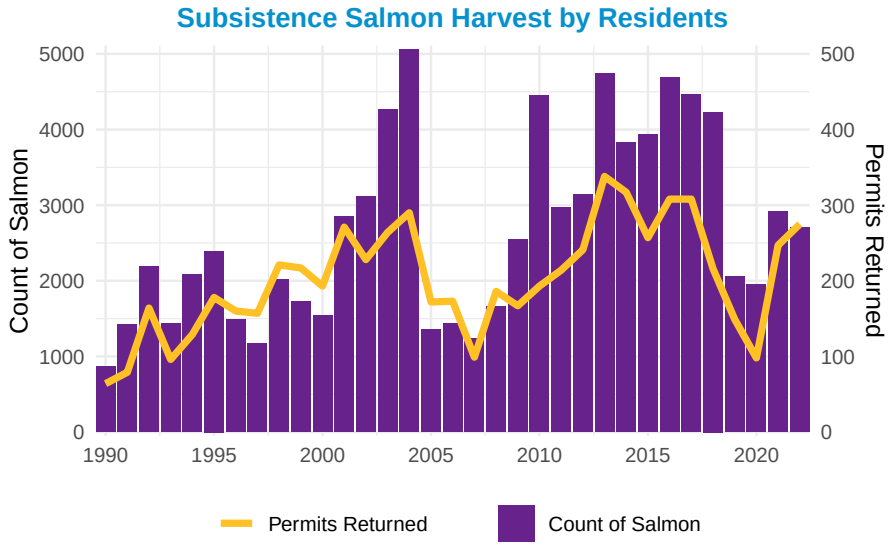
[13] Central Council of the Tlingit & Haida Indian Tribes of Alaska. (n.d.). Climate Change Adaptation Plan. Retrieved from https://www.ccthita.org/services/community/environmental/documents/T&HClimateChangeAdaptationPlan.pdf

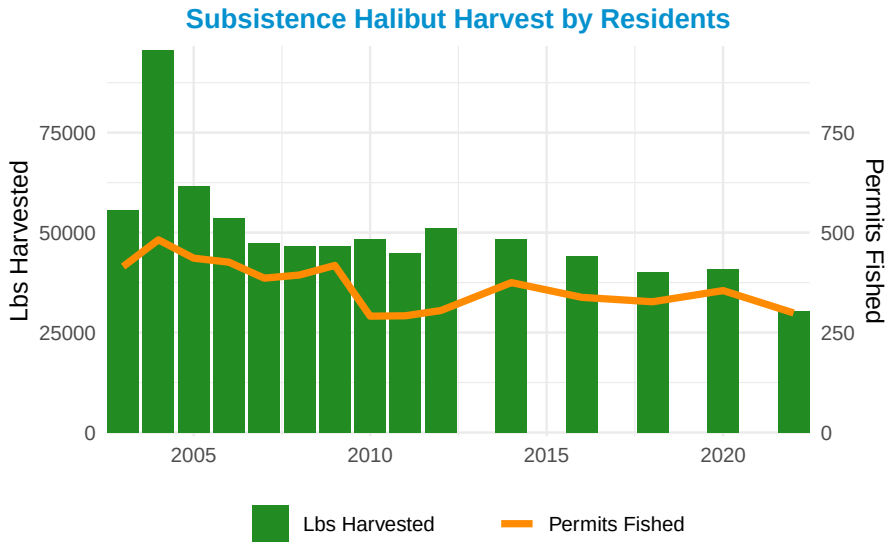
[14] Central Council of the Tlingit & Haida Indian Tribes of Alaska. (n.d.). Climate Change Adaptation Plan. Retrieved from https://www.ccthita.org/services/community/environmental/documents/T&HClimateChangeAdaptationPlan.pdf

[15] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

[16] Alaska Department of Fish and Game Division of Subsistence. 2011. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.

over impacts from climate change on this species' population given that size-at-age has decreased significantly in recent years for this species.[17]



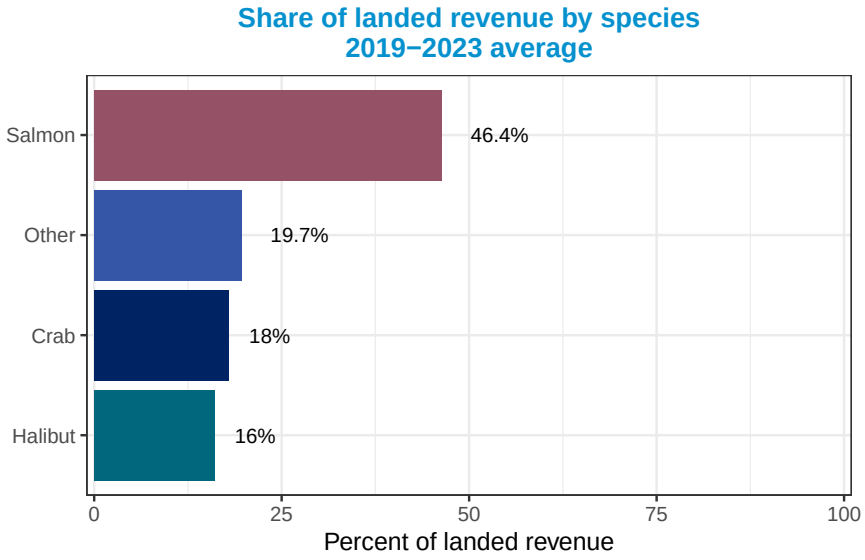


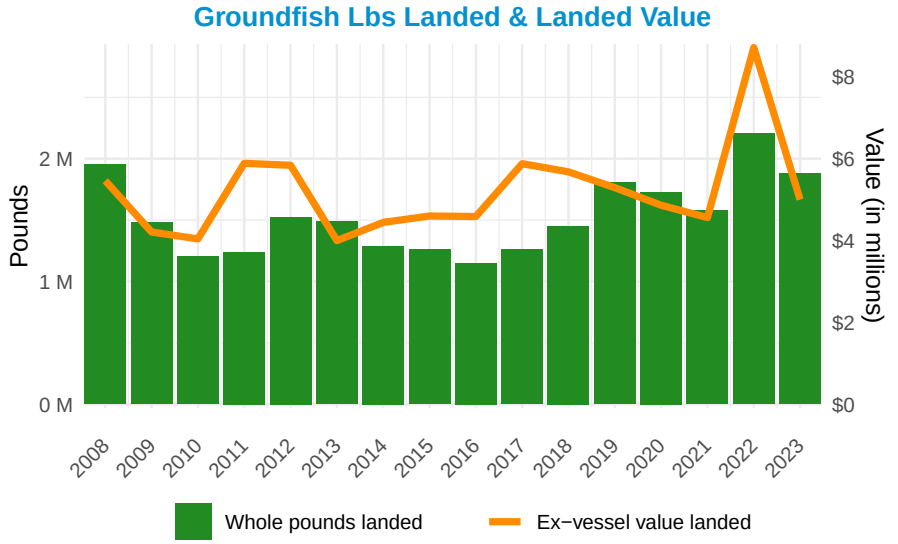
15.0.0.9. Groundfish Processing Engagement - MEDIUM-HIGH

The processing sector in Petersburg is dominated by salmon fisheries accounting for 45% of the landed revenue. Across the last five years, crab fisheries accounted for 18.6%, halibut 17.2%, and other fish 19.2%. In 2021, Petersburg had a total of 78 seafood processing facilities, landing a total of 49.5 million pounds of fish at a value of $46.9 million. Of those facilities, 16 processed groundfish, landing a total of 1.5 million pounds of groundfish with an associated value of $4.5 million. Compared to 2019, this marks 12% decrease in volume and a 13% decrease in value. Both

[17] Alaska Department of Fish and Game Division of Subsistence. 2011. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.

landed volume and value have begun a downward trend since 2019 when they peaked. In 2021, groundfish made up 3.1% of total volume landed, and about 9.7% of total value.





15.0.0.10. Crab Processing Engagement - LOW

There is not a substantial amount of crab processing activity in Petersburg to report.

16. Saint Paul

16.0.0.1. Area Description & History

St. Paul is located on the southern tip of St. Paul Island, the largest of the Pribilof Islands, located north of the Aleutians in the Bering Sea. The native community name is Tanax^ Amix^, and the native language spoken is Unangan Aleut. The traditional homeland of the Unangan Aleut is the Aleutian Islands and Siberia; however hunters traveled to the Pribilof Islands for seasonal hunting for centuries. In 1788, the Russian-American Company enslaved and relocated Aleut families from Siberia, Atka, and Unalaska, to hunt for fur seal and their decedents continue to live on St. Paul today.[1] During World War II, the US government evacuated the Pribilof Islands and forced Unangax residents to Funter Bay on Admiralty Island as part of the emergency evacuation of residents from the Bering Sea. In 1983, Congress passed the Fur Seal Act Amendments, which ended government control of the seal harvest, and the St. Paul economy transitioned to commercial fisheries. The local commercial halibut fishery began in 1981 and a Trident Seafoods crab processing plant was built in 1989. The St. Paul economy relied heavily on the seafood processing industry, and the plant closed for the first time in history October 2022 due to collapses in the Bering Sea snow crab and Bristol Bay red king crab fisheries. Soon after, St. Paul's City Council declared a cultural, economic and social emergency.[2]

St. Paul was included under the Alaska Native Claims Settlement Act (ANCSA), has a federally recognized Tribal entity, and the traditional government is the Aleut Community of St. Paul Island. Native associations and corporations include the Aleut Corporation, Aleutian Pribilof Islands Association, and Tanadgusix Corporation which manages land and owns several companies that provide services. St. Paul is located within Pacific Halibut Fishery Regulatory Area 4C, Federal Statistical and Reporting Area 513, and the Bering Sea Sablefish Regulatory Area. Central Bering

[1]National Marine Fisheries Service (NMFS). (2022). *Final Environmental Impact Statement for Halibut Amendment 123: Appendix 1.* U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). https://media.fisheries.noaa.gov/2022-11/halibut-amd-123-feis-appendix1.pdf

[2]Nelson, M. (2022, November 8). *St. Paul government declares emergency in attempt to get ahead of looming crab crash.* KUCB. https://www.kucb.org/industry/2022-11-08/st-paul-government-declares-emergency-in-attempt-to-get-ahead-of-looming-crab-crash

Sea Fishermen's Association (CBSFA) is the management organization for St. Paul Island under the Western Alaska Community Development Quota Program.

16.0.0.2. Infrastructure & Transportation

St. Paul is accessible by air and water, and has scheduled commercial flights. There is a State-owned gravel runway that is 6,500 feet, as well as a breakwater, with 700 feet of dock space. Most freight arrives by barge with approximately six cargo ships arriving from Seattle each year. Water is supplied by wells and an aquifer, and is piped to all households. There is a house shortage on St. Paul which has been identified as a vulnerability.[3] In 2021, St. Paul constructed a Vessel Repair and Marine Facility to provide space for vessel building and maintenance for St. Paul fishermen, local entrepreneurs, and small business start-ups. (ibid) There is one local health clinic that provides health services to residents. With the closures of Bering Sea snow crab fisheries in October and Bristol Bay king crab fishery closures, budgetary cuts threaten medical services.[4]

There is one school in St. Paul with a reported enrollment of 52 students in 2024. This number is up by 4 since last year. School enrollment remains a concern, as the only other school in the Pribilof Islands (located on St. George Island) closed in 2018.

16.0.0.3. Demographics

It is important to note that national Census efforts may not accurately reflect St. Paul demographic given the influx of temporary seafood industry workers. Additional references were examined to more accurately describe St. Paul's resident population.[5][6][7][8] According to these sources, St. Paul's population is predominantly Alaska Native, with 84% of residents identifying as American Indian or Alaska Native. The population has declined in recent years and is under transition given the recent commercial fisheries closures.

[3] Aleut Community of St. Paul Island. (2023, December). *St. Paul CEDS Public Review Draft: December 2023.* Aleut Community of St. Paul Island. https://www.aleut.com/wp-content/uploads/2023/12/St-Paul-CEDS-Public-Review-Draft-Dec2023.pdf

[4] Nelson, M. (2023, January 19). *Bering Sea crab crash jeopardizes St. Paul Island's emergency medical services.* KUCB. https://www.ktoo.org/2023/01/19/bering-sea-crab-crash-jeopardizes-st-paul-islands-emergency-medical-services/

[5] U.S. Census Bureau. (2020). *Decennial Census of Population and Housing.* PROFILE OF GENERAL POPULATION AND HOUSING CHARACTERISTICS. U.S. Department of Commerce. Retrieved from https://www.census.gov

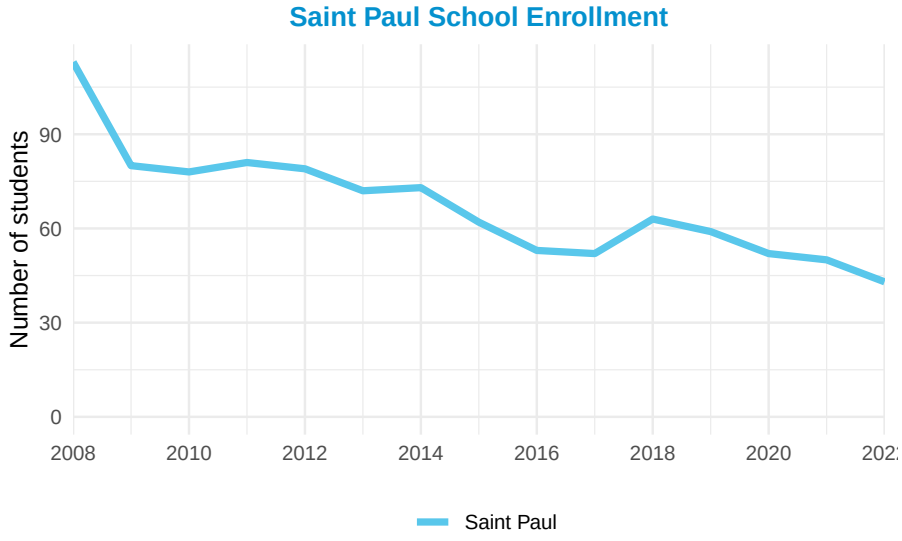
[6] U.S. Census Bureau. (2023). *American Community Survey 5-Year Estimates, 2018-2022.* U.S. Department of Commerce. Retrieved from https://www.census.gov/data

[7] Alaska Department of Education & Early Development. (2023). *District enrollment totals for Alaska public school districts.* Retrieved from https://education.alaska.gov/data-center

[8] Aleut Community of St. Paul Island. (2023). St. Paul Comprehensive Economic Development Strategy (CEDS): Public Review Draft. Retrieved from https://www.aleut.com/wp-content/uploads/2023/12/St-Paul-CEDS-Public-Review-Draft-Dec2023.pdf

Demographics	
Population	352
Population in group housing	37
Median household income	83,214
Housing units	121
Percentages	
Male	73.6%
Female	26.4%
White	10.9%
American Indian or Alaska Native	78.5%
Black or African American	1.7%
Asian	0.9%
Native Hawaiian or Pacific Islander	0%
Hispanic or Latino	0%
Below poverty line	27.8%
High school diploma or higher	95.2%
Population under 5	5.2%
Population over 18	76.8%
Population over 65	15.2%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.



16.0.0.4. Current Economy

St. Paul describes their economic vision as *An Unangan community of healthy, resilient people working together to sustain a robust ocean based economy* and identified six goals: 1) Support, protect, and create new fisheries opportunities; 2) Cultivate marine resources to enhance existing natural resources and create new export opportunities for St. Paul; 3) Develop the Bering Sea Research Center into a leading mariculture, climate change, and coastal resilience research center; 4) Grow St. Paul Island into a culturally & ecologically unique tourism destination; 5) Advance St. Paul Island's status as a gateway to the Arctic, while highlighting regional research capabilities including infrastructure, expertise, capacity, and the workforce to support an overall mission of improving and understanding and response within the Bering Sea and Arctic region; and 6) Strengthen infrastructure and improve quality of life to create a healthy foundation for residents and businesses to thrive and stay.[9]

Fishing has historically been a major economic driver on St. Paul until the recent collapse of crab fisheries. The federally controlled fur seal industry dominated the economy at St. Paul until 1985. The economy transitioned to servicing commercial fisheries, and the city is the home port for the Central Bering Sea fishing fleet. There is a small commercial halibut fishery that uses tenders to transport its catch to Unalaska/Dutch Harbor for processing since the plant closure. Ecotourism, reindeer harvesting and local government jobs provide additional sources of income. The 2022 collapse in Bering Sea crab and subsequent fisheries closures dramatically affected the St. Paul. Government (including Tribal, state, and federal) is the largest employment category on Island. A 2023 community survey found 36% of residents had experienced some difficulty finding a job in the last 5 years.[10] High food and fuel costs are priority concerns for the community and a recent Food Security Assessment stated 63% of St. Paul residents purchase some of their food online, and 97% identified costs as a barrier to purchasing healthy foods.[11]

St. Paul continues to be proactive in exploring economic opportunities for the community including the feasibility of a salmon hatchery on St. Paul, and the economic potential of the local reindeer population. In 2020, the St. Paul Island Visitor Development Study was completed, and the St. Paul Island Tour program restarted in 2022 after a Covid-19 required pause in operations. In 2024, Iḷisaġvik College announced plans to create a satellite campus on St. Paul Island to offer education and training opportunities and classes to St. Paul residents.

In 2023, St. Paul levied a 2-3.5% (depending on species) raw fish tax, generating $524,888. This is a steep decline (84.3%) from the $3,347,430 in raw fish taxes collected in 2022. With the loss of associated taxes from seafood processing, St. Paul's municipal budget has been severely impacted. In 2024, the City Council passed three ordinances proposing new taxes on alcohol, marijuana and tobacco products, rental of vehicles for non-residents, and long-term room rentals to compensate for the loss in fisheries-related tax.[12]

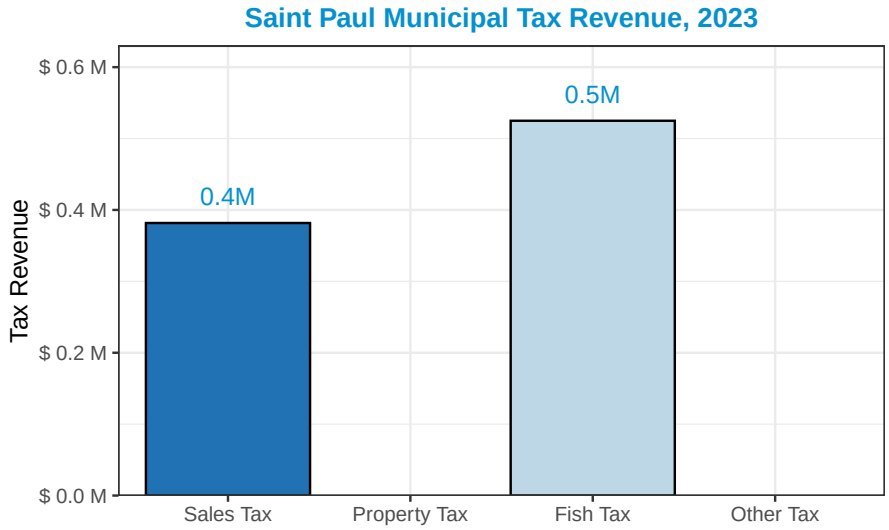
[9] Aleut Community of St. Paul Island. (2023). *St. Paul Comprehensive Economic Development Strategy (CEDS): Public Review Draft* [PDF]. Retrieved from https://www.aleut.com/wp-content/uploads/2023/12/St-Paul-CEDS-Public-Review-Draft-Dec2023.pdf

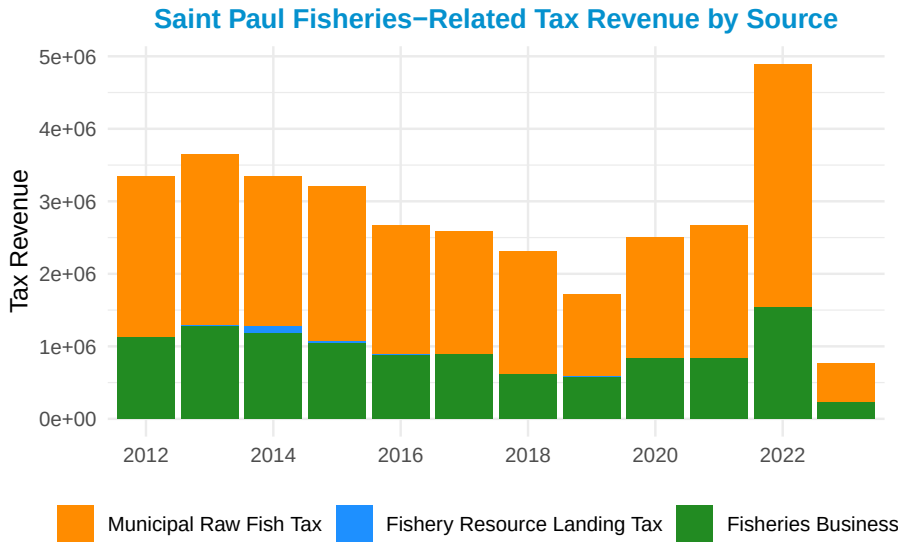
[10] Aleut Community of St. Paul Island. (2023). *St. Paul Comprehensive Economic Development Strategy (CEDS): Public Review Draft* [PDF]. Retrieved from https://www.aleut.com/wp-content/uploads/2023/12/St-Paul-CEDS-Public-Review-Draft-Dec2023.pdf

[11] Alaska Food Policy Council. (2023). *Food security task force report: Final 2023.03.03.* Alaska Food Policy Council. https://www.akfoodpolicycouncil.org/wp-content/uploads/2024/09/2023_Food_Security_Task_Force_Report_Final_2023.03.03.pdf

[12] City of Saint Paul. (2023, December 20). *City proposes tax increases in 2024 due to 0% tax revenue from crab tax increase.* https://stpaulak.com/2023/12/20/city-proposes-tax-increases-in-2024-due-to-0-tax-revenue-from-

In 2022, the American Community Survey 5 estimated the median household income in St. Paul to be $83,214, slightly lower than the Alaska statewide median income ($86,370). With the closures of Bering Sea snow crab and Bristol Bay king crab fisheries, St. Paul's economy, which is 90% dependent on snow crab is facing an estimated $2.7 million downturn.





16.0.0.5. Climate Change Vulnerability and Adaptive Capacity

16.0.0.5.1. Exposure to Biophysical Effects of Climate Change

The Bering Sea has experienced warmer temperatures, increased erosion loss of sea ice, changes

crabtax-increase/

in precipitation, more frequent storms, flooding, and higher storm surges.[13] These changes affect health, livability, food and economic security, and the ecology of the area.

Sand dune erosion, road damage, and vulnerable protected areas have been reported, directly affecting wildlife populations, subsistence practices, and traditional and cultural ways of life[14]. Climate change is expected to drive increased temperatures and precipitation and more frequent and intense storm events. Reductions in seasonal shore fast ice is increasing St. Paul's vulnerability to storms and subsequent erosion. Marine safety concerns are on the rise as people must travel farther across open ocean to fish. Ice free waters are leading to significant increases in marine traffic and associated marine plastics and debris. Activities such as vessel traffic, energy development, mining and fuel extraction, tourism, aquaculture and mariculture, and military and national security interests are directly affecting St. Paul in many ways. Given St. Paul's high reliance on commercial and subsistence fisheries, the community is vulnerable to climate-driven disruptions.[15][16]

Adaptive capacity in St. Paul is limited due to its remote location and vulnerable infrastructure. Rates of poverty and other indicators of vulnerability contribute to St. Paul's limited adaptive capacity. The FEMA National Risk Index identified that the Pribilof's has having very low levels of community resilience.[17] As St. Paul residents experience increased frequency of climate-driven biophysical changes, their ability to adapt may be limited.

16.0.0.5.2. Dependence on Fisheries Affected by Climate Change

The city of St. Paul has been highly engaged in commercial fisheries in primarily in crab, groundfish, and halibut. The recent climate-driven collapse in crab fisheries, and subsequent fisheries closures deeply impacted St, Paul's economy. The community is in transition and actively seeking viable economic alternatives. As the recent crab fisheries closures indicate, St. Paul is substantially dependent on fisheries resources affected by climate change. Island residents are highly engaged in subsistence fishing and continue to fish for halibut for commercial and subsistence purposes; however data suggests that subsistence halibut may be on the decline as well. In 2022, St. Paul reported 23 SHARC permits harvesting an estimated 375 pounds or 5 whole halibut. This shows a decline from previous years although available data is inconsistent.

Subsistence salmon permit data is confidential due to confidentiality concerns. As species compositions and distributions change due to warming oceans and acidification, they will likely continue to impact the community of St. Paul.

[13] Tran, J., Divine, L. M., & Heffner, L. R. (2021). "What are you going to do, protest the wind?": Community perceptions of emergent and worsening coastal erosion from the remote Bering Sea community of St. Paul, Alaska. *Environmental Management*, *67*(1), 43-66.

[14] Tran, J., Divine, L. M., & Heffner, L. R. (2021). "What are you going to do, protest the wind?": Community perceptions of emergent and worsening coastal erosion from the remote Bering Sea community of St. Paul, Alaska. *Environmental Management*, *67*(1), 43-66.

[15] Himes-Cornell, A., & Kasperski, S. (2015). Assessing climate change vulnerability in Alaska's fishing communities. *Fisheries Research*, *162*, 1-11.

[16] Herman-Mercer, N. M., Laituri, M., Massey, M., Matkin, E., Toohey, R. C., Elder, K., ... & Mutter, E. (2019). Vulnerability of subsistence systems due to social and environmental change. *Arctic*, *72*(3), 258-272.

[17] Federal Emergency Management Agency. (n.d.). *National Risk Index: Map*. FEMA. https://hazards.fema.gov/nri/map

Saint Paul	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED-HIGH
Poverty	MED
Population Composition	MED-HIGH
Personal Disruption	MED-HIGH

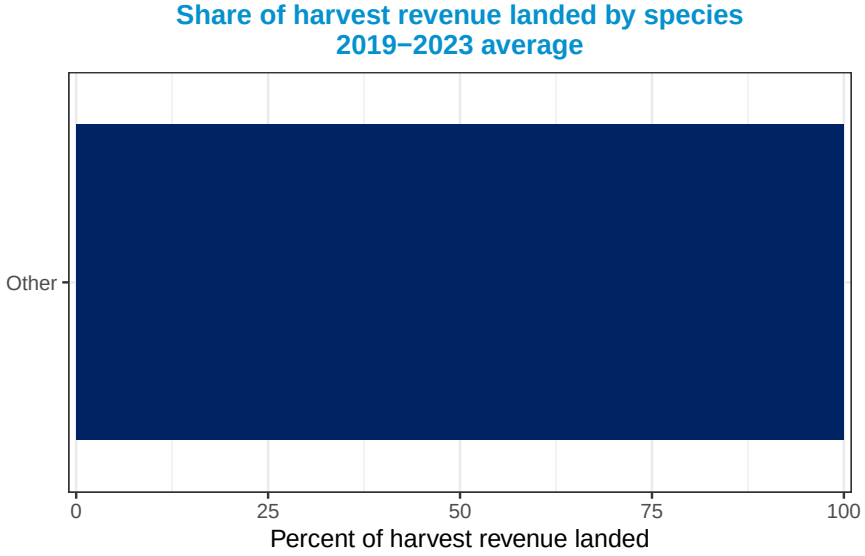
Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

16.0.0.5.3. Local Adaptive Capacity

Adaptive capacity in St. Paul is limited due to its remote location and vulnerable infrastructure. Rates of poverty and other indicators of vulnerability contribute to St. Paul's limited adaptive capacity. The FEMA National Risk Index identified that the Pribilof's has having very low levels of community resilience.[18] As St. Paul residents experience increased frequency of climate-driven biophysical changes, their ability to adapt may be limited.

16.0.0.6. Groundfish and Crab Harvesting Engagement

Since 2019, halibut has dominated commercial fisheries for St. Paul. Harvests are then tended to Unalaska/Dutch Harbor for processing. Prior to the collapse in Bering Sea snow crab and Bristol Bay red king crab fisheries, St. Paul was highly engaged in crab fisheries. The number of resident-owned vessels and permits in St. Paul has diminished below the threshold of three disallowing data reporting due to confidentiality concerns.

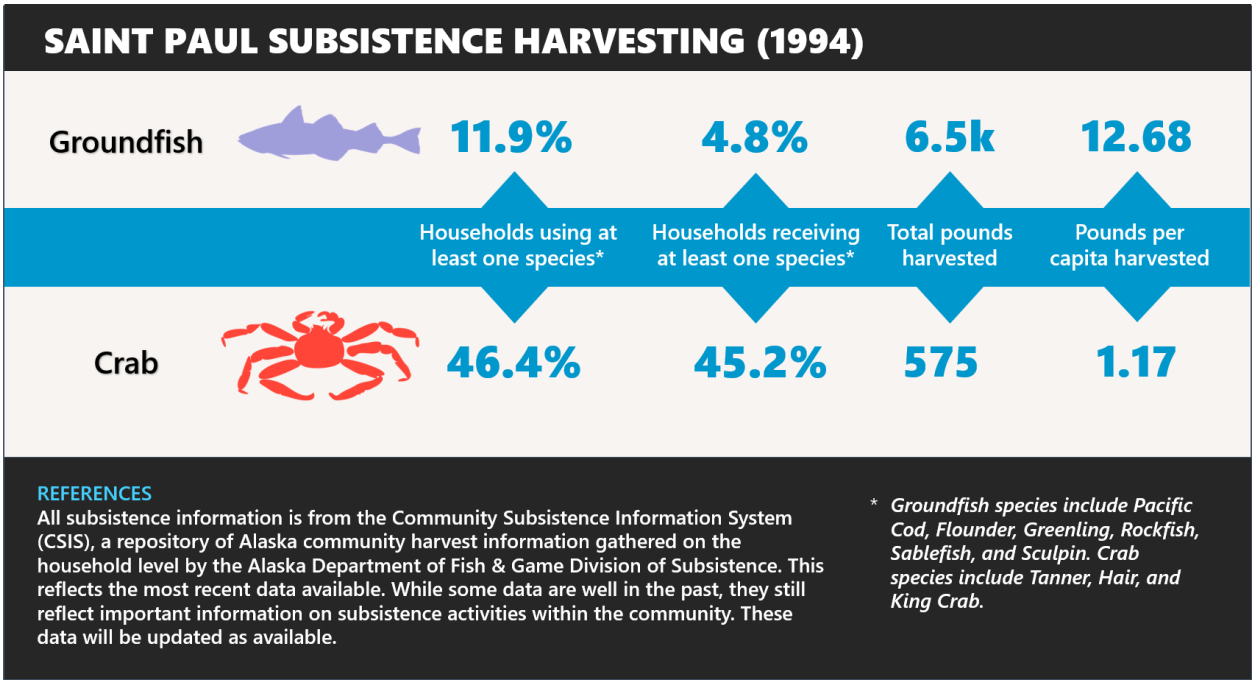


Halibut is the primary target fishery for St. Paul. 1.5 million pounds of halibut was harvested in St. Paul in 2019. Groundfish fisheries account for less than one percent of harvest. There is not

[18]Federal Emergency Management Agency. (n.d.). *National Risk Index: Map.* FEMA. https://hazards.fema.gov/nri/map

a substantial amount of groundfish harvest activity in St. Paul to report. *Due to confidentiality concerns, only select data are available.*

16.0.0.7. Subsistence Harvesting Engagement



St. Paul residents continue to engage in subsistence harvest for a number of species including seals, sea lions, walrus, halibut and other fish, marine invertebrates, birds, bird eggs, plants, and berries.[19][20] Northern fur seals or Laaaqudan are an important cultural and subsistence resource, and used for food, clothing, and art.[21] Subsistence harvest of fur seals in the Pribilof Islands was first regulated by the Fur Seal Act which was modified by NMFS in 2019. In 2000, the Aleut Community of St. Paul Tribal Government (ACSPI) entered into a co-management agreement with NMFS under Section 119 of the Marine Mammal Protection Act to provide for the conservation and co-management of laaqudan, qawan or Steller sea lions (Eumetopias jubatus), and isuĝin or

[19] Fall, J. A., Braem, N. S., Brown, C. L., Hutchinson-Scarbrough, L. B., Koster, D. S., & Krieg, T. M. (2013). Continuity and change in subsistence harvests in five Bering Sea communities: Akutan, Emmonak, Savoonga, St. Paul, and Togiak. Deep sea research part II: topical studies in oceanography, 94, 274-291.

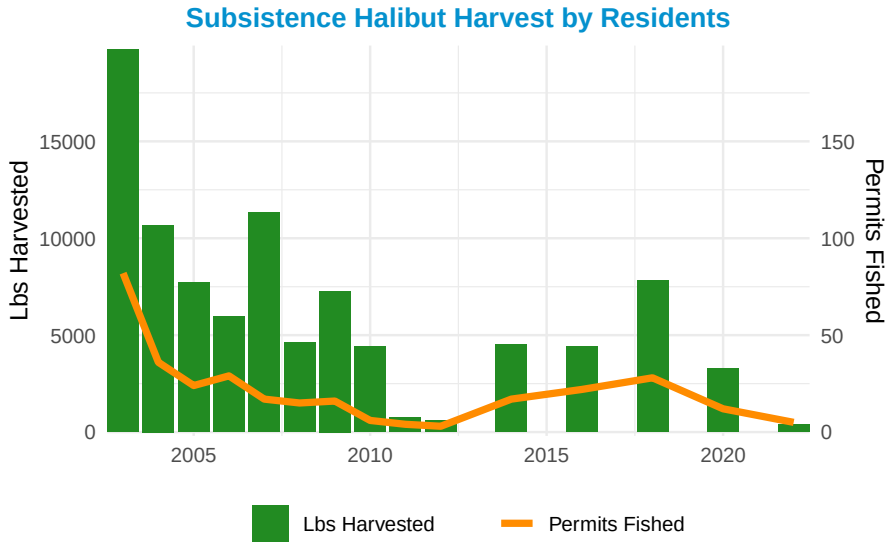
[20] Zavadil, P., et al. 2011. Bering Sea Project, Subsistence Harvest Monitoring Results for St. Paul Island, Alaska from 1999 to 2009.. Version 1.0. UCAR/NCAR - Earth Observing Laboratory. https://doi.org/10.5065/D6HX19PZ. Accessed 20 Mar 2024.

[21] L.M. Divine, P.I. Melovidov, A.P. Lestenkof, V. Padula, M. Malavansky Jr., E. R. Malavansky, D.A. Bristol Kushin, and H. Hellen. 2023 Subsistence harvest of juvenile laaqudan (northern fur seals, Callorhinus ursinus) on St. Paul Island, Alaska in 2022. Aleut Community of St. Paul Island, Tribal Government, Ecosystem Conservation Office. St. Paul Island, Pribilof Islands, Alaska. 13 pp.

harbor seals (Phoca vitulina).[22]

Island residents are highly engaged in subsistence fishing and continue to fish for halibut for commercial and subsistence purposes; however data suggests that subsistence halibut may be on the decline as well. In 2022, St. Paul reported 23 SHARC permits harvesting an estimated 375 pounds or 5 whole halibut. This shows a decline from previous years although available data is inconsistent.

Subsistence salmon permit data is confidential due to confidentiality concerns. As species compositions and distributions change due to warming oceans and acidification, they will likely continue to impact the community of St. Paul.



16.0.0.8. Groundfish Processing Engagement - LOW

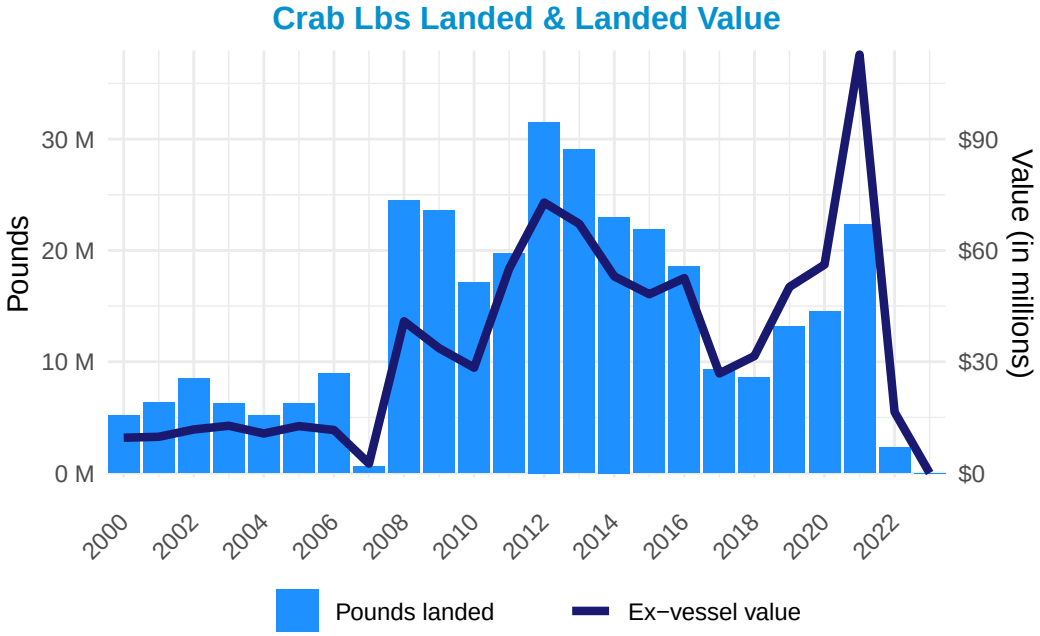
There is not a substantial amount of groundfish processing activity in St. Paul to report. *Due to confidentiality concerns, only select data are available*

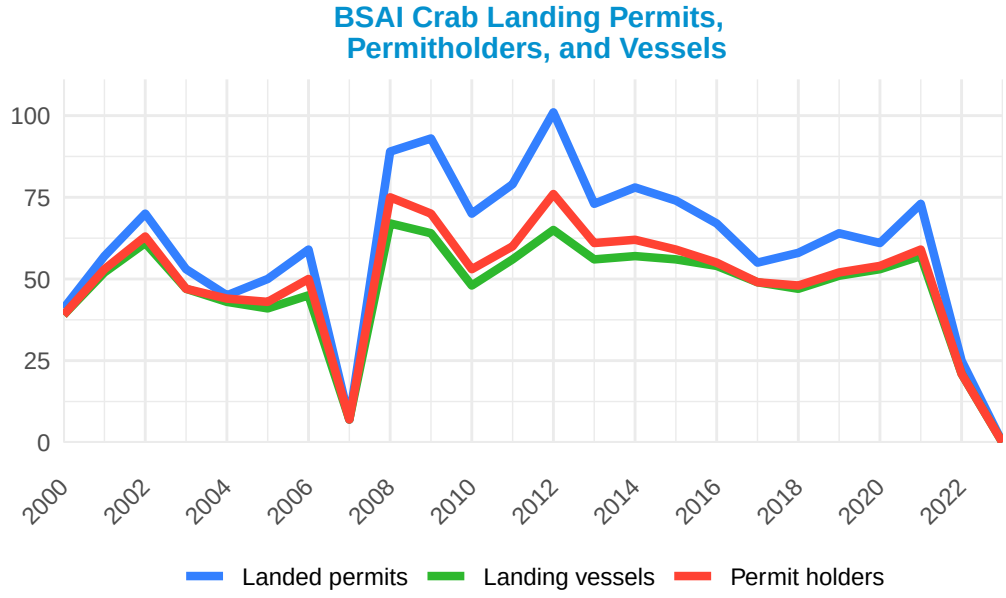
16.0.0.9. Crab Processing Engagement - FACILITIES CLOSED

The majority of processing activity in St. Paul is for crab (94% of landed revenue). Halibut accounts for 6% of landed revenue. In 2019, the island of St. Paul had six processing facilities, which landed 13.2 million pounds of crab with an associated value of $40.7 million. This marked an increase from the last two previous years; however compared to the previous five year average, there was an overall decreased in volume by 1.1 million pounds (8%) and increase of $39 million (4%) in landed ex-vessel value. After hitting a peak in 2012 of 31.5 million pounds and $73 million landed revenue, crab processing began a steady decline with a sharp uptake in 2019.

[22] L.M. Divine, P.I. Melovidov, A.P. Lestenkof, V. Padula, M. Malavansky Jr., E. R. Malavansky, D.A. Bristol Kushin, and H. Hellen. 2023 Subsistence harvest of juvenile laaqudan (northern fur seals, Callorhinus ursinus) on St. Paul Island, Alaska in 2022. Aleut Community of St. Paul Island, Tribal Government, Ecosystem Conservation Office. St. Paul Island, Pribilof Islands, Alaska. 13 pp.

The number of landing permits in St. Paul increased slightly since 2018 from 58 to 64 (up 10%), while the number of permit holders increased from 48 to 52 (up 8%). Compared to the previous five year average, the number of permits remained steady while permit holders fell by 1%.

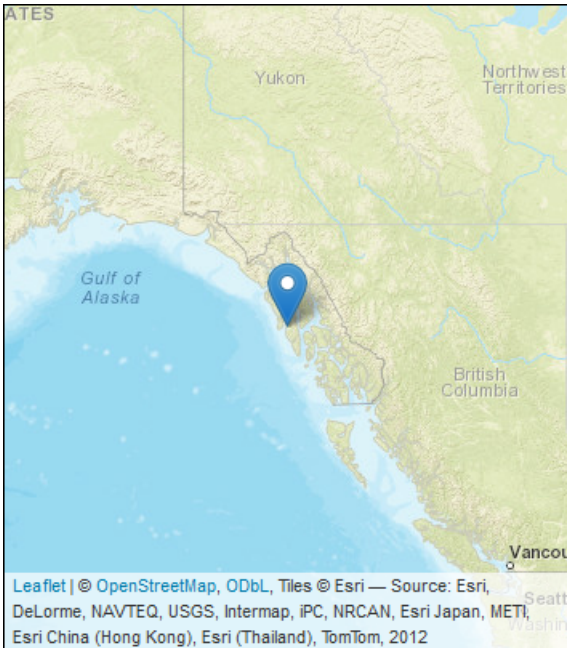




*Permits counted are CFEC gear operator permits

17. Sitka

17.0.0.1. Area Description & History



The location of Sitka was settled by the Tlingit several thousand years ago, with the name deriving from the Tlingit Shee At'iká, meaning "People on the Outside of Shee (now Baranof Island)." A Russian expedition arrived in 1741 and by 1808, Sitka was the capital of Russian Alaska. Fur trading and fish canning were mainstays in the town's growth. Sitka was the capital of the Alaska Territory until the government was transferred to Juneau in 1906. In 1878, Sitka became the site of one of the first canneries in Alaska, although the Sitka cannery closed after only two seasons of operation. During the early 1900s, gold mines flourished, and the city was incorporated in 1913. During World War II, the US Navy built an air base on Japonski Island with 30,000 military personnel. Sitka has approximately 1,800 seasonal workers each year: this annual peak in population is mostly driven by fisheries and tourism. The Tlingit people and other residents have historically used a wide variety of marine resources. Subsistence harvests continue to be vital to many, and salmon is an important resource economically and culturally. Sitka was included under the Alaska Native Claims Settlement Act and is recognized as a Native Village.[1] Salmon, herring, groundfish, halibut, and dive fisheries are the main commercial fisheries residents participate in. Pacific cod and lingcod are also harvested in SE Alaska under state regulations. Demersal rockfish are caught as bycatch. A small directed fishery for flatfish (other than halibut) has also taken place, but effort has declined. Pacific halibut fisheries in SE Alaska are managed by the International Pacific Halibut Commission. Sitka is located in Pacific Halibut Fishery Regulatory Area 2C and Federal Statistical and Reporting Area 650.

17.0.0.2. Infrastructure & Transportation

Sitka is accessible by air and water and serviced twice daily with flights to Juneau and Seattle. There are several air taxis and air charters available as well. Sitka operates five small boat harbors with 1,350 slips. The harbors can handle vessels up to 300 feet. A boat launch, haul-out, boat repairs,

[1] U.S. Congress. (1971). *Alaska Native Claims Settlement Act of 1971*, Pub. L. No. 92-203, 85 Stat. 688.

and other services exist. The privately owned Old Sitka Dock is the only deep water moorage facility in Sitka capable of accommodating large vessels, including cruise ships that frequent the area.[2] The state ferry services Sitka three times a week in the summer, less in the winter. Freight arrives by barge and cargo plane. Over the last several years, issues with the ferry system (State support and aging boats) coupled with the elimination of mixed passenger-freight Alaska Airlines planes have undermined freight transfer capacity for Sitka, along with other communities throughout Alaska. Water is drawn from a reservoir treated, stored, and piped to nearly all homes. There are two hospitals and coastguard medical facilities. Sitka has seven schools; enrollment has decreased by 10.2% since 2008, and 5.9% between 2019 and 2020,3 likely reflecting impacts of the COVID-19 pandemic.

17.0.0.3. Demographics

The population of Sitka has been declining and aging over the last decade. This is reflected in school enrollment numbers for the community, which have been steadily declining over time. The number of fisheries participants in the community has also decreased over this timeframe.[3] At the same time, food prices in the community have increased substantially, over time and relative to a national reference point.[4] The combination of these factors–declining fisheries participation, an aging demographic, and increasing food prices - is straining local food sharing networks in the community as there are fewer fishermen able to supply fish for community residents but an increasing demand for these fish.[5]

In 2020, per capita income in Sitka was estimated to be $41,082,5 and the median household income was estimated to be $81,708.45 This represents a 6.9% increase and a 15.5% increase in these measures respectively compared to 2018. However, the percentage of the population living below the poverty line has decreased by 2.6% since 2018.

[2]Celebrity Century Docks at Sitka, Alaska Deep Water Dock. (2012, September). Cruise Industry News. https://cruiseindustrynews.com/cruise-news/2012/09/celebrity-century-docks-at-sitka-alaska-deep-water-dock/

[3]Szymkowiak, M., & Kasperski, S. (2021). Sustaining an Alaska coastal community: integrating place based well-being indicators and fisheries participation. Coastal Management, 49(1), 107-131.

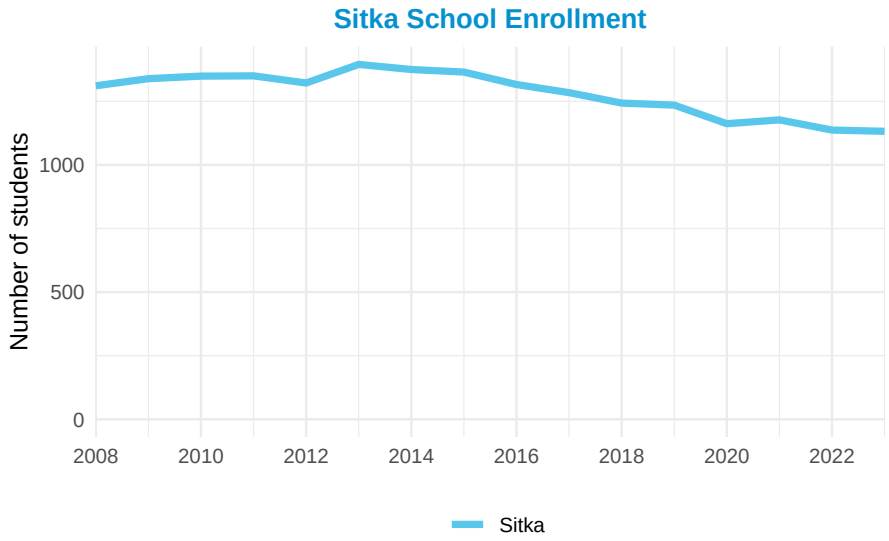
[4]Szymkowiak, M., & Kasperski, S. (2021). Sustaining an Alaska coastal community: integrating place based well-being indicators and fisheries participation. Coastal Management, 49(1), 107-131.

[5]Szymkowiak, M., & Kasperski, S. (2021). Sustaining an Alaska coastal community: integrating place based well-being indicators and fisheries participation. Coastal Management, 49(1), 107-131.

Demographics	
Population	8231
Population in group housing	378
Median household income	95,261
Housing units	4,138
Percentages	
Male	52.2%
Female	47.8%
White	62.3%
American Indian or Alaska Native	9.4%
Black or African American	0.7%
Asian	7.9%
Native Hawaiian or Pacific Islander	1.2%
Hispanic or Latino	5%
Below poverty line	6.9%
High school diploma or higher	95.2%
Population under 5	4.7%
Population over 18	79.8%
Population over 65	16.2%

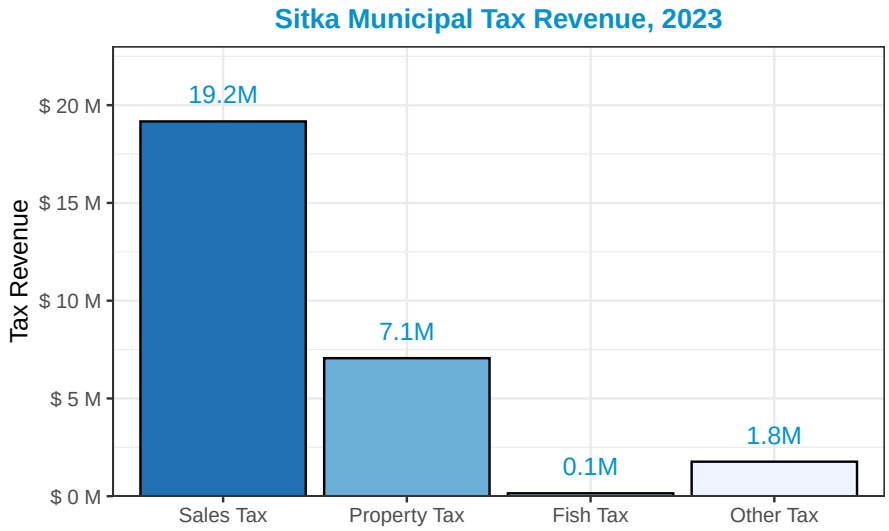
Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

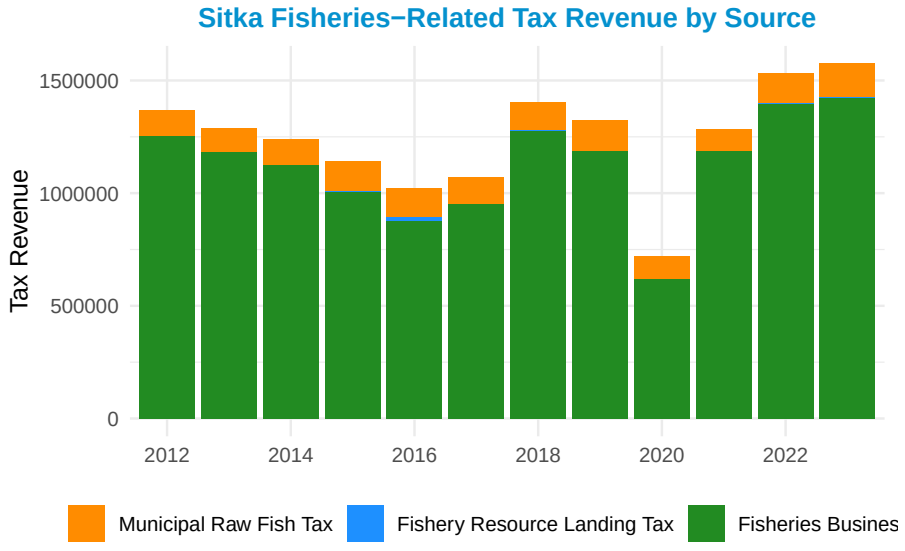
17.0.0.4.



17.0.0.5. Current Economy

The economy of Sitka is diversified with commercial fishing and processing, tourism, government, healthcare, retail, and transportation. The seafood industry is a major employer. Community leaders reported that Sitka's economy primarily relies on natural resource-based industries such as fishing, ecotourism (e.g. whale watching, kayaking), and sport hunting and fishing. The waterways of Southeast Alaska are an important resource for the tourism industry and the lifestyle of local residents alike. In 2023, Sitka generated $1,574, 491 in total fishery related taxes (including shared and municipal).[6] The community generated $29.57M in total tax revenue, including property, sales, fish, and other taxes. These revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and wellbeing.





[6] Tax data from AK. Dept. of Revenue, Annual Reports 2008 2008-2021. Retr.' 06/30/2022 from http://tax.alaska.gov/programs/sourcebook/index.aspx aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.'10/2022 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx

17.0.0.6. Climate Change Vulnerability and Adaptive Capacity

17.0.0.6.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in determining their vulnerability. Biophysical risks to the Gulf of Alaska as a whole include sea level rise, coastal erosion, extreme weather events, changes in precipitation (rates, timing, and snowpack), increasing landslides and avalanches, and increased storm severity. Similar to other areas of Alaska, southeast Alaska is already experiencing increasing temperatures and changes in precipitation patterns, including receiving less snow and more rain. Sitka in particular has a long climatological record in comparison to most other Alaskan communities, and scientists have found that temperatures have risen 1.56 degrees since 1827.6 Changes have also been observed in forest habitats, including declines of yellow cedar trees, and marine habitats, including ocean acidification and increased prevalence of invasive species. These impacts are currently and will continue to impact human health in various ways.[7] The community's hazard management plan (2010) outlines a series of risks–severe weather, wildland fire, flood/erosion, snow/avalanche–that (although not explicitly addressed in the HMP as such) will be exacerbated by climate change. These risks are already being felt in the community. In 2015, an intense atmospheric river event triggered a series of landslides, which took the lives of three residents and destroyed homes and property.

17.0.0.6.2. Dependence on Fisheries Affected by Climate Change

Reliance on fisheries resources which are being impacted by climate change can determine how vulnerable a community is to disruption from climate change. Sitka is highly engaged in harvesting and processing within the groundfish fishery. Fishermen in the community are also highly dependent on salmon (especially Chinook), as well as State groundfish and dive fisheries. Tourism and guided tours for recreational fishing are also a substantial industry in Sitka. In addition, Sitka residents are highly engaged in subsistence fishing of particular groundfish and crab species, including rockfish, greenling, lingcod and Dungeness crab. Halibut and salmon are also staple species that are widely utilized in the community. Given this, Sitka is overall highly dependent on fisheries resources that will be impacted by climate change. Therefore, as this community is impacted by a changing marine environment, their ability to fish for commercial, recreational, and subsistence purposes will be affected. Residents are highly concerned about impacts to several key species, including salmon, shellfish, eulachon, herring and halibut.[8] In addition, shrimp fisheries were closed in 2021 due to poor population in the area, and restrictions on subsistence and recreational harvests of King salmon went into effect in 2022.[9][10] The Southeast Alaska salmon troll fishery, in which hundreds of Sitka fishermen participate, has also been under threats of closure in recent years due to a lawsuit

[7] Central Council of the Tlingit & Haida Indian Tribes of Alaska. (n.d.). Climate Change Adaptation Plan. Retrieved from https://www.ccthita.org/services/community/environmental/documents/T&HClimateChangeAdaptationPlan.pdf

[8] Wendler, G., Galloway, K., & Stuefer, M. (2016). On the climate and climate change of Sitka, Southeast Alaska. Theoretical and Applied Climatology Climatology, 126 (1), 27 27–34. https://doi.org/10.1007/s00704-015-1542-7

[9] Vincent-Lang, D., Rabung, S., and Rutz, D. H OONAH SOUND SUBSISTENCE AND SPORT SHRIMP FISHERIES REMAIN CLOSED.(2021). Report #21 21-3259.Alaska Department of Fish & Game. https://www.adfg.alaska.gov/sf/EONR/index.cfm?ADFG=region.NR&Year=2022&NRID=3259

[10] Alaska Department of Fish & Game. (2022, February 1). Sport Fishing Regulations For King Salmon In Southeast Alaska And The Petersburg/Wrangell Area For 2022. https://www.adfg.alaska.gov/sf/EONR/index.cfm?ADFG=region.NR&Year=2022&NRID=3285

Sitka	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED
Poverty	LOW
Population Composition	LOW
Personal Disruption	LOW

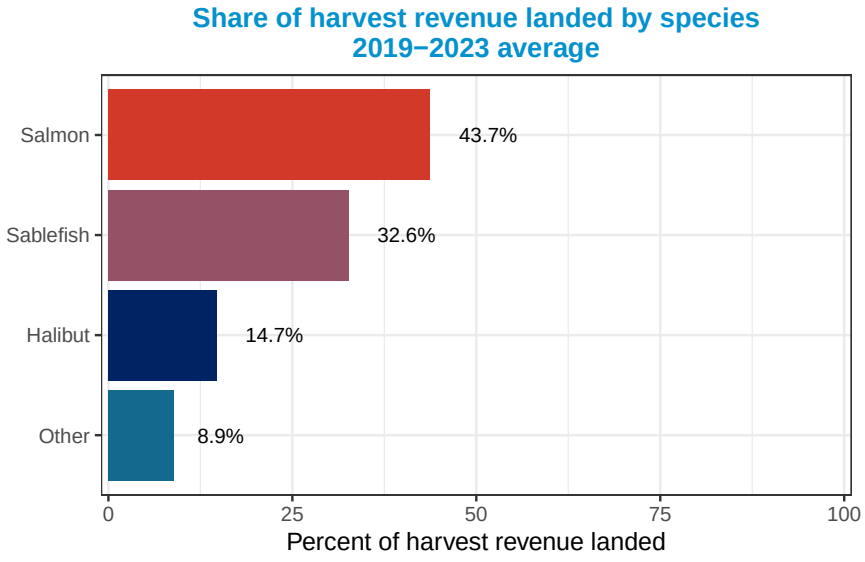
Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

raising concerns over the potential impact of this fishery on the food supply of Southern resident killer whales, which reside largely in British Columbia, Washington, and Oregon.

17.0.0.6.3. Local Adaptive Capacity

Sitka has a low vulnerability ranking on all of the community social vulnerability indicators with the exception of housing characteristics. A moderate vulnerability ranking for housing characteristics reflect issues associated with limited, aging, and costly housing, as is prevalent throughout Alaska. It is important to consider that these social vulnerability indicators encompass the whole community and are not specific to the fishing fleet, which may have different vulnerability levels on any of these indicators. FEMA's National Risk Index also rates Sitka as having very low community resilience,[11] meaning they have a very low ability to adapt to changing conditions and withstand and recover rapidly from disruptions.

17.0.0.7. Groundfish Harvesting Engagement - HIGH

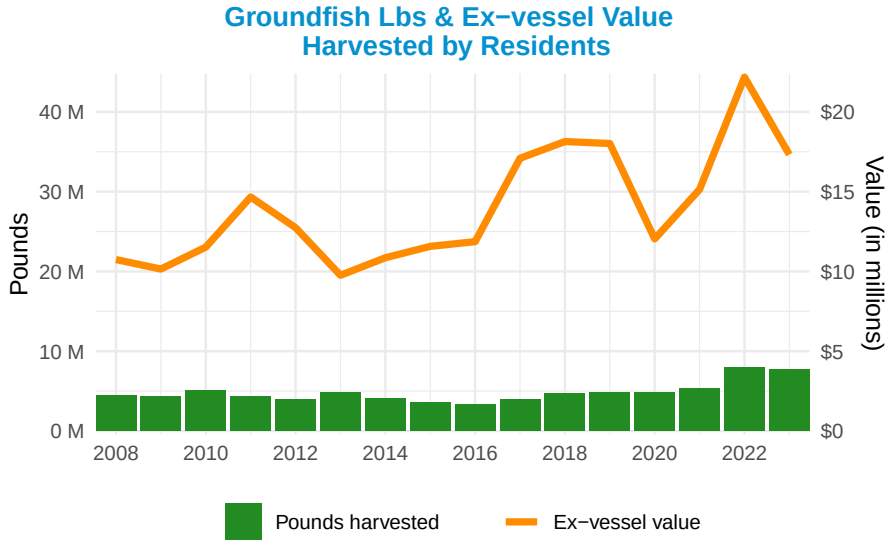


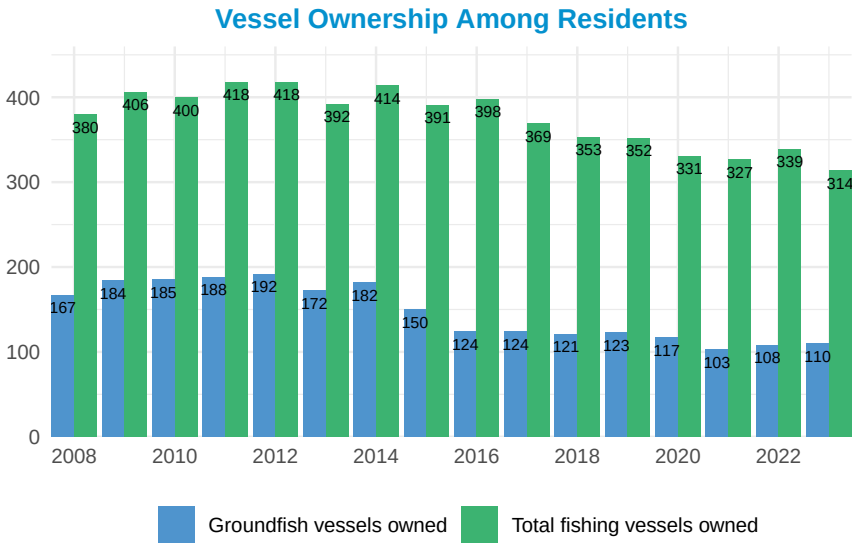
[11]Federal Emergency Management Agency. (n.d.). *National Risk Index: Sitka City and Borough, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02013

Sitka was among the top ports in Alaska for the volume of groundfish harvested and the associated ex-vessel value in 2023. However, the top fishery by revenue for the community is salmon, accounting for 44% of ex-vessel revenues. In 2023, Sitka fisheries harvested 7.8 million whole pounds of groundfish with an associated value of $17.33 million. The disconnect between volume and values reflects seafood market issues in 2023 that led to steep price declines across species. Groundfish landing volumes have increased significantly in Sitka over the last two years relative to 2021 due to increasing landings of sablefish. Sitka residents largely participate in groundfish fisheries with longline vessels that target sablefish in State and federal waters. The former necessitates a State limited entry permit while the latter necessitates quota shares.

The number of groundfish vessels owned by Sitka residents has been relatively steady over the last three years, although the 2023 groundfish vessel count (110) represents a 43% decline over the peak in 2012 (of 192 vessels).

The total number of fishing vessels owned by residents in 2023 was 314. Community leaders noted that commercial fishing boats under 125 feet use Sitka as their base of operations during the fishing season. While the typical vessel ranges between 30 and 600 feet in length, there is a high number of small vessels less than 30 feet that use the Sitka port.



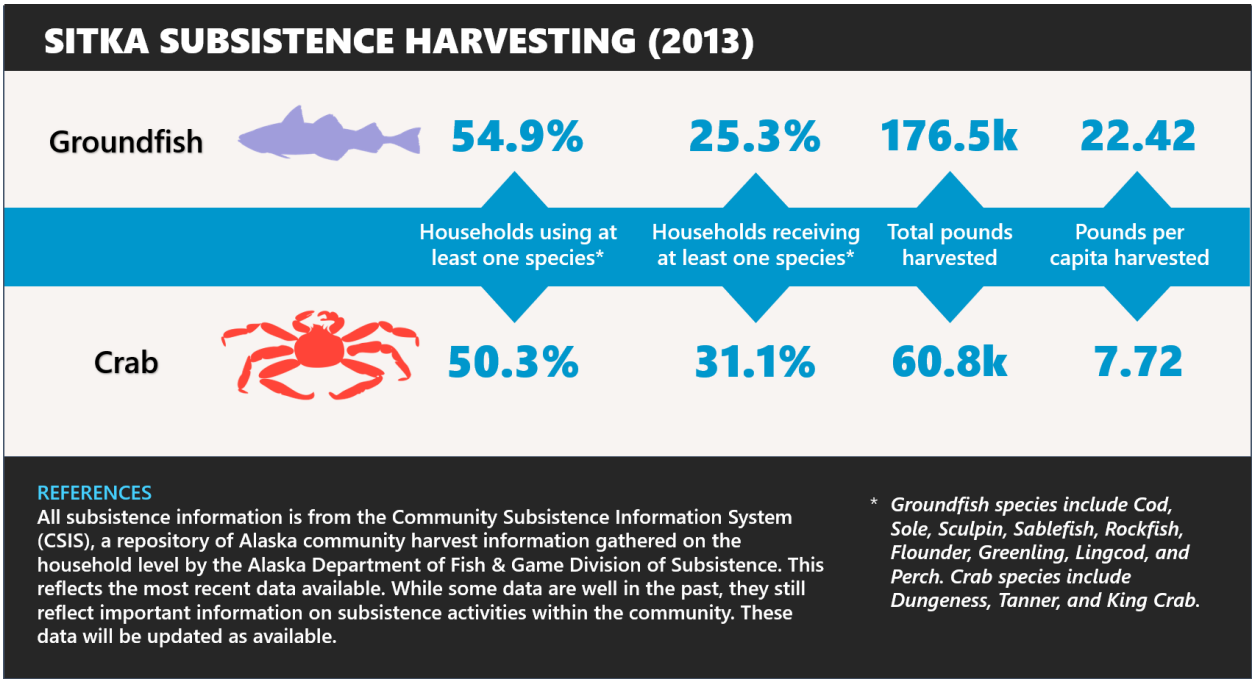


17.0.0.8. Crab Harvesting Engagement - N/A

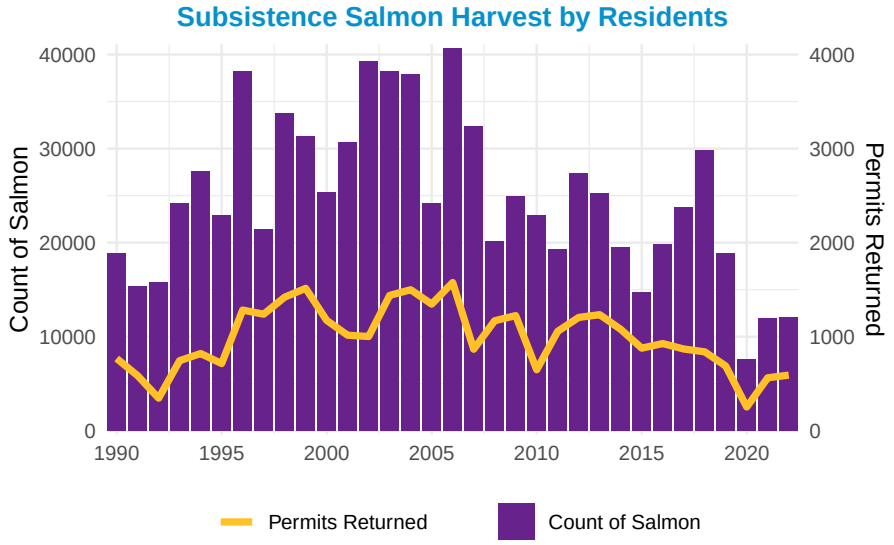
There is not a substantial amount of crab harvesting activity in Sitka to report.

Due to confidentiality concerns, only select data are available.

17.0.0.9. Subsistence Harvesting Engagement



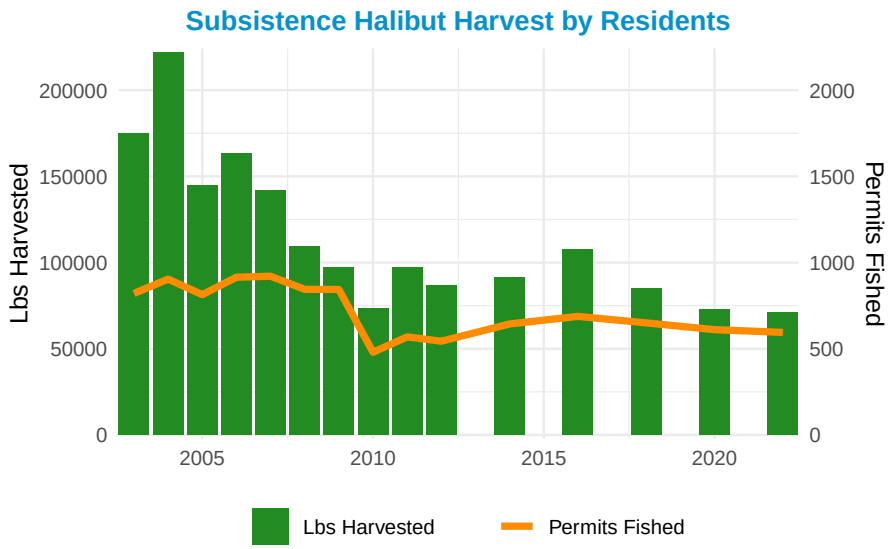
The community of Sitka is highly engaged in subsistence fishing within the groundfish and crab fisheries, particularly for rockfish, greenling, lingcod, and Dungeness crab, which are the most widely utilized species from these fisheries. The community overall harvested approximately 22.42 pounds of groundfish per capita in 2013. This represents a significant nutritional source for residents. In addition, the people of Sitka are highly engaged in subsistence harvests of halibut and salmon, according to Alaska Dept. of Fish and Game data. Their engagement with halibut has remained relatively constant in recent years, while salmon participation declined precipitously since 2013, from a peak of 1,234 permits returned in 2013 to a low of 252 in 2020.[12] The most recent data in 2022 shows an increase in subsistence salmon participation and harvests in 2022 to 591 permits.[13] Traditionally, salmon provided the foundation for almost all aspects of cultural life for the Tlingit and Haida peoples living in the region. Today, it continues to represent an important tribal cultural connection to their homeland and provides a valuable economic and nutritional resource for residents. Halibut is also a key subsistence resource for residents, however concern exists over impacts from climate change on this species' population given that size-at-age has decreased significantly in recent years for this species.[14]



[12] Alaska Department of Fish and Game Division of Subsistence. 2011. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.

[13] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

[14] Central Council of the Tlingit & Haida Indian Tribes of Alaska. (n.d.). Climate Change Adaptation Plan. Retrieved from https://www.ccthita.org/services/community/environmental/documents/T&HClimateChangeAdaptationPlan.pdf

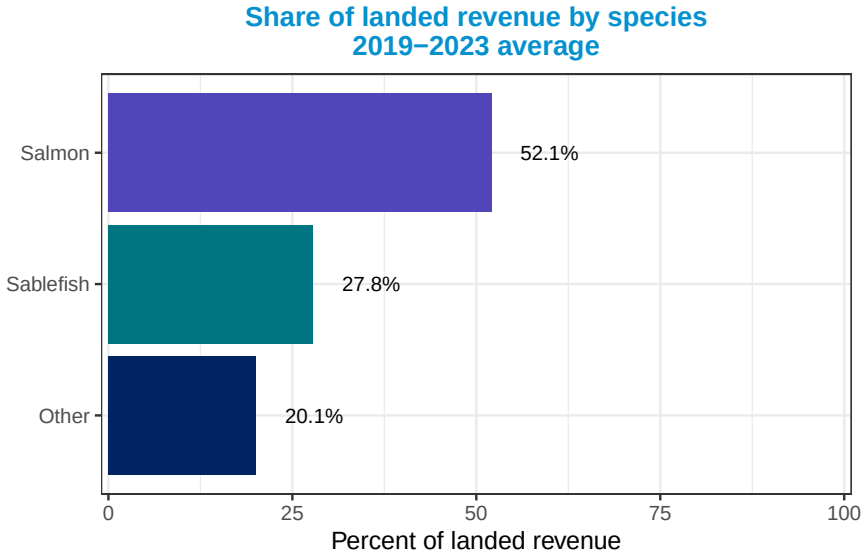


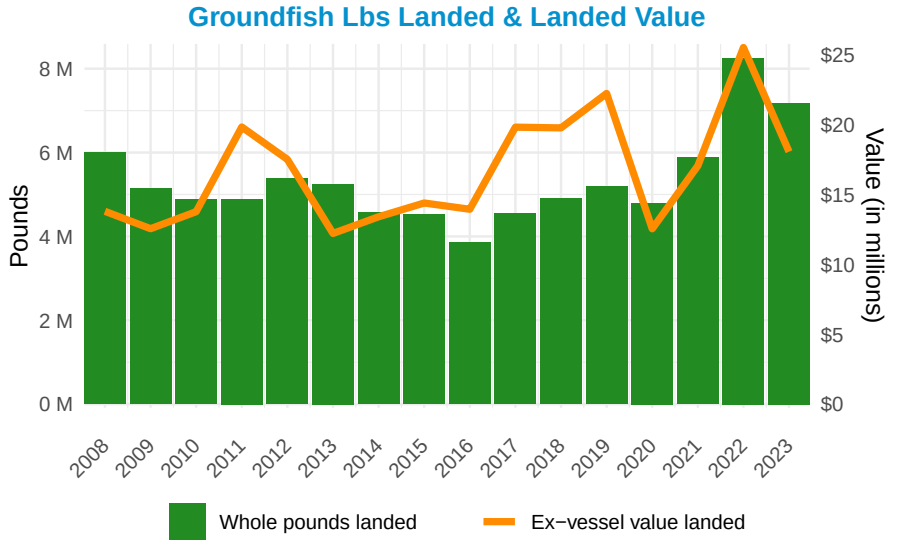
17.0.0.10. Recreational Fishing Engagement

Sitka is one of the four communities in Alaska that has been highly engaged in recreational fishing in all years 2004-2023 as well as highly engaged in commercial fishing (harvesting or processing), the others being Homer, Kodiak, and Seward. Sitka consistently ranked the fifth most highly engaged Alaska community in recreational fishing for most of the 2000s but recently overtook Ketchikan to rank fourth in 2022 and 2023 as a result of a decline in Ketchikan's engagement score.

17.0.0.11. Groundfish Processing Engagement - HIGH

The majority of processing activity is for salmon (52.1%), although sablefish made up 27.8% of total processing revenue across the last five years. In 2023, three processing facilities in Sitka processed Pacific cod, eight processed rockfish, and five processed sablefish. Together they landed 7.2 million pounds, with an associated value of $18 million. This marks a decrease of 1.1 million pounds and $7.5 million over 2022.





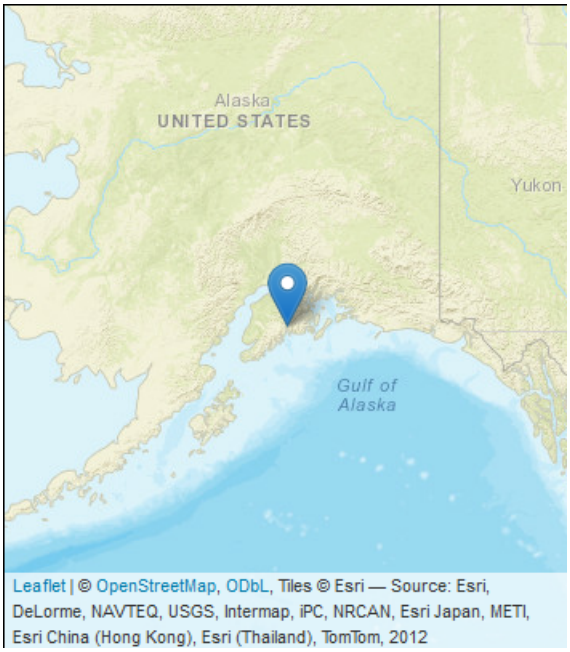
17.0.0.12. Crab Processing Engagement - N/A

There is not a substantial amount of crab processing activity in Sitka to report.

Due to confidentiality concerns, only select data are available.

18. Seward

18.0.0.1. Area Description & History



Seward is located at the head of Resurrection Bay on the Kenai Peninsula, and is the gateway to the Kenai Fjords National Park. Seward's earliest residents were the Unegkurmiut, a subgroup of the Alutiiq Chugash. The City was founded in 1903 and, as an ice-free harbor, Seward has become an important transport and supply center for Interior Alaska. Seward was incorporated in 1912, and became a strategic military port during WWII. Seward was not included under the Alaska Native Claims Settlement Act, although the Qutekcak Native tribe is active in the area and seeking federal recognition. Qutekcak translates from the Alutiiq language as "Big Beach." Qutekcak was a prehistoric Alaska Native mixing area, serving as a crossroads for the various Alutiiq and Sugpiaq groups residing in the region.1 The first commercial salmon fishery in Prince William Sound (PWS) developed along the Copper River Delta around 1900. Commercial exploitation of halibut and groundfish first extended into the Gulf of Alaska (Gulf) in the 1920s. During this time, herring became increasingly valued for oil and meat, and a number of reduction plants were also built. Commercial crab fisheries began to develop in the Gulf in the 1930s. The marine waters at the outlet of Resurrection Bay are included within Federal Statistical and Reporting Area 630, Pacific Halibut Fishery Regulatory Area 3A, and the Central Gulf Sablefish Regulatory Area. In addition to federal groundfish fisheries that take place in the Central and Eastern Gulf, state groundfish fisheries take place in the inland waters of Cook Inlet and PWS for rockfish, lingcod, pollock, sablefish, and Pacific cod.

18.0.0.2. Infrastructure & Transportation

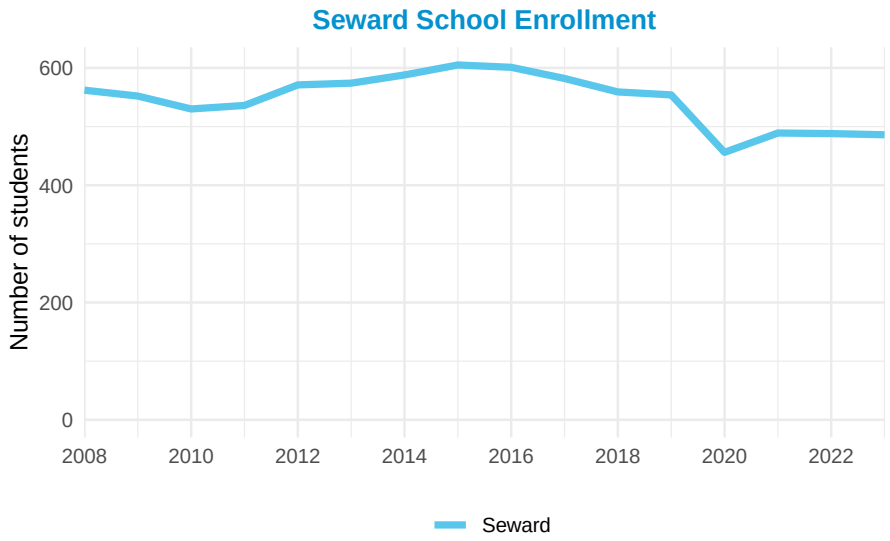
Seward is accessible by air, water, highway and rail. Bus and other commercial trucking services are available daily from Anchorage. The deep water port remains ice-free year round, and services cruise ships, and other cargo barges from Seattle. The small boat harbor has slips for 650 boats. All water, waste collection, and power services are offered through the city and the borough. Medical services in Seward are provided by the Providence Seward Medical Center. ADF&G and NMFS

Demographics	
Population	2582
Population in group housing	736
Median household income	77,850
Housing units	1,227
Percentages	
Male	65.3%
Female	34.7%
White	70.7%
American Indian or Alaska Native	12.5%
Black or African American	3%
Asian	1.6%
Native Hawaiian or Pacific Islander	4.9%
Hispanic or Latino	1.4%
Below poverty line	6.1%
High school diploma or higher	94.9%
Population under 5	3.7%
Population over 18	79.3%
Population over 65	17.2%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

both have offices in Seward. Seward has 3 schools, where student enrollment has decreased by 13% since 2008.[1] Additionally, Seward schools experienced an 18% enrollment decrease between 2019 and 2020,[2] which is likely a result of the COVID pandemic.

18.0.0.3. Demographics

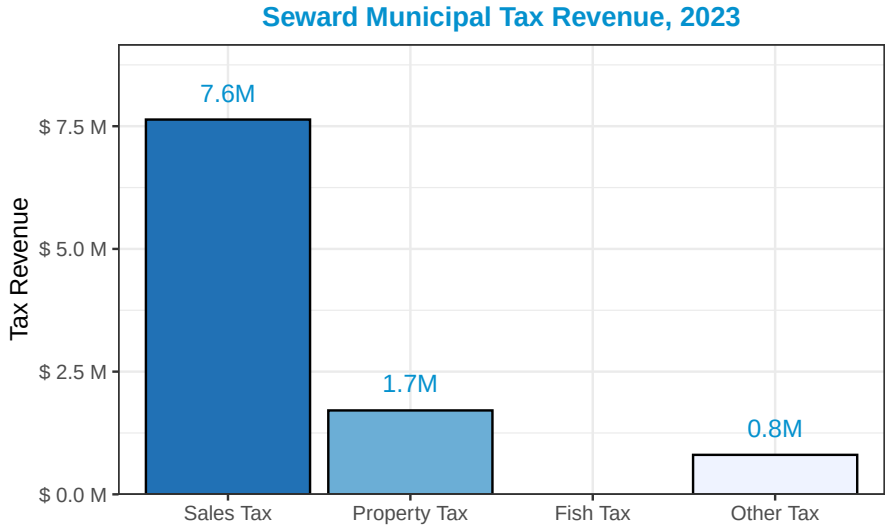


[1]School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retri eved November 14, 2024 at http://www.eed.state.ak.us/stats/

[2]School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retri eved November 14, 2024 at http://www.eed.state.ak.us/stats/

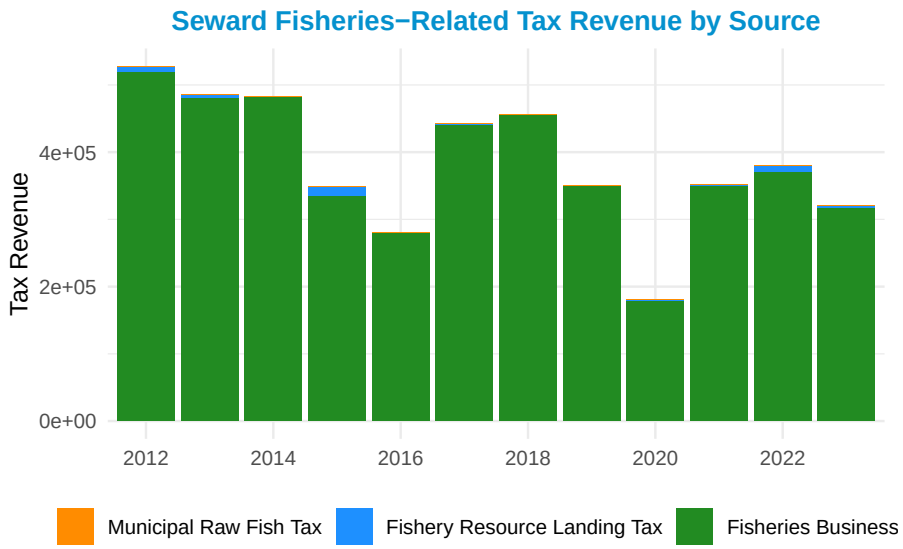
18.0.0.4. Current Economy

Seward's economy is shaped by its role as a transportation hub. The economy is diversified and includes commercial fishing and processing, shipping, coal export, employment through the state prison and tourism fueled by its proximity to Kenai Fjords National Park. In 2023, Seward generated $320,495 in total fishery related taxes (including shared and municipal).3 The overall amount of total fish taxes collected in 2023 decreased by 8% from 2021.3 These revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and wellbeing. In 2022, per capita income in Seward was estimated to be $34,044,4 and the median household income was estimated to be $77,850.[3] This represents a 22% increase and a 5% increase in these measures respectively compared to 2019. The percentage of the population living below the poverty line has decreased by 6% since 2019.[4]



[3]U.S. Census Bureau. (2023). *American Community Survey 5-Year Estimates, 2018-2022*. U.S. Department of Commerce. Retrieved from https://www.census.gov/data

[4]U.S. Census Bureau. (2023). *American Community Survey 5-Year Estimates, 2018-2022*. U.S. Department of Commerce. Retrieved from https://www.census.gov/data



18.0.0.5. Climate Change Vulnerability and Adaptive Capacity

18.0.0.5.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in determining their vulnerability. Biophysical risks to the Gulf of Alaska as a whole include sea level rise, coastal erosion, extreme weather events, changes in precipitation (rates, timing, and snowpack), increasing landslides and avalanches, wildfire risk, and increased storm severity. Seward's hazard management plan (HMP) dates back to 2010; however, the Kenai Peninsula Borough is currently updating its HMP which will include Seward. Seward's 2010 HMP lists a number of hazards that may be exacerbated by climate change–flooding, coastal erosion, wildfire, and extreme weather. The community has also experienced landslides in recent years, which can be exacerbated by extreme weather events. Seward is further vulnerable to increasing glacial lake outburst flooding as the Snow Glacier near the community has thinned. Over the last 20 years, these floods have become "more frequent, peaked more rapidly, and have had generally higher peaks."[5] A community forum from 2019 on the topic of a climate action plan indicates that residents are concerned about flooding, droughts, wildfires, sea level rise, and various impacts of climate change on ocean health including acidification, toxic algae blooms, glacial melts, and increased shipping and tourism.[6]

18.0.0.5.2. Dependence on Fisheries Affected by Climate Change

Reliance on fisheries resources which are being impacted by climate change can determine how vulnerable a community is to disruption from climate change. The community of Seward is highly engaged in processing within the groundfish fishery. In addition, nearby Kenai Fjords National Park is a popular destination for recreational fishers, with 28 active sport fish guide businesses,

[5] Beebee, R. A. (2022). *Recent history of glacial lake outburst floods, analysis of channel changes, and development of a two-dimensional flow and sediment transport model of the Snow River near Seward, Alaska* (Scientific Investigations Report No. 2022-5099). U.S. Geological Survey. https://doi.org/10.3133/sir20225099

[6] PACAB Climate Action Plan Public Forum. (2019). https://www.cityofseward.us/home/showpublisheddocument/1612/637060950125430000

Seward	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED-HIGH
Poverty	MED
Population Composition	LOW
Personal Disruption	LOW

Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

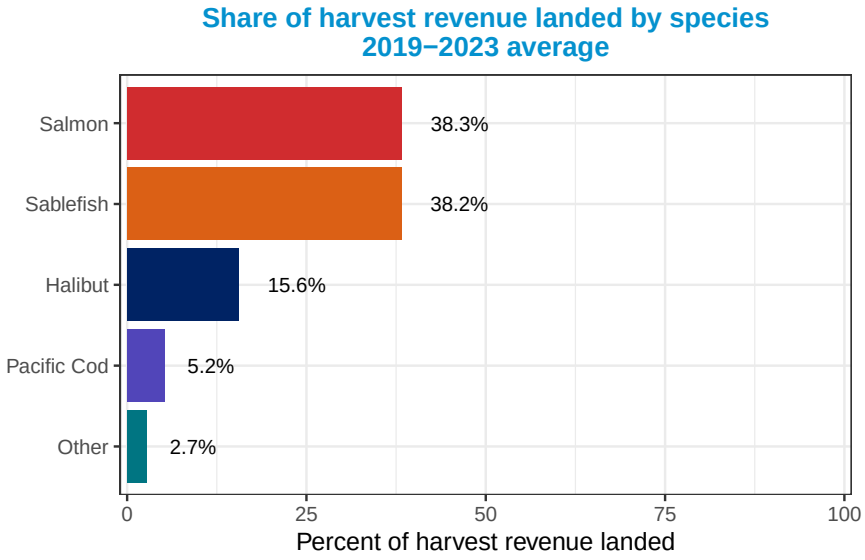
making this an important part of the community's culture and economy. However, residents appear to be only moderately engaged in subsistence fishing within the groundfish and crab fisheries in comparison to other communities. The most widely utilized species include rockfish, greenling, lingcod, and King crab. The community is only moderately engaged in halibut subsistence fishing, but highly engaged in salmon subsistence fishing. Given this, Seward is overall moderately dependent on fisheries resources that will be impacted by climate change. Therefore, as this community is impacted by a changing marine environment, the community's well-being will be significantly affected.

18.0.0.5.3. Local Adaptive Capacity

Seward has moderate to moderately-high vulnerability associated with its housing and various characteristics of its population, such as income level, economic diversity, education, and employment status. The FEMA National Risk Index also rates Seward as having very low community resilience, meaning they have a very low ability to adapt to changing conditions and withstand and recover rapidly from disruptions.[7]

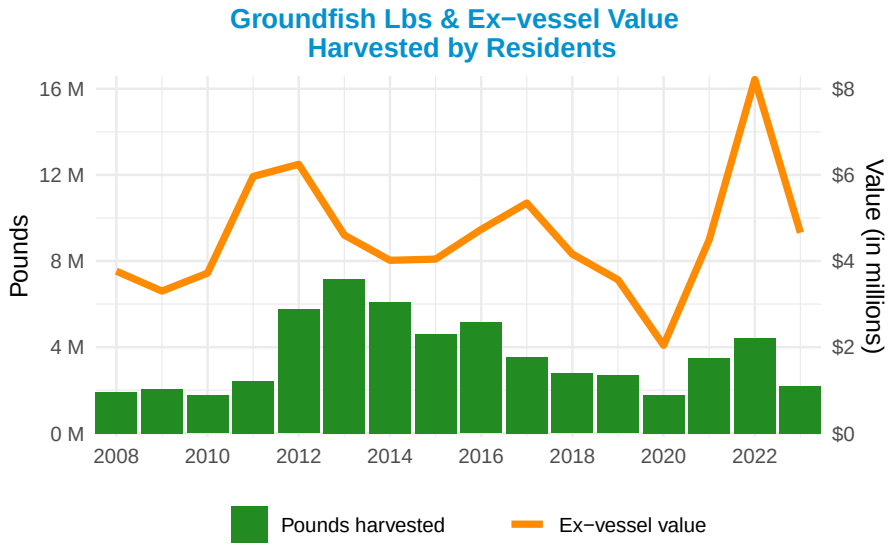
[7]Federal Emergency Management Agency. (n.d.). *National Risk Index: Kenai Peninsula Borough, Alaska.* Retrieved November 13, 2024, from https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C02122

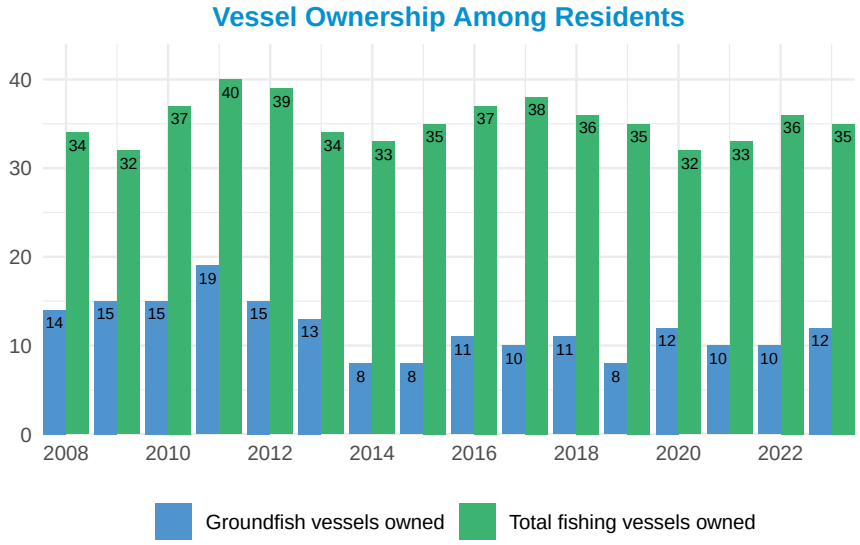
18.0.0.6. Groundfish Harvesting Engagement - MEDIUM



Seward residents participate in several fisheries. In 2023, about 52.5% of ex-vessel value was from groundfish fisheries, while 15.6% was from halibut fisheries, and 38.3% from salmon. In 2023, vessels owned by Seward residents harvested over 2.1 million pounds of groundfish with an associated value of over $4.6 million, showing a steep decline in these metrics from the previous year. Groundfish harvests in Seward peaked in 2013, but have been declining since then. In 2021 and 2022, both pounds harvested and associated ex-vessel value of groundfish harvests increased briefly after a sharp decline in 2020, potentially due to the COVID-19 pandemic. Declines in groundfish harvests were observed again in 2023, with a 50% decrease in volume harvested and 43% decrease in associated value.

In 2023, the number of groundfish vessels owned by Seward residents increased to a total of 12 vessels and the total number of fishing vessels owned by residents decreased to 35. Between 2008 and 2019, the number of groundfish vessels owned by Seward residents fluctuated, peaking in 2011 at 19 vessels. In 2020, despite significant decreases in pounds harvested, the number of groundfish vessels increased to 12 and have remained between 10 and 12 in recent years.



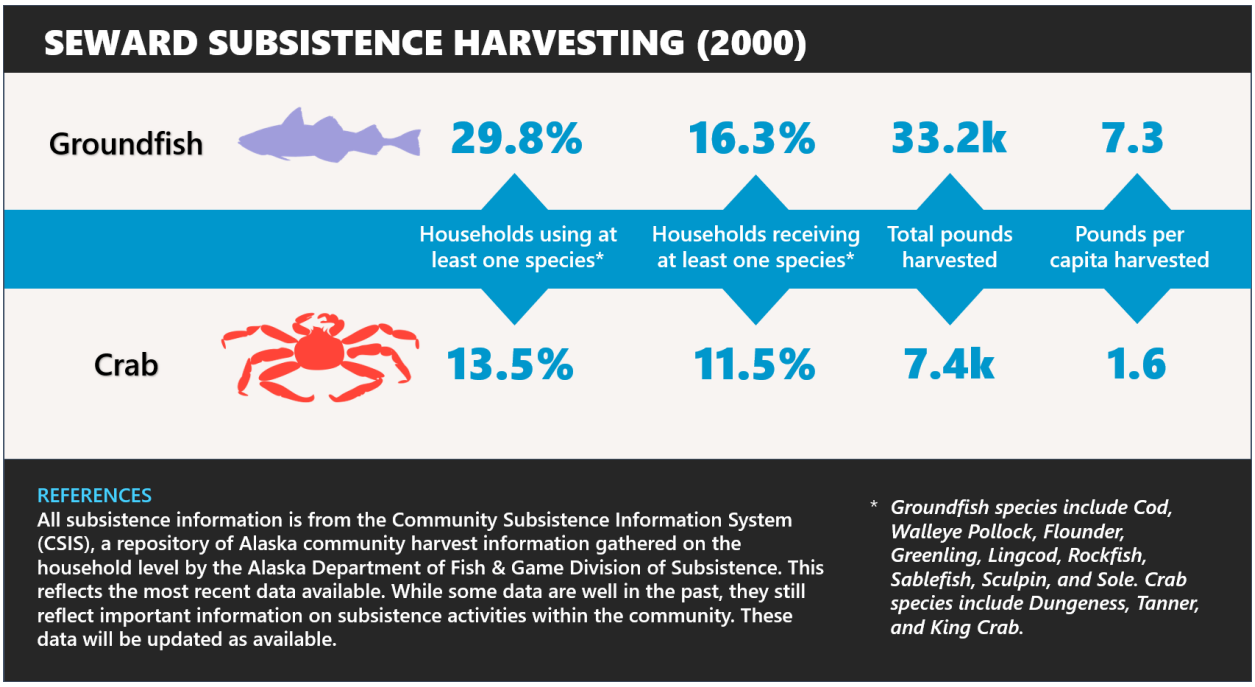


18.0.0.7. Crab Harvesting Engagement - N/A

There is not a substantial amount of crab harvesting activity in Seward to report.

Due to confidentiality concerns, only select data are available.

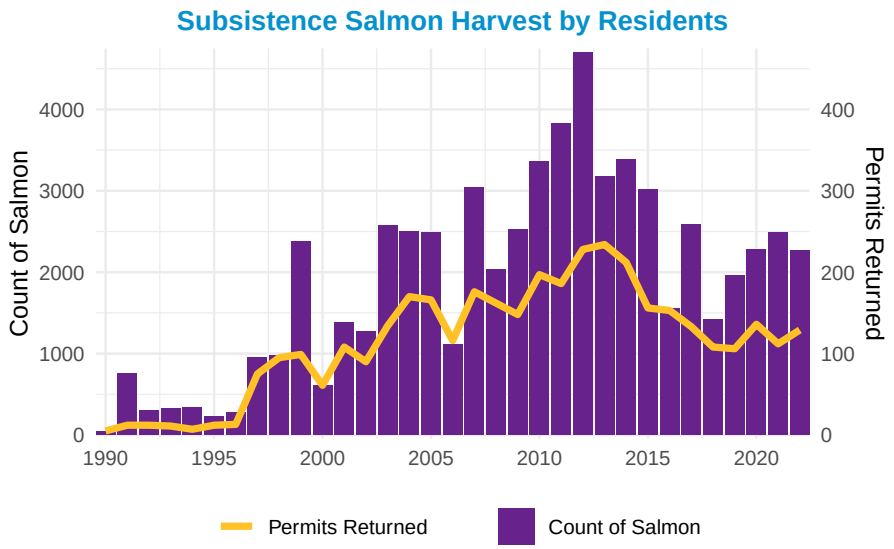
18.0.0.8. Subsistence Harvesting Engagement



Residents of Seward are moderately engaged in subsistence fishing in groundfish and crab fisheries, according to the most recent data available. The most popular groundfish species were rockfish, greenling and lingcod, while the most widely utilized crab species were King crabs. Similarly, residents are only moderately engaged in subsistence halibut harvests. Recorded harvests of halibut shrank to 0 in the most recent year data was available, 2016.[8] By contrast, subsistence salmon fishing has long been practiced in the area, and Seward residents have been recorded harvesting higher amounts of salmon for subsistence since 1999, reaching a peak in 2012. Harvests of subsistence salmon saw a dramatic increase in 2019 from 2018 levels, which remained high through 2022. The same upward trend was observed in the nearby Kenai Peninsula community of Homer, which also saw dramatic increases in salmon harvests in 2019 that persisted to 2022.[9]

[8] Alaska Department of Fish and Game Division of Subsistence. 2011. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.

[9] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

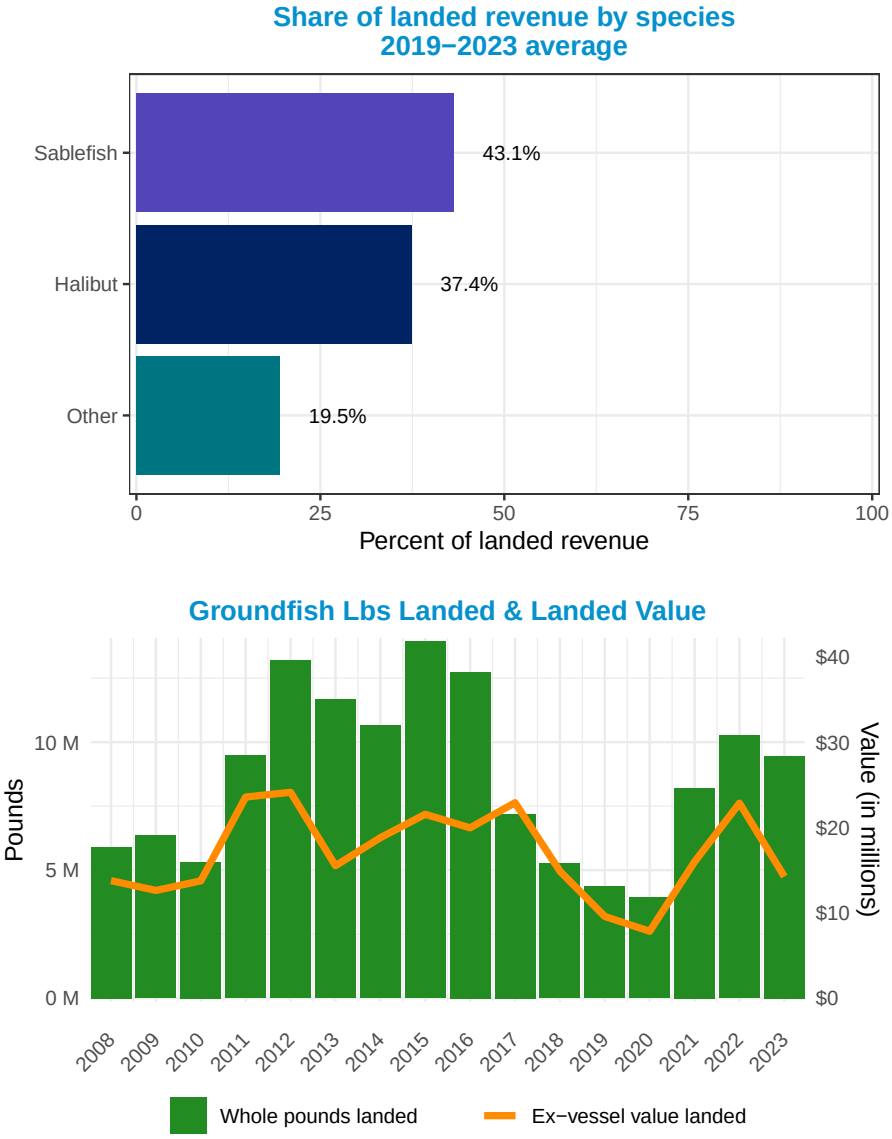


18.0.0.9. Recreational Fishing Engagement

Seward is one of the four communities in Alaska that has been highly engaged in recreational fishing in all years 2004-2023 as well as highly engaged in commercial fishing (harvesting or processing), the others being Homer, Kodiak, and Sitka. Unlike these other communities however, Seward was not highly engaged in 2003, the first year of the study period. Seward increased its average recreational fishing engagement score from an average of 1.24 from 2003-2009 to an average of 1.58 from 2010-2019 and 1.64 for 2020-2023 despite its engagement score falling to 1.49 in 2023 which is slightly above its overall mean.

18.0.0.10. Groundfish Processing Engagement - MEDIUM

In 2023, there were five processing plants in Seward that processed groundfish. Processing facilities landed 9.5 million whole pounds with an associated value of $14.2 million. This shows a recent trend of increased groundfish landings and value from 2021 to 2023, compared with the same metrics from 2018 to 2020.



18.0.0.11. Crab Processing Engagement - N/A

There is not a substantial amount of crab processing activity in Seward to report.

Due to confidentiality concerns, only select data are available.

19. Unalaska

19.0.0.1. Area Description & History

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 Unangan. When commerce with Russian fur traders began in 1759, more than 3,000 Unangan lived in 24 settlements on Unalaska and Amaknak Islands. The City of Unalaska was incorporated 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 top commercial fishing port in the nation. An estimated 2,500 seasonal workers come to Unalaska for fisheries employment each year.[1] The population of Unalaska reaches its annual peak between January and April each year (during Pollock "A" Season). In 2010, 2,099 residents lived in group quarters, which is associated with processor housing.[2] Unalaska was included under the Alaska Native Claims Settlement Act (ANCSA) and is federally recognized as a Native village. The active Native Corporations are Ounalashka Corporation and Aleut Corporation. 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.

[1]Himes-Cornell, A., K. Hoelting, C. Maguire, L. Munger-Little, J. Lee, J. Fisk, R. Felthoven, C. Geller, and P. Little. 2013. Unalaska. In *Community Profiles for North Pacific Fisheries – Alaska: Aleutian and Pribilof Islands* (pp. 237–260). NOAA Technical Memorandum NMFS-AFSC-259, Volume 6. National Marine Fisheries Service. https://apps-afsc.fisheries.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Aleutian_and_Pribilof_Islands.pdf

[2]Himes-Cornell, A., K. Hoelting, C. Maguire, L. Munger-Little, J. Lee, J. Fisk, R. Felthoven, C. Geller, and P. Little. 2013. Unalaska. In *Community Profiles for North Pacific Fisheries – Alaska: Aleutian and Pribilof Islands* (pp. 237–260). NOAA Technical Memorandum NMFS-AFSC-259, Volume 6. National Marine Fisheries Service. https://apps-afsc.fisheries.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Aleutian_and_Pribilof_Islands.pdf

Demographics	
Population	4093
Population in group housing	2577
Median household income	104,706
Housing units	944
Percentages	
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%
High school diploma or higher	88.9%
Population under 5	4.4%
Population over 18	82.9%
Population over 65	5.7%

Source:
*Source: US Census Bureau American Community Survey 5-year estimates (2018-2022). Population and group housing estimates sourced from Alaska Department of Labor, 2023.

19.0.0.2. Infrastructure & Transportation

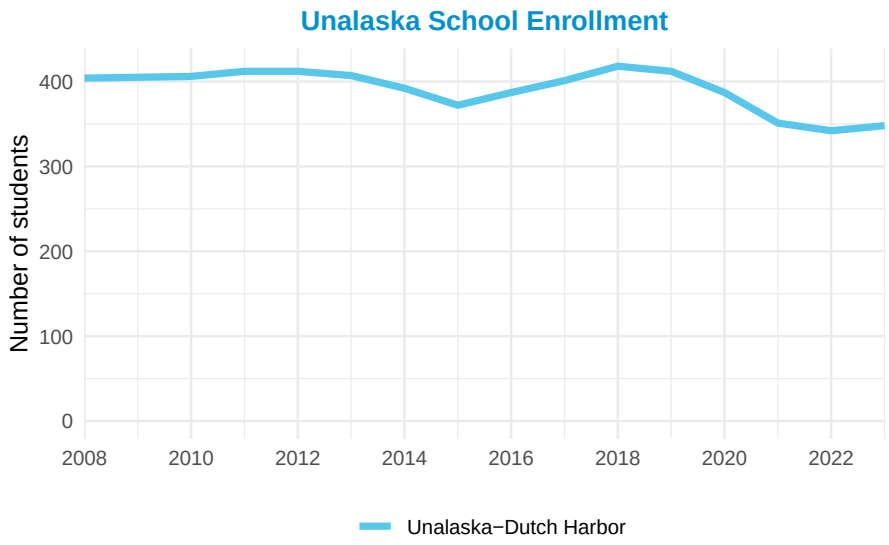
Unalaska is serviced by daily scheduled flights from Anchorage. The state ferry operates bi-weekly from Homer between May and September. There are six marine facilities in Unalaska which include 10 docks, three operated by the city.[3] Dutch Harbor has 5,200 ft. of moorage and 1,232 ft. of floating dock, 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. All on-shore processors generate their own electrical power. Unalaska school enrollment has decreased by 16.7% since 2018.[4]

19.0.0.3. Demographics

In 2023, 2,577 of the 4,093 residents of Unalaska lived in group quarters, which is associated with processor housing.[5] This was just above the mean population over the 1990-2023 period which has stayed roughly stable around this population level.

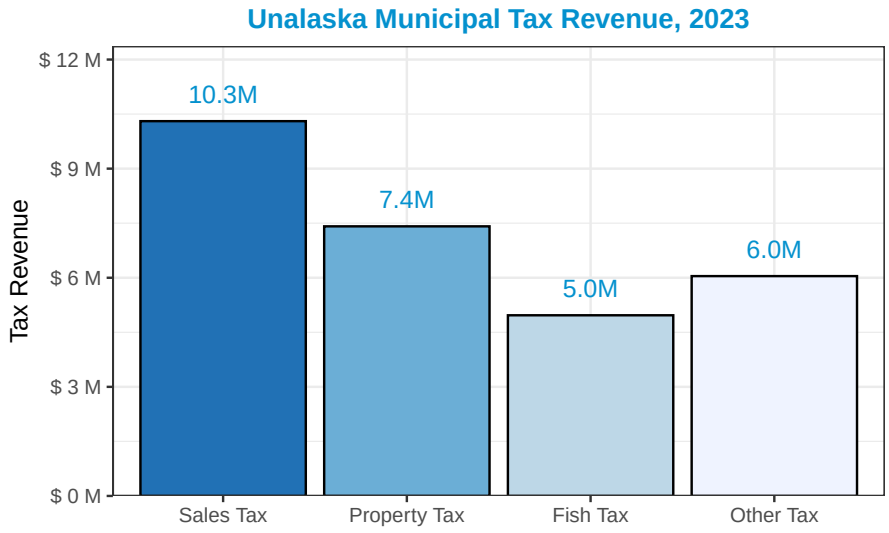
For the 2018-2022 period, median household income in Unalaska was estimated to be $104,706 and the percentage of people living below the poverty line was estimated to be 8%.[6]

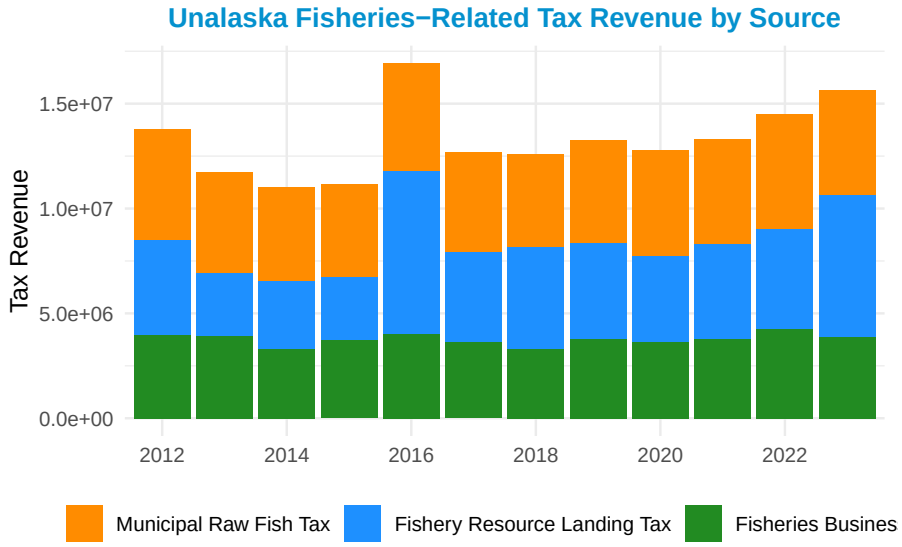
[3]Aleutian Pribilof Islands Association. (n.d.). Unalaska. https://www.apiai.org/tribes/unalaska/
[4]School enrollment statistics compiled from AK. Dept. of Education & Early Development. Retrieved November 14, 2024 at http://www.eed.state.ak.us/stats/
[5]Alaska Department of Labor. (2023). Alaska Population Estimates: Cities and Census Designated Places (CDPs), 2020 to 2023. https://live.laborstats.alaska.gov/data-pages/alaska-population-estimates
[6]U.S. Census Bureau. (2023). *American Community Survey 5-Year Estimates, 2018-2022.* U.S. Department of Commerce. Retrieved from https://www.census.gov/data


Unalaska School Enrollment
Number of students
400
300
200
100
0
2008
2010
2012
2014
2016
2018
2020
2022
Unalaska−Dutch Harbor

19.0.0.4. Current Economy

Unalaska's economy is based on commercial fishing, fish processing, and fleet services, such as maintenance, trade, repairs, fuel, and transportation. Processors provide employment, and seasonal workers are brought in during peak seasons. In 2022, Unalaska generated $26.8 million in municipal tax revenue, of which $14.5 million was fishery related taxes (including shared and municipal).5 The overall amount of total fish taxes reported in 2022 increased by 9% compared with 2021.[7] These revenues support basic city services such as education, sanitation, transportation, etc. and are important indicators of community health and wellbeing.





[7]Tax data from AK. Dept. of Revenue, Annual Reports 2008 2008-2021. Retr.' 06/30/2022 from http://tax.alaska.gov/programs/sourcebook/index.aspx aspx; Dept. of Commerce AK Taxable Database, AK Division of Community & Regional Affairs. Retr.'10/2022 https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/AlaskaTaxableDatabase.aspx

19.0.0.5. Climate Change Vulnerability and Adaptive Capacity

19.0.0.5.1. Exposure to Biophysical Effects of Climate Change

A community's exposure to the biophysical effects of climate change, which include effects to the biological organisms and physical landscape surrounding them, aids in determining their vulnerability. The Aleutian islands are expected to experience increased temperatures and precipitation, and increased summer storminess. Similar to other Alaskan communities, they will be impacted by reduced sea ice as well.[8] In 2021, the Aleutians experienced an uncharacteristically warm winter and Unalaska had its rainiest February on record. These trends mirror those that are predicted for the region.8 However, in comparison to other Alaskan communities, Unalaska has a low risk of exposure to the biophysical effects of climate change.

19.0.0.5.2. Dependence on Fisheries Affected by Climate Change

Reliance on fisheries resources which are being impacted by climate change can determine how vulnerable a community is to disruption from climate change. Unalaska has high engagement with processing in both the groundfish and crab fisheries, Residents are also highly engaged in subsistence fishing of various species of groundfish and crab as well, with most households utilizing at least some subsistence fisheries resources. Overall, Unalaska is highly dependent on fisheries resources which will be impacted by climate change. As abundance and location of species continue to shift, Unalaska residents will likely be severely impacted by these shifts and any commensurate fisheries closures. Recently, Unalaska island has been impacted by several subsistence salmon closures.[9] The Aleutian islands also have a history of being impacted by overexploitation of natural resources on which they depend for subsistence and other uses, specifically sea otters and Stellar sea lions.[10]

19.0.0.5.3. Local Adaptive Capacity

Unalaska has low to medium-high limitations on its adaptive capacity. This rating takes into account factors in the community which can make it harder to adapt when disruptions occur. Unalaska received these ratings due to moderate vulnerability of the characteristics of its population, such as age, income level, economic diversity, education, ability to speak English, and the number of individuals in group housing. However, Unalaska ranks as having low social vulnerability in terms of its labor force structure, housing characteristics, poverty, and personal disruption as compared with all other U.S. fishing communities.

[8] Aleutian & Bering Climate Vulnerability Assessment Assessment-ABCVA. Unalaska Lecture & Community Discussion Discussion-September 2014

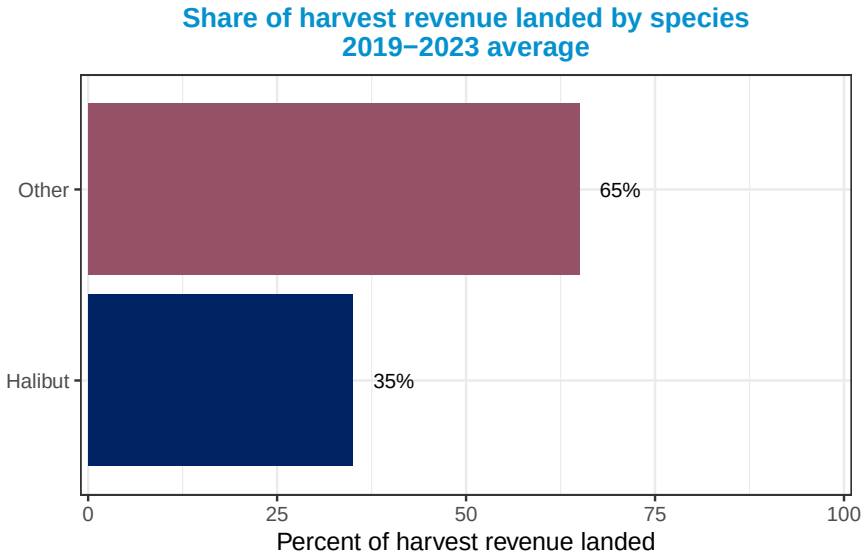
[9] McKenney, Hope. (2021). Warm, wet February in the Aleutians linked to warming ocean temperatures. KTOO Public Media. https://www.ktoo.org/2021/02/19/warm-wet-february-in-the-aleutians-linked-to-warming-ocean-temperatures/

[10] Rosen, Yereth. (2021). In the Aleutians, climate change and ocean acidification impacts add to legacies of past exploitation. Arctic Today. https://www.arctictoday.com/in-the-aleutians-climate-change-and-ocean-acidification-impacts-add-to-legacies-of-past-exploitation/

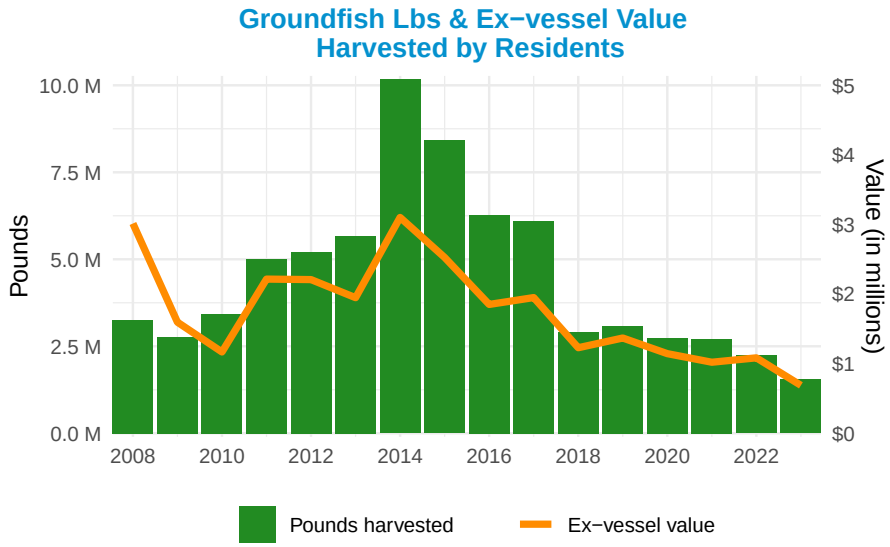
Unalaska	
Social Indicators for Fishing Communities*	
Labor Force	LOW
Housing Characteristics	MED
Poverty	LOW
Population Composition	HIGH
Personal Disruption	LOW

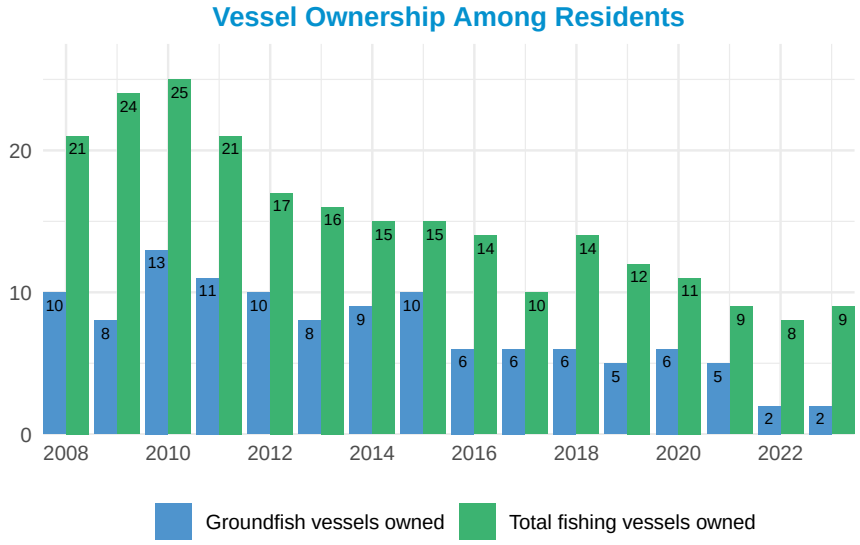
Source:
*NOAA Fisheries Office of Science and Technology. 2019. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 3 (Last updated December 21, 2020). https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0

19.0.0.6. Groundfish Harvesting Engagement - LOW



Unalaska commercial fishers are diversified in commercial fisheries, including halibut, crab, groundfish, and salmon. Salmon remains the most abundant and valuable species; However, a wide range of fishing vessels use Unalaska as a base of fishing operations.On average, from 2019-2023, the majority of harvest revenue came from halibut (35%), pacific cod (29%), crab (22%), and salmon (13%). Fishing vessels owned by Unalaska residents continued a downward trend from a peak of 25 in 2010 to 9 in 2023 (64% decrease). Similarly, ownership of groundfish vessels continues to decline and was below 5 for the first time in 2022 and 2023. The pounds of groundfish harvested has steadily declined since 2014, with a sharp decline in 2018. Compared to 2014, the volume harvested has decreased by 8.5 million pounds (85%) while the ex-vessel value has decreased by about $2.4 million in the same time period (78%).

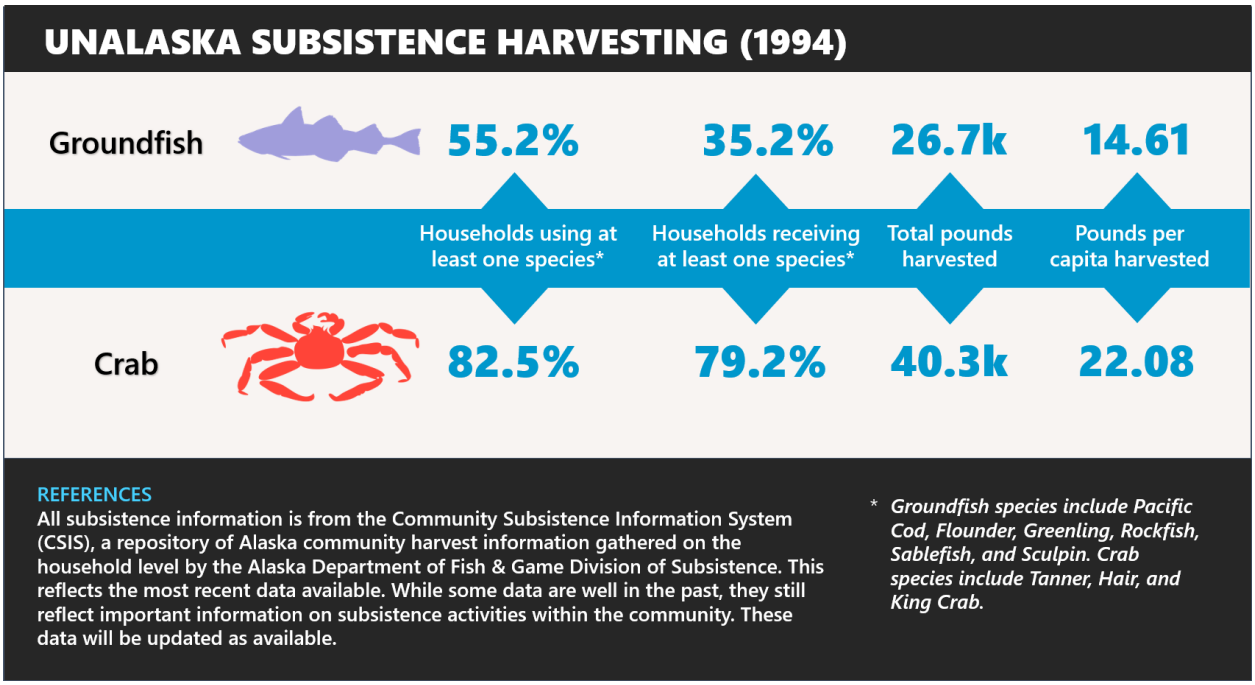




19.0.0.7. Crab Harvesting Engagement - LOW

There is not a substantial amount of crab harvesting activity among vessels owned by residents of Unalaska to report. *Due to confidentiality concerns, only select data are available.*

19.0.0.8. Subsistence Harvesting Engagement



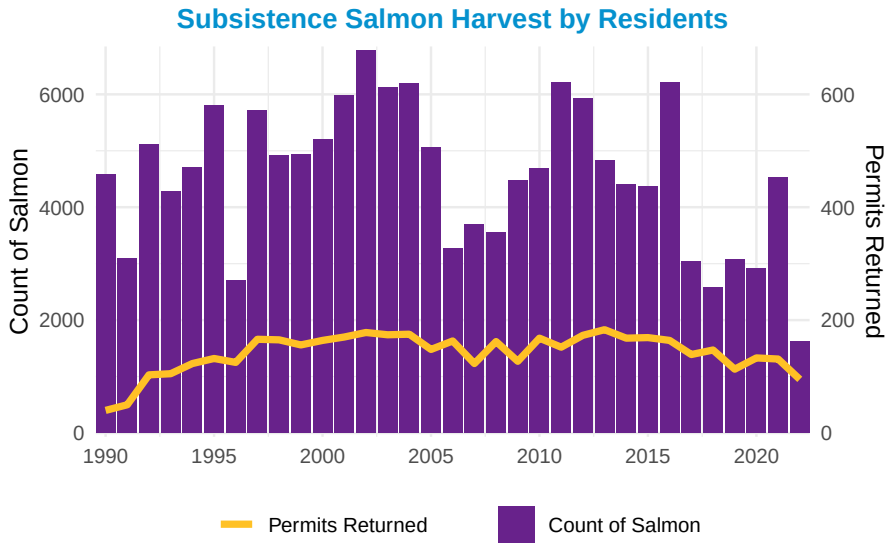
Residents of Unalaska are almost universally engaged in subsistence fishing, with 96.8% of all households utilizing fisheries resources (according to the most recent data available).[11] The most common species include salmon, halibut, crabs (King crab, Tanner crab and Dungeness crab), cod, and rockfish. The high per capita harvest rates of both groundfish and crab indicate that residents of Unalaska rely on these species as key sources of nutrition in their diets. According to more recent data on their halibut and salmon subsistence harvesting practices from the Alaska Dept. of Fish and Game, trends indicate that engagement in subsistence fishing for these two species has remained relatively constant in recent years, although declines in salmon harvests occurred starting in the year 2017.[12][13] Given that there have also been recent salmon subsistence fishing closures in the area, it is likely that these closures of declines in the salmon population more generally have impacted their ability to harvest as much as years past.[14]

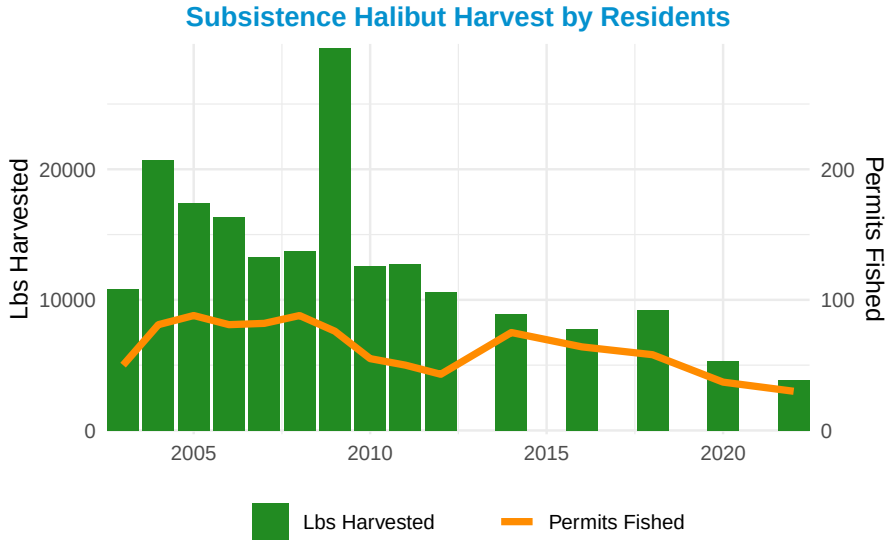
[11] Alaska Department of Fish & Game Division of Subsistence. (2024). 2020 Unalaska Harvest Data. Retrieved November 14, 2024 from https://adfg.maps.arcgis.com/apps/dashboards/c5a783dd9f9049efb6489cce9fc38319

[12] Alaska Department of Fish and Game Division of Subsistence. 2021. Alaska Subsistence Fisheries Database. Data compiled by Alaska Fisheries Information Network in the Alaska Community Profiling Dataset.

[13] Alaska Department of Fish and Game Division of Subsistence. 2011. Pacific Halibut Subsistence Data. Data compiled by Alaska Fisheries Information Network in Alaska Community Profiling Dataset.

[14] U.S. Department of the Interior. https://www.doi.gov/subsistence/karac/closures





19.0.0.9. Groundfish Processing Engagement - HIGH

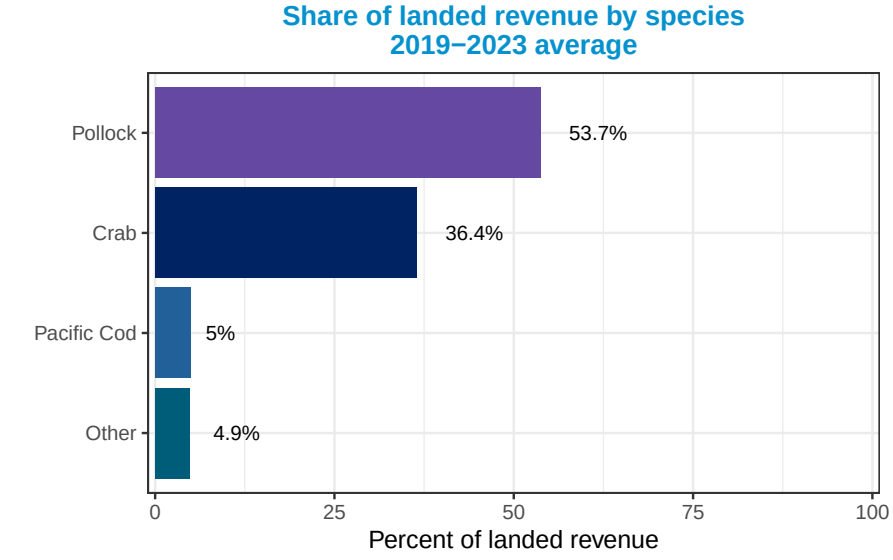
Although the majority of Unalaska residents depend on income derived directly from the commercial fishing and fish processing industry, few residents have ownership interest in major seafood related firms. Many of the largest shoreside fish processors are wholly- or partially-owned by Japanese interests (Alyeska[15], Westward[16], and Unisea[17]). Many other large processor vessels (motherships),

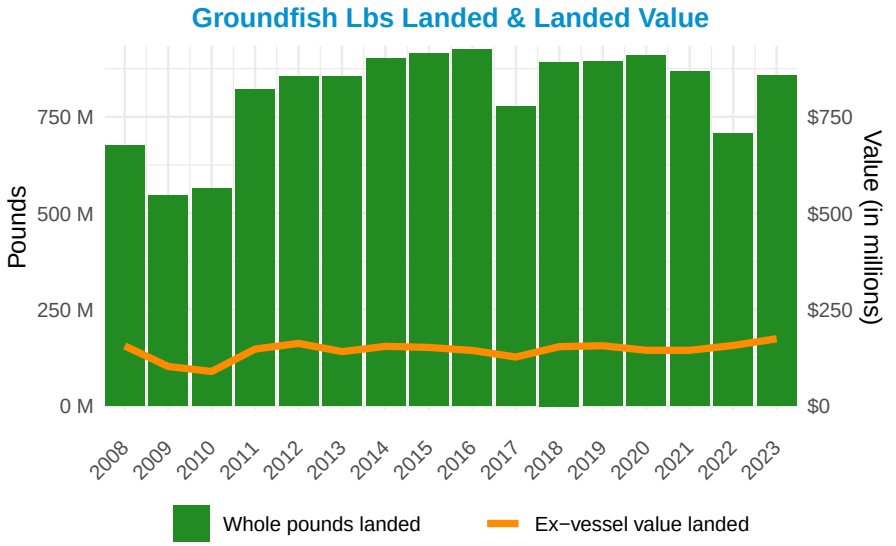
[15]Maruha Nichiro Corporation. (2020). *Corporate profile 2020*. Retrieved from https://www.maruha-nichiro.com/who_we_are/pdf/corporate_profile_en_202007.pdf

[16]Maruha Nichiro Corporation. (2020). *Corporate profile 2020*. Retrieved from https://www.maruha-nichiro.com/who_we_are/pdf/corporate_profile_en_202007.pdf

[17]Nissui Corporation. (n.d.). *Global Network (Overseas)*. Retrieved November 20, 2024, from https://www.nissui.co.jp/english/corporate/group/overseas.html#tab

or floating processors are owned by non-Alaskan firms[18][19], although CDQ groups have some ownership interests as well.[20] Unalaska has a total of 13 seafood processing plants, five of which process groundfish. The vast majority of landings in Unalaska over the last five years is pollock at 53.7%; Pacific cod accounts for about 5%, and crab 36.4%. In 2023, Unalaska processed 858 million pounds of groundfish with an associated landed value of $174 million. This is a 4% decrease in volume from 2019 (down 35 million pounds) but an increase in landed value (up $18 million or 12%).





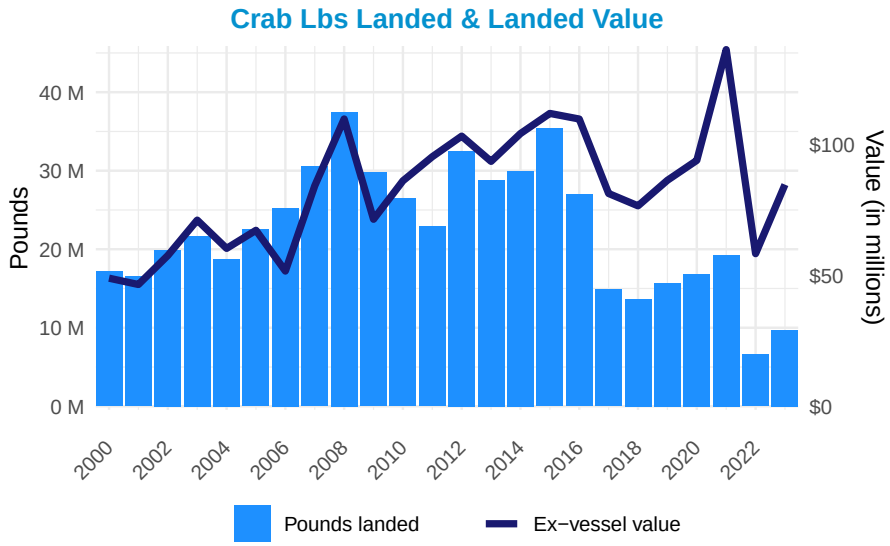
[18]Phoenix Processor Limited Partnership. (n.d.). *Home.* Retrieved November 20, 2024, from https://www.pplp.fish/

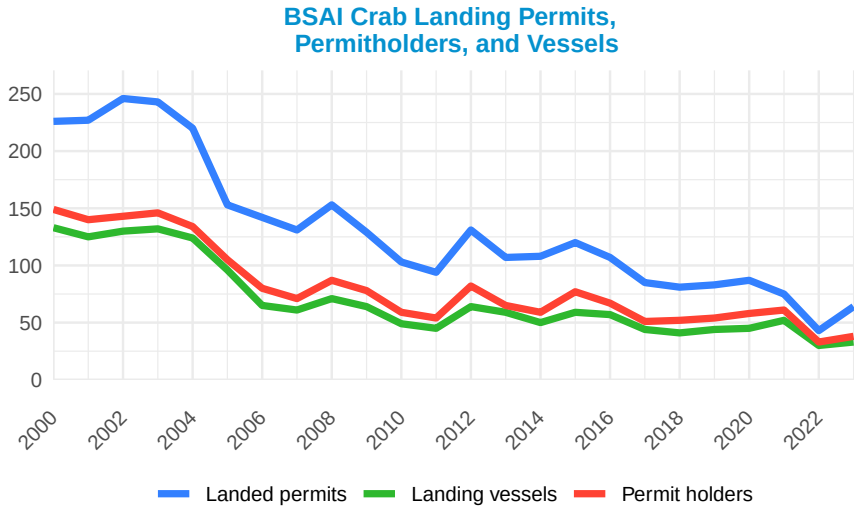
[19]McKenney, H. (2022, January 14). *New owner to take over Unalaska fish processing plant.* KUCB. Retrieved November 20, 2024, from https://www.kucb.org/industry/2022-01-14/new-owner-to-take-over-unalaska-fish-processing-plant

[20]Seaman, T. (2022, October 21). *CDQ group takes control of Golden Alaska pollock mothership after two catcher boat deals.* Undercurrent News. Retrieved November 20, 2024, from https://www.undercurrentnews.com/2022/10/21/cdq-group-takes-control-of-golden-alaska-pollock-mothership-after-two-catcher-boat-deals/

19.0.0.10. Crab Processing Engagement - HIGH

Unalaska is highly engaged in the crab processing sector. In 2023, 13 Unalaska processors processed 9.69 million pounds of crab with an associated value of $85 million. This marks a 38% decrease (6 million pounds) in volume landed since 2019, yet only a 2% decrease in landed value (down $1.65 million). The amount of BSAI crab processed in the region reached a peak of 37.5 million pounds (with a value of $110 million) in 2008, but the total value was maximized in 2021 at $136 million on a volume of only 19.6 million pounds.





*Permits counted are CFEC gear operator permits

20. Available Data

Selected data produced as part of ACEPO are available through the AKFIN Reports Portal.

20.1. Public Reports

Public reports provide data that meet aggregation standards for reporting of non-confidential data.

- Groundfish and crab harvesting and processing engagement indices
- Groundfish harvesting and processing regional quotient
- Crab harvesting and processing regional quotient
- Tax revenue for highly engaged Alaska communities
- Fisheries tax revenue for highly engaged Alaska communities
- School enrollment for highly engaged Alaska communities

20.2. Confidential Reports

Confidential reports require a log-in and are available to users authorized through NOAA Fisheries and the State of Alaska to view confidential fisheries data. Contact jean.lee@noaa.gov if you are interested in accessing these reports.

- Groundfish harvesting and processing regional quotient (confidential)
- Crab harvesting and processing regional quotient (confidential)