OCS Study
BOEM 2012-109

Subsistence Study for the North Aleutian Basin

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Subsistence Study for the North Aleutian Basin

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ACRONYMS

ADF&G	Alaska Department of Fish and Game
AEB	Aleutians East Borough
AHA	Aleutian Housing Authority
ANCSA	Alaska Native Claims Settlement Act
APIA	Aleutian Pribilof Islands Association
APICDA	Aleutian Pribilof Island Community Development Association
BBNA	Bristol Bay Native Association
BBNC	Bristol Bay Native Corporation
BIA	Bureau of Indian Affairs, U.S. Department of the Interior
BOEM	Bureau of Ocean Energy Management
BP	Bering Pacific Seafoods, Inc.
BSIERP	Bering Sea Integrated Ecosystem Research Program
CAMF	Concerned Area M Fishermen
CDQ	Community Development Quota
CFEC	Commercial Fisheries Entry Commission, State of Alaska
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GMU	Game Management Unit
IFQ	Individual Fishing Quota
IGAP	Indian General Assistance Program
IPHC	International Pacific Halibut Commission
IRA	Indian Reorganization Act
LNG	Liquid Natural Gas
L&PB	Lake and Peninsula Borough
MMS	Minerals Management Service, U.S. Department of the Interior
NAB	North Aleutian Basin
NAHASDA	Native American Housing and Self-Determination Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fisheries Management Council
PAF	Pacific American Fisheries
PPSF	Peter Pan Seafoods, Inc.
OCS	Outer Continental Shelf
OMB	Office of Management and Budget
RSW	Refrigerated Sea Water
SSL	Steller Sea Lion
TAC	The Aleut Corporation
TDHE	Tribally Designated Housing Entity
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
VPSO	Village Public Safety Officer
WAC	White Alice Communications

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PART I

CHAPTER 1. INTRODUCTION

PURPOSE

The U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM), Alaska OCS Region, is responsible for the oil and gas leasing program on the Outer Continental Shelf (OCS of Alaska). The Environmental Studies Program (ESP) establishes the information required for assessment and management of oil and gas exploration and development. The ESP sponsored socioeconomic and sociocultural research in advance of a proposed development scenario in the North Aleutian Basin planning area in the southern Bering Sea to identify and assess the human environment and how this might respond to OCS of Alaska oil and gas activities. Idaho State University was contracted by BOEM to initiate a subsistence study of the North Aleutian Basin region and the study communities of Akutan, False Pass, Nelson Lagoon, and Port Heiden to provide needed baseline data about subsistence harvesting and sharing activities.

INTRODUCTION

This document serves as the final report for the North Aleutian Basin Subsistence Study on the people and subsistence activities in the villages around the proposed North Aleutian Basin offshore oil and gas lease sale. The study region encompasses four villages, two Alaska Native sociocultural groups, hundreds of miles of coastline, and numerous species of wild birds, fish, and large and small game. This study investigates the role of subsistence and commercial harvests across the community and at household levels, and explores characteristics of harvesters and their harvesting behavior, where they harvest, when, what species, how much, and access to commercial opportunities. All of these data are used to describe household networks of food distribution, sharing and exchange, and the range of variation in subsistence production and distribution. These data are used to describe and characterize how, where, and why the people of Akutan, False Pass, Nelson Lagoon, and Port Heiden use the landscape the way they do. These data are then used to identify aspects of the communities that could be vulnerable to oil and gas exploration and development. This report also contains a description of the historical, cultural, political, and economic aspects of each community, which provides a foundation for the survey and its analyses.

Scope of the Project

This is a community baseline study that describes four communities as they currently exist and the potential changes that may accompany offshore oil and gas exploration and development in the North Aleutian Basin. The study used qualitative and quantitative methodologies to investigate each community's subsistence and commercial harvest activities, economic structure, demographic characteristics, infrastructure, and sociocultural systems, and examine each community in the context of the greater southern Bering Sea region. Historical trajectories for each community are also explained, and may indicate future responses to exploration and development.

Timeline

The North Aleutian Basin (NAB) Program Area identified in the 5-Year Proposed Offshore Oil and Gas leasing Program (2007-2012) of the USDOI includes more than 50,000 square miles of ocean and outer continental shelf. The North Aleutian Basin Lease Sale area 214 was selected from the planning area as having the greatest prospects for oil and gas exploration and development with lease sale planning for 2011. On March 31, 2010, the Obama Administration announced support for some oil and gas leases in Alaska's Arctic waters but cancelled leasing plans for federal waters in the North Aleutian Basin. Interior Secretary Ken Salazar said the Bristol Bay region is "simply too special to drill" citing wildlife and salmon abundance and value (Bluemink, Anchoarge Daily News, 3/31/2010).

Shell Offshore Inc. (SOI, whose parent company is Royal Dutch Shell) had been preparing its role in leasing for several years, including visiting villages, meeting with community leaders, supporting a trip for community leaders to travel to Sakhalin to observe operations there, and working on mitigations with the Aleutians East Borough. Many leaders were disappointed in the decision and concerned that Secretary Salazar did not visit peninsula communities situated closer to the proposed exploration and development.

The majority of data collection for this study had been completed at the time of the Obama Administration's decision and the study was allowed to carry forward to completion, including authorization of the survey instrument by the Office of Management and Budget (Figure 1). The moratorium on North Aleutian Basin exploration and development extends to 2017, and this study might serve to provide baseline information for future analysis.

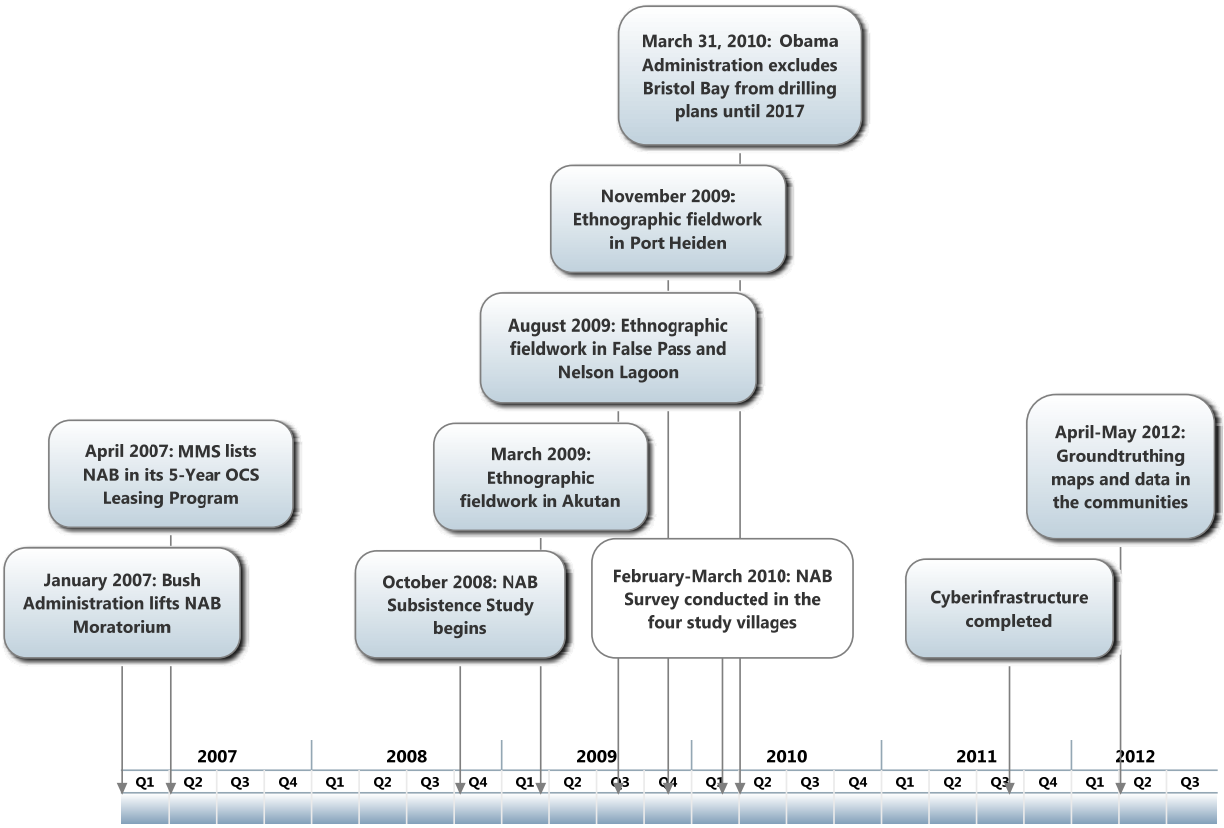

Figure 1. Project Timeline.

RESEARCH GOALS AND OBJECTIVES

The project team investigated the social dynamics of subsistence and commercial harvests at the community and household levels using detailed ethnographic methods and a valid survey instrument (OMB Control Number 1010-0181, see Appendix 3). Recent studies on this region are few, but those that have been conducted emphasize the linkages between commercial and subsistence harvesting, the importance of sharing, the role of immigrant fishermen in the region, economic integrations, marine dependency, and identity (e.g. Black et al. 1999; Braund et al. 1986; Reedy-Maschner 2004, 2007, 2010), which contribute to hunter-gatherer-fishermen studies more generally that often privilege subsistence over other aspects of society. The present study explores characteristics of the harvesters themselves and their harvesting behavior, locations, seasonality, species and quantity, and access to commercial opportunities. These data provide the foundations for exploring household networks of food distribution, food exchange, exchange frequency, and the range of variation in subsistence production and distribution that link to community and inter-community sharing patterns. Each community exhibits complex and varied social maps of food harvest and distribution. These data allow us to then identify the key nodes that could be vulnerable to oil and gas exploration and development.

Generally, this project sought baseline and detailed analyses of the following topics.

- What resources are harvested, where they are harvested, and in which seasons.

- Who harvests those resources, the structure of harvest teams, and how harvests are shared.
- How resources are ultimately distributed, who participates in the distribution, and the variation in immediate versus delayed redistribution.
- The affinal and consanguinial relationships among all participants and the role of kinship in regulating sharing and distribution networks.
- The role of key peoples and places (network nodes) in the maintenance of the subsistence infrastructure.
- The role of commercial harvests in subsistence returns.
- Historical changes (living memory) in the structure and functioning of the subsistence--commercial continuum and in the realm of subsistence in general.
- An analysis of potential disruptions and other factors that may negatively affect subsistence/commercial harvesting and sharing networks.
- An assessment of food insecurity in the communities and vulnerability in the face of potential oil and gas exploration and development.

In this context, three major areas of investigations were conducted. First, ethnographic data were collected that includes genealogical information, qualitative assessments of subsistence and sharing, traditional ecological knowledge, land use patterns, and local-global interactions. Second, a survey seeking quantitative data on subsistence, harvests, sharing, customary trade, local-global imports/exports and redistribution, GIS-based land and sea use patterns, perceived impacts on OCS exploration and development on the subsistence economy, and the underlying socio-political and economic networks was conducted. Using ethnographic and survey data, a comprehensive analysis of the subsistence baseline was conducted, a non-linear analysis of sharing/transaction networks was achieved, and simulations of potential disturbances to facets of the networks were completed and analyzed.

Research Questions, Hypotheses, Tasks

The project has multiple research components addressing the modern production of subsistence foods and mechanisms of individual, family, community, and ecological relations involving the distribution of these foods and other goods and their abilities to maintain certain social and ecological values in the face of change. Formal hypotheses are in the format of a statistical null hypothesis test, however many of these hypotheses proved more qualitative than quantitative, so that the null model should be seen more simply as an *alternative* hypothesis, rather than a null hypothesis in the strict definition of the term.

Relevant to these hypotheses is a working definition of an "effect." One of the goals of this study is to identify thresholds of effect that can only emerge through the study process and analyses. A "disruption" is also an important concept to define for our working hypotheses. A disruption is defined as an external act, event or series of events that leads to change in activity or behavior, or interrupts the current state or continuity. This can be temporary or permanent.

- $H1_1$ Current social networks are organized around central nodes made up of either the most successful commercial fishermen or a senior matriarch directly related to one or more of the most successful commercial fishermen. Should any one of these nodes

change roles in the network, there will be a disruption in the subsistence and sharing economies.

- $H1_0$ Current social networks have sufficient depth that should any primary node leave the subsistence and sharing network, other nodes will fill any voids created by that disruption.

Social networks are critical to understanding the sustainability and resilience of northern communities. Genealogical, interview, and survey data were used to map social networks in kinship, redistribution systems, the subsistence and commercial economy, and in local and regional geographic space, in order to build the baseline data for all of these hypotheses and research questions. Key to investigating H1 is the identification of the dominant nodes in the economic and social systems, and the roles they play in local and regional social and economic integration. Previous studies indicate that while there are key nodes in all of the networks that are instrumental in determining access to subsistence and commercial goods for numerous households, there is less depth in the networks than might be expected. Thus, it is expected that an interruption in the ability of a major node to participate in the network may have negative impacts on the network as a whole. For example, the hypothetical pipeline to an LNG terminal at Balboa Bay may prompt restricted use of the land and waters in those areas, removing a key node from a network. Alternatively, exploration and development project may *add* a node that enhances the network.

- $H2_1$ A disruption in the commercial fishing industry, either through natural disaster, industrial accident, or through economic development where commercial fishing becomes a secondary enterprise, will have influence on networks and cause their disarticulation and reorganization.

- $H2_0$ A disruption in the commercial fishing industry will be mitigated through success in other commercial areas since new economic opportunities are often best articulated by the most successful fishermen, an economic expansion in the region will lead to the strengthening and expansion of traditional networks.

Previous research has demonstrated that commercial fishing is the key variable that determines the degree of subsistence activities for individuals and families. Previous research has also shown that the greater the access to commercial fishing, the greater the access to all levels of subsistence activities. Thus, we might expect that the most successful commercial fishermen would generate the greatest access to non-commercial economic activities. But conversely, with increased access to high paying jobs associated with oil and gas exploration and development, this influx of new capital may mitigate or replace the advantages of commercial and subsistence fishing.

- $H3_1$ Since the subsistence economy is based upon local land use and interactions between traditional subsistence and modern commercially harvested enterprises, a disruption in access along the subsistence-commercial continuum caused by a ship grounding, landscape restrictions due to pipeline and facility construction, oil spills, or similar

factors could lead to a change in traditional economies, a breakdown of sharing networks, and community abandonment.

- $H3_0$ A disruption in access along the subsistence-commercial continuum caused by a ship grounding, landscape restrictions due to pipeline and facility construction, oil spills, or similar factors will have small local effects but will not alter the basic structure of sharing networks.

To address H3, a combination of ethnographic interviews, focus groups, and a structured survey to identify the key factors associated with the underlying structure of the community were used. All local and regional networks of exchange and interaction were mapped, including a complete understanding of kinship and family structure. Using the role of both subsistence and commercial harvests, we also identified the key nodes, species, seasons, and levels of interaction in the total community network. If $H3_1$ is supportable, it is expected that each community will have a number of elements that are at immediate risk given any perturbation to the overall subsistence, commercial, and sharing network continuum. We also expect that there would be a few stronger nodes in the network, and a suite of weaker links, where a change within a key link in the network would have effects throughout any one community. On the other hand, and in support of the alternative H3, it is expected that that the system of subsistence and commercial harvests, and their subsequent networks of exchange and interaction, to have depth such that the loss of any particular node or other factor in the overall network is quickly replaced by other nodes or factors in the network resulting in little measurable change.

- $H4_1$ An influx of wealth with strong paying jobs could increase subsistence harvests because these practices are intimately tied to wealth and access to technology.

- $H4_0$ An influx of wealth with strong paying jobs could decrease subsistence harvests because as these practices become superfluous to other wealth options.

To address H4, the factors limit participation in the subsistence economy, and thus participation in redistribution and sharing networks, were identified. This was done through both ethnographic interviews and structured survey. This hypothesis is critical in order to investigate whether increased wealth leads to greater subsistence access, or increased wealth (or job security) decreases the time, or desire, to participate in subsistence activities. Critical also to this hypothesis is the shift from commercial fishing to other forms of labor, and the effects of this shift on participating in subsistence and sharing networks.

- $H5_1$ Changing work roles of subsistence harvesters (e.g. from commercial fisherman to platform worker) will exclude key harvesters at significant times during the year leading to lower subsistence harvests, less subsistence food sharing, and less community cohesion.

- $H5_0$ Changing work roles of subsistence harvesters (e.g. from commercial fisherman to platform worker) will increase participation in subsistence activities by other members of the community leading to increased subsistence harvests, increased subsistence food sharing, and increased community cohesion.

Drawing on data from H1 – H4, H5 seeks to identify the depth and flexibility of the subsistence system and its resilience to individual-based changes in participation. Crucial is the investigation as to whether there could be a systemic transformation in the subsistence network should one of the key subsistence participants decide to take an industry job. Using interviews and the survey, data on whether or not subsistence participation will be increased by lesser participants when a senior subsistence harvester stops participating because of wage employment were investigated. Once again, network depth and network structure are key to understanding network resilience.

- $H6_1$ The increased wealth produced by increased exploration and development and economic expansion in the region will change sharing networks from subsistence / commercially harvested foods to goods and products imported from Anchorage and elsewhere.

- $H6_0$ The increased wealth produced by increased exploration and development and economic expansion in the region enhance sharing networks by the addition of goods and products imported from Anchorage and elsewhere to the subsistence / commercially harvested foods already harvested.

While subsistence goods certainly play a critical role in local and regional sharing networks, less understood is the role of manufactured goods imported from Anchorage, Seattle, and elsewhere in sharing networks. Through interviews and the survey instrument, we identified significant sources of external goods and services, how they are imported and used, if they are redistributed and to whom, and determined the importance of imported commodities to the subsistence and commercial harvesting of local resources. Critical to understanding H6 is whether or not the importation of non-local goods enhances redistribution networks during periods of increased access and economic boon, or if non-local goods replace local goods in redistribution networks during times of network instability and economic reorganization.

- $H7_1$ An influx of resident industry employees with subsistence access would strain local resources and local access, leading to a breakdown in local subsistence activities, sharing networks, and traditional culture.

- $H7_0$ An influx of industry employees will not affect subsistence access because of the transitory nature of their residence.

Returning to the communities and building on the analyses of the associated networks, the effects of a substantial increase in resident population in the region that would participate in subsistence activities, given that the rural subsistence priority is non-discriminatory, were modeled. Using the primary exploration and development scenario, the scale of this change was investigated to evaluate its potential impact. But, because this is a hypothetical scenario, the primarily interest is in the perceived effects as evidenced by local peoples in the region.

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CHAPTER 2. BACKGROUND

REGIONAL BACKGROUND

The Aleut and Alutiiq[1] of the western Alaska Peninsula and Eastern Aleutian Islands (Figure 2) are coastal societies who engage simultaneously in for-profit commercial fisheries and subsistence harvesting of wild fish and game. The majority of local families rely on the sea for a living as commercial seiners, gillnetters, longliners, trawlers and/or pot fishermen (Reedy-Maschner 2007, 2010). An archaeological record reveals their 10,000-year relationship to a marine ecosystem (e.g. Dumond 1987; Langdon 1982; Laughlin 1963, 1980; Laughlin and Aigner 1975; Maschner 1998, 1999a, 1999b, 2000, 2004a, 2004b; Maschner and Hoffman 2003; Maschner and Jordan 2001, 2008; Maschner and Reedy-Maschner 1998; McCartney 1984) to which the living Alaska Native peoples link their maritime sociocultural identity. Traditionally, the Aleut and Alutiiq harvested a wide variety of sea mammal, fisheries, intertidal and terrestrial resources (e.g. Black et al. 1999; Maschner and Reedy-Maschner 2006; Laughlin 1980; Lantis 1984; Partnow 2001; Veltre and Veltre 1987; Veniaminov 1984). The ancient Aleut and Alutiiq thrived on the landscape and waters, built ranked societies with nobility and common classes, and were frequently at war (Maschner and Reedy-Maschner 1998).

The first documented foreign contact in the region was in 1741 in the Shumagin Islands by the two ships of Vitus Bering's Second Kamchatka Expedition (Black et al. 1999). The next century saw an intense occupation of Russian fur hunters who reorganized the Aleut and Alutiiq peoples to be fur producers for the Tsar. This occupation had devastating consequences for the health and well-being of the Alaska Native people, with epidemics and violence reducing the populations (Fortune 1992), but within a few generations, the Aleut and Alutiiq had become citizens of Russian America. Russian Orthodoxy became the primary church for the Alaska Native people and remains so today (Mousalimas 1995; Smith and Petrivelli 1994).

After fur bearing sea mammals dwindled in numbers, and thus Russian interests in Alaska, Alaska was purchased by the United States in 1867 (Haycox 2006). The new territory came under military jurisdiction. The Alaska Commercial Company assumed control of many of the former Russian trading posts, and expanded into trapping and fishing operations (Jacka 1999). Missionaries spread out across the territory, and managed the education of many rural peoples (Haycox 2006). Protestant missionaries were in the Alaska Peninsula and Aleutian Islands regions, but Russian Orthodoxy remained the primary religion for most (Smith and Petrivelli 1994). Commercial fisheries for cod, salmon and crab developed throughout the region (Jacka 1999).

In 1942, the Japanese occupied the Near Islands, which are the Aleutian Islands farthest west, and took Aleut residents and one Caucasian as prisoners of war (Kohlhoff 1995). The U.S. government evacuated the other Aleut villages east of Unimak Island to abandoned canneries in Southeast Alaska or into shabby and abandoned CCC (Civilian Conservation Corps) camps, for example, at Ward Lake near Ketchikan, Alaska, with the goal of protecting the people during the

[1] The Aleut and Alutiiq are ethnically, linguistically, and socioculturally distinct indigenous Alaska Native groups bordering one another at the Alaska Peninsula.

war. They were, however, left to fend for themselves for three years, and many died from disease and malnourishment. When they were allowed to return to the Aleutians at the end of the war, they found their villages in disarray from U.S. military occupation. They fought and won reparations for this disaster from the government in the 1980s (Kohlhoff 1999). The Alutiiq and eastern Aleut villages did not experience an evacuation, but the presence of the military was felt in several communities. Akutan was evacuated during the war, and it is still a painful scar for many in the community.

The importance of Alaska in strategic defense fueled a push for statehood after World War II, which eventually came in 1959. The discovery of oil in Prudhoe Bay on the North Slope in 1968, and the construction of the Trans-Alaska Pipeline, changed the political landscape. Ongoing fights for land claims between the state, federal entities, homesteaders and Alaska Natives came to a head, forcing the passage of the Alaska Native Claims Settlement Act (ANCSA) in 1971 (Berger 1985; Mitchell 2003). Alaska Native peoples extinguished further aboriginal claims to their land in exchange for land and cash settlements that were divided between thirteen regional corporations, and urban and village corporations. These corporations manage their lands and funds, with Alaska Native members enrolled as shareholders. Non-profit regional corporations were also created to manage health care, social services and cultural resources for their regions.

The federal government recognizes tribes by village in Alaska, and IRA (Indian Reorganization Act) Traditional Councils govern more than 200 villages. Further, many communities have incorporated as cities under Alaska State law. Municipal and tribal powers operated side by side but with different rules and jurisdictions. The municipalities are mayor and city council forms of government and the tribal councils have presidents and council members. Cities and unincorporated communities are also located within boroughs and governed by borough assemblies.

Statehood and the discovery of North Slope oil forced a number of these political shifts in the state, and Alaska has only grown in value for its mineral development (Haycox 2002). New explorations in petroleum are occurring, and mining operations have expanded around the state. The latest mining development being debated is the Pebble Mine in Bristol Bay (Figure 2). The Pebble Mine is a planned gold, copper and molybdenum open pit mine proposed for development in the watersheds of Bristol Bay. It is near the largest commercial sockeye salmon fishery in the world, numerous sport and subsistence fisheries and hunting grounds, and the home of many Yup'ik and Alutiiq Alaska Natives who engage in both subsistence and commercial pursuits. It is highly controversial, and the debate over the project is shaping attitudes towards other mineral exploration and development projects across the state.

Regionally, there are 43 communities in the Dillingham Census Area, the Lake & Peninsula Borough, the Bristol Bay Borough, Aleutians East Borough and Aleutians West Census Area. Of these 43 communities, 22 have fewer than 100 residents and only 2 have over 1,000 residents. Table 1 shows regional population trends, with a negligible rise in the past decade.

Table 1. Regional population trend between 2000 and 2010.

Population in 2000 (43 communities)	**16,165**
Population in 2010 (43 communities)	16,177
% Change	**+0.074%**

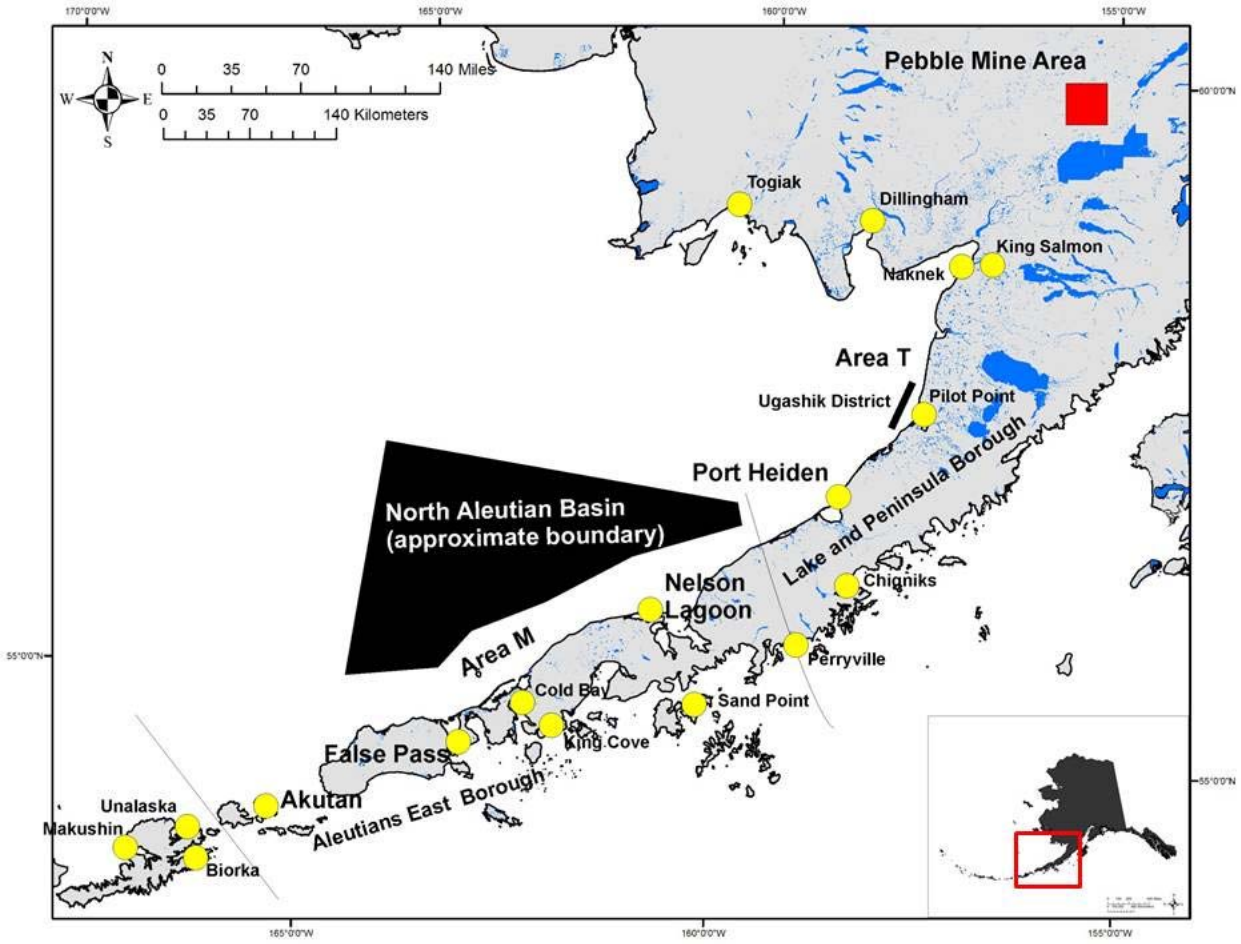

Figure 2. Regional map showing the project area and region of potential development. Map drawn by B. Benson and H. Maschner.

The Alaska Peninsula and Aleutians have a long history of engaging with commercial enterprise: the Russians pursued sea otters and fur seals beginning in 1741; Americans pursued fur seals, salmon and crab; and Scandinavians chased cod, herring and whales. The development of minerals in the region has been described by local people as simply "other natural resources" but also as a riskier enterprise that could undermine the fisheries and hunting economies. It has been shown that local indigenous peoples participated in the development of fishing industries alongside codfish saltery and salmon cannery companies (Reedy-Maschner 2010). The salmon industry that began in the late 19th century is the reason for the size and location of many modern day Alaska Native villages. Akutan also became a center for whaling, crabbing and fishing other Bering Sea species. Initially, the canneries depended on company-owned salmon traps, and

employed a small fleet of fishermen, both outsiders and locals, to fish other areas where there were no traps. When fish traps were outlawed in 1959 following a territory-wide fisheries crisis, the canneries became dependent on the growing local fleets. Within a few generations, local peoples went from supporting the fishing industry using cannery-owned equipment to being pivotal in the industry as boat owners and later as permit owners under the 1973 Limited Entry Permit Plan, which gave every qualifying fisherman salmon permits. Many local people in the region see mineral exploration and development as the next phase of commercial enterprise but others are much more cautious about changing the landscape and the uses of the region's resources.

Port Heiden is an Alutiiq Native village located near the mouth of the Meshik River within the Lake and Peninsula Borough (Figure 2, Table 2). Although some elders speak a Yup'ik dialect called Sugpiaq, English is the common language, and most residents call themselves Aleut instead of Alutiiq (Crowell, Steffian and Pullar 2001; Kresge et al. 1974; Partnow 2001). During World War II, Fort Morrow was built nearby and housed 5,000 personnel, only to close after the war. The town incorporated in 1972. Today, Port Heiden has a resident population of 102 (78 percent Alutiiq) (Census 2010). Thirteen residents hold commercial salmon fishing permits. Port Heiden is also a member of the Bristol Bay Economic Development Corporation (BBEDC), which is a groundfish Community Development Quota (CDQ) program. The Commercial Development Quota (CDQ) program was created in 1992 to promote fisheries related economies in western Alaska communities. This federal program has led to the creation of six regional CDQ groups with 65 participating communities. The CDQ program allocates a portion of the Bering Sea and Aleutian Islands harvests of certain species to these groups, who use the profits to expand fisheries infrastructure, buy shares in catcher vessels, and fund education and training.

The vicinity in which the present day village of Nelson Lagoon is located was used traditionally by Aleuts for fish camps and hunting grounds (Figure 2, Table 2). It is located on a narrow sand spit between the lagoon and the Bering Sea on the north shore of the Alaska Peninsula. In the lagoon itself, on Egg Island, a salmon saltery/cannery operated between 1906 and 1923. This facility was then moved to Port Moller under Peter Pan Seafoods, Inc. and residents and fishermen were scattered around the lagoon, coming together only during commercial fishing seasons. The modern town site grew up around a school beginning in 1960 with families from nearby Port Moller, Bear River and Ilnik regions moving there. Today, there is a population of 52 (82 percent Alaska Native Aleut) (Census 2010). In 2011, 24 residents held 26 commercial salmon fishing permits, the majority of which are set gillnet. Residents are also avid trappers and bird and caribou hunters maintaining cabins around the lagoon and along the Bering Sea coast. Nelson Lagoon is a member of the groundfish CDQ program of the Aleutian Pribilof Island Community Development Association (APICDA). Nelson Lagoon imports food and supplies by barge at Port Moller twice yearly. Food is also air freighted from King Cove or Cold Bay. All of these shipping options are expensive.

False Pass is located on the eastern end of Unimak Island (Figure 2, Table 2), having been established around a cannery in 1917 with people from Morzhovoi, Ikatan and Sanak Island. The cannery burned in 1981, but the facility continued to be a supply base. In 2003, Peter Pan Seafoods announced closure of its facility altogether. In 2000, Bering Pacific Seafoods opened as a local cooperative cannery, which closed after two years. It has reopened for the 2008 salmon

season. False Pass also participates in APICDA. False Pass has a population of 35 (66 percent Aleut) (Census 2010) with six fishermen holding nine commercial salmon fishing permits fishing in 2011, with additional permit holdings in halibut, herring, sablefish, and other groundfish fisheries.

Akutan is located on Akutan Island in the eastern Aleutians (Figure 2, Table 2). It was founded in 1878 after it was chosen as the site for a trading post for the Western Fur & Trading Company, a Russian Orthodox Church, and a school, attracting Aleuts from the region. The company expanded into commercial cod fishing and processing. In 1912, the Pacific Whaling Company built a whale processing station across the bay from Akutan, which operated until 1939. After the Japanese attacked Unalaska in June 1942, the U.S. government evacuated Akutan residents to Southeast Alaska. The village was re-established in 1944 with a much smaller population. The City was incorporated in 1979, and has supported a Trident processing plant since the 1980s. Akutan is also a member of APICDA. The Census Bureau reported 1,037 residents in 2010, of which the vast majority is seasonal cannery employees. Only seven residents hold commercial fishing permits.

Table 2. Historical population figures for study communities and former nearby villages (Census 2000, 2010; Fall et al. 1993; Fall et al. 1996; Fall and Morris 1987). The figures for Akutan include the more transient employees of the Trident Plant. The Akutan Traditional Council estimates there are about 83 permanent local village residents today.

	Port Heiden	Herendeen Bay	Port Moller	Nelson Lagoon	Morzhovoi	False Pass	Ikatan	Akutan
1880	40				100			
1890	74				68			80
1900					81			60
1910								
1920	30	51			60			66
1930	51				22	59		71
1940		13	45		17	88		80
1950	74		33		0	42	29	86
1960	66				0	41		107
1970	92			43	0	62		101
1980	103				0	70		
1990	119			83	0	69		589
2000	119			83	0	73		713
2010	102			52		35		1037

Millennia of commodification practices and commercial exchange of resources has been well documented for the region, and the economy of the local peoples is a modern extension of these ancient processes. The modern Aleut and Alutiiq of the region are continuing practices and activities that have been traditional among them for generations. The commercial salmon harvest is the time of year when most fishermen earn their income for the entire year, the time when most subsistence foods are harvested in conjunction with commercial fishing, the time when most foods are shared amongst family and friends, and the time in which a body of social and

economic relations are enacted. Commercial fishing centers on the summer salmon season. Other fisheries, such as crab in the fall and winter; cod and pollock in the winter; halibut in fall, winter and spring; and herring in the spring, are fished in the area and some local people participate as crew. Alaska Native fishermen dominate the local salmon fleets, fishing in regional waters designated as "Area M" and "Area T" by the Alaska Board of Fisheries (Figure 2) (Commercial Fisheries Entry Commission 2007).

Subsistence is an institution for many households, and is enacted through vast sharing networks of families and friends. These networks extend between villages and out to Alaska's cities where family members may be living or attending college. Each community is facing unique challenges and economic and sociopolitical circumstances that influence subsistence. People preferred to discuss politics and economics that directly influence their communities and subsistence. Discussions of subsistence harvesting, sharing, processing, and eating offered almost a relief from the other issues and stresses that weigh on families and individuals. Commercial fishing has been the economic and social mainstay for generations, yet it is becoming increasingly difficult for communities to continue to participate given changing time and area fishing restrictions, low prices paid for fish, high fuel and other operating costs, the volatility of salmon, cod, crab, herring, and pollock abundance, and market volatility. Alternative jobs are few, and many are seasonal, such as guiding hunts or short-term construction jobs, and thus do not offer consistent security. Three communities struggle to keep their schools open, and two (False Pass and Nelson Lagoon) struggle to keep residents in the community altogether. Outmigration is a constant concern in rural Alaska, and these villages are no exception. Women and children are often the first to leave, which prompts the closure of schools, and eventually the demise of small villages (Martin 2009). These, and other factors to be described, affect the nature of subsistence.

Table 3 shows the primary administrative entities for the study villages. Three of the four villages (Akutan, False Pass and Nelson Lagoon) are linked politically in the Aleutians East Borough (AEB) and The Aleut Corporation (TAC), economically within designated regional commercial fisheries, and share Aleut (Unangan) ethnicity and history. These communities also experience a high degree of interrelatedness and kinship ties among and between them. They participate in Area M commercial fisheries. They are also linked through the regional non-profit corporation of the Aleutian Pribilof Islands Association (APIA) which is responsible for many health, cultural, and economic services to the communities, and the Aleutian Housing Authority, which is the Tribally Designated Housing Entity for the region.

The fourth community of Port Heiden is primarily Alutiiq or Yup'ik Eskimo (with significant cultural and familial ties to the other three villages), part of the Lake and Peninsula Borough (L&PB), the Bristol Bay Native Corporation (BBNC), and the Bristol Bay Native Association (BBNA), and participates in Area T commercial fisheries. Their Tribally Designated Housing Entity is the Bristol Bay Housing Authority.

All study villages are members of CDQs. Port Heiden is part of the Bristol Bay Economic Development Corporation (BBEDC) and the other three villages are part of the Aleutian Pribilof Islands Community Development Association (APICDA). For each community, funds generated from Bering Sea fisheries as part of the CDQ program provide significant fisheries development and infrastructure. Every community is structured by the ability to harvest wild resources from

its environment, and this program guarantees a portion of revenue from groundfish fisheries is returned to the coastal villages of the region.

Table 3. Associated administrative entities for the study communities.

	Akutan	False Pass	Nelson Lagoon	Port Heiden
Administrator	Aleutians East Borough	Aleutians East Borough	Aleutians East Borough	Lake & Peninsula Borough
Regional Corporation	The Aleut Corporation	The Aleut Corporation	The Aleut Corporation	Bristol Bay Native Corporation
Regional Non-profit Corporation	Aleutian Pribilof Islands Assn.	Aleutian Pribilof Islands Assn.	Aleutian Pribilof Islands Assn.	Bristol Bay Native Assn.
Village Corporation	Akutan Corporation	Isanotski Corporation	Nelson Lagoon Corporation	Alaska Peninsula Corporation
Tribe	Akutan Traditional Council	False Pass Tribal Council	Nelson Lagoon Village Council	Native Village of Port Heiden
Native Housing Authority	Aleutian Housing Authority	Aleutian Housing Authority	Aleutian Housing Authority	Bristol Bay Housing Authority
CDQ Group	Aleutian Pribilof Islands Community Development Assn.	Aleutian Pribilof Islands Community Development Assn.	Aleutian Pribilof Islands Community Development Assn.	Bristol Bay Economic Development Corp.

STUDY BACKGROUND

Social Network Analysis

The project was tasked with focusing ethnographic fieldwork on informant perspectives on subsistence food harvesting and sharing behaviors so that the survey results can be better interpreted and explained. The social dynamics of sharing (and food sharing in particular), distribution, and exchange are critical areas of anthropological investigation expressed variously as gifting, commodity exchange, reciprocity, and social networks. Structures of social relations and cultural rules in a given society can be elucidated through analyses of gift exchange and other transactional types. Social bonds, cooperation, and antagonisms are often revealed.

Early social network analysis in anthropology can reasonably be attributed to Marcel Mauss and explained in his essay *The Gift* (1923). Mauss explored gift giving and the social obligations it creates using comparative analysis of ethnographic examples. This analysis was done through highlighting aspects of the Trobriand Islanders' *kula ring,* the Maori's *hua* in New Zealand, the potlatch of the Northwest Coast Native American tribes, among many other cases. He identified moral obligations created once a gift has been made, the power or value of the object(s), gifts made to other beings or spirits, and the responsibilities of those on the receiving ends. Analyses

of exchange patterns formed the basis of economic anthropology for much of the 20th century (e.g. Bohannan 1955; Firth 1959; Fortes 1949; Sahlins 1972; Weiner 1992). Bohannan's (1955) famous study on the Tiv, for example, identified three "spheres of exchange": foodstuffs or subsistence goods, prestige goods (which can include high prestige possessions and foods, like cattle), and women through marriage. Goods and women are able to be exchanged within the spheres but not between them. Each sphere has its own status and moral structure: these were ranked with the first sphere less valued than the second, which was less valued than the third. Tiv spent a great deal of effort trying to convert lower valued items from one sphere to a higher sphere. This is a strong example of cultural economics and the rules that govern them. A more contemporary example is offered by Yan (1996) who tracks reciprocity and social networks in a northern Chinese village by examining the value and meaning of gifts.

The role of kinship has been an important consideration in these studies. Mauss distinguished personalized gift giving from impersonalized commodity exchange. Sahlins critiques these distinctions as two end points on a continuum (1972:191-197) and argues that people tend to exchange gifts among kin and commodities among non-kin. Social network analysis software programs do not presently allow researchers to track activities between affines (in-laws). Nevertheless, exchange between affines has been an important focus in anthropology and is an important component of this analysis. Fortes, for example, (1949:120) tracked gift exchange among the Tallensi and found that political stability is achieved partly through exchange between affines who might otherwise conflict. More recently affines in Belgium were found to be treated much the same as biological kin, and the study authors recommend that affines be considered in studies of biological kin (Burton-Chellew and Dunbar 2011).

Examinations of property and value from an economic standpoint also have bearing on the analyses. Production of wild foods involves technology, materials, and labor; people's relationships to the product are transformed, usually in the form of property and the rights attached. Value can be expressed monetarily, socially, emotionally, nutritionally, among many other attachments. Food sharing and the social contexts are expressed differently among a range of societies, sometimes examined along a continuum of scale and political complexity. Anthropological analyses of sharing has involved concepts of shares (standard amounts of food distributed), generalized-negative-balanced reciprocity (Sahlins 1972), gifting, generosity, exchange, transfer, demand sharing (compulsory sharing with those without), and tolerated theft. Property and control of objects/foods may involve "sweat equity," that is, objects belong to the one who worked for the food. They may also involve hierarchical systems where, for example, elders are always given preference without playing a role is production. Value is poorly understood and carries subjective elements between each individual.

Social status of the givers and receivers is a critical component as well. In Alaska Native communities around the state, 30 percent of households tend to account for 70 percent of the total harvest and share with others, described by the ADF&G Subsistence Division as the "30/70 rule" (Wolfe 1987; Wolfe and Utermohle 2000). This pattern generally reflects people's capacities, skills, and relative wealth in each community. Social capital is the accumulation of trust, skill, information, power, among other elements that can be gained or lost through the quality and frequency of sharing (Bourdieu 1986). Social immunity, defined as the ability of a group of people to mitigate changes and impacts, may also be rooted in networks and

interpersonal ties. Individuals exchange resources, goods, services to deal with problems and respond to opportunities. In order to scrape by or be successful in these communities, one has to interact.

Location and access also structures sharing behaviors and social networks. In Alaska, urban-rural exchanges are frequent. Playing on the kula ring, Lee (2002) describes a "cooler ring" in which an elder Yup'ik woman from Anchorage exchanges donuts and other urban goods for wild foods (and thus, filling her cooler) with relatives and friends in southwest Alaska.

Food sharing, gift exchange, mutual aid, and reciprocal obligation have been addressed in numerous studies across the arctic by Chance (1990), Collings, Wenzel and Condon (1998), Bodenhorn (2000a, 2000b), Damas (1972), Hovelsrud-Broda (2000), and Wenzel (1995, 2000). Frequently, sharing is described as a form of risk management as part of people's adaptive capacity in extreme environments (e.g. Berkes and Jolly 2001). Writing on the Inuvialuit of Sachs Harbour, Northwest Territories, Berkes and Jolly describe how frequent hunters support occasional/non-hunters or those in hunting roles support those with wage jobs that cannot afford time away. Products that Sachs Harbour can get, such as musk ox and snow geese, are exchanged with other communities for things they cannot easily harvest, such as beluga. Cash can appear as part of the exchange, but generally the system is based on sharing and generalized reciprocity. This study traces adaptive flexibilities in harvesting and the emergence of exchange forms as part of coping with climate change impacts, and offer insights into thinking about emergent responses to development.

Social network analysis is an emerging research tool that allows for the documentation of relationships, exchange systems, and social linkages, with subsequent analyses (Borgatti, Everett, and Freeman 2002; Hanneman and Riddle 2005). This tool has only recently been used on data from Alaska Native communities (Magdanz et al. 2002, 2004). Magdanz has applied social networks using expanded Alaska Department of Fish & Game subsistence surveys with illuminating results. While assessing household and community harvest and consumption patterns of numerous species, Magdanz was then able to code the exchanges between individuals and households, resulting in a rich depiction of subsistence dynamics, essentially diagramming overlapping sharing networks and the flows of wild foods between households. This project uses portions of Magdanz's model to explore relationships in harvesting, sharing, and consumption in the four North Aleutian Basin communities. The structure of the survey was oriented specifically towards social network analysis. We include genealogical work, adding a kinship dimension that is critical to understanding sharing networks, since kinship often structures obligations and interactions between people. As such, we expect that people will shar food and services more often with relatives than non-relatives. This project employs ego centered networks in which each "actor" is analyzed in terms of his or her relationship to other "actors" based upon their actions towards one another. Actors and relationships are defined as nodes and are diagrammed as networks. Nodes can be keystone species, individuals, hunting or fishing grounds, households, businesses, communities, et cetera. These nodes can then be manipulated to explore hypothetical circumstances.

Building on the social network studies of Wasserman and Faust (1994; and Wasserman and Galaskiewicz 1994), the "small world" concepts of Watts and Strogatz (1998), and following a

number of recent studies on the relationship between status, wealth, and the structure of networks (drawing specifically on Bentley and Maschner 1999, 2000, 2001, 2003a, 2003b, 2007; Maschner and Bentley 2003), this project uses the structure of networks in social systems to model the sustainability and resilience of networks in the study region. Among north Pacific foragers, we would expect these to be fractal, or scale free networks such as those scale-free growth networks of the World Wide Web (Huberman et al. 1998; Huberman and Adamic 1999; Albert et al. 1999), Hollywood actor networks (Barabási and Albert 1999), prehistoric villages on the North Pacific (Maschner and Bentley 2003) and social networks leading to wealth inequality (e.g. Bodley 1999, among many others).

These systems have a number of characteristics in common. Each is composed of agents (in this case people) whose conditions are a product of interactions with other individuals. Another important factor is that even though individuals may have similar goals and aspirations, differences in the connectedness of agents lead some to increase their attributes at the expense of others in the network (Barabási and Albert 1999) – "the rich get richer," so to speak. If the most connected people in a network are also the most likely people to add new network connections, then the those with the most wealth, or status, or some other attribute in the beginning, will increase those attributes faster than those less well connected (Bentley and Maschner 2003:47-48).

Bentley and Maschner (2003:48) found that "In human societies, we see that preferential acquisition of social connections occurs even at the scale of the individual fisherman, for example. A person's advantageous, well-connected position in an exchange network makes it easier for that person to gain further network contacts and resulting benefits. It is this concept of increasing returns that is the basis for an explanation of the "power-elite hypothesis" of Bodley (1999)."

Bodley (1999) does not use the language of complex systems in his analysis, but he demonstrates clearly that power law distributions of wealth exist in all scales of society. These patterns have been recognized for many years in the field of economics (Pareto 1907). The concept of the scale free network leads us to new investigations and insight with social and cultural data, expecially in regards to sharing networks, redistribution of the good and services, and the development of wealth disparities is a fishing society.

Maschner and Bentley go on to set up a series of expectations (2003:50):

- Most individuals in a scale-free network are not well-connected, while the majority of links tend to lead through a few well-connect individuals (Figure 3). A frequency histogram of connections held by individuals in a scale-free network forms a power law distribution as seen in Figure 3 (Albert et al. 2000).

- This is quite different from a random network (Erdős and Rényi 1960) where all of the individuals have the same chance of acquiring network links, leading to a normal distribution of links per individuals, as seen in Figure 4. This occurs because scale-free networks grow in a tree-like fashion but with the added rule

that agents that are already the most well-connected acquire more connections preferentially.

- One critical attribute of a scale-free network is its vulnerability to catastrophic collapse or change. A scale-free a sharing network is organized around a few highly-connected individuals, which leads to network vulnerability because the removal of one or a few of the most well-connected individuals breaks up the network considerably (Albert et al. 2000).

- Because most of the individuals in a agents in a scale-free network are relatively poorly connected and insignificant to its smooth operation, the random loss of individuals does not significantly damage the network.

Complex systems are often robust to perturbations, yet subject to unexpected events and perturbations (Carlson and Doyle 2000). Contingency (Gould 1999) is critical in these networks, and historical events, such as a change in fisheries regulations or the development of a new scientific approach (Bak et al. 1987), can have significant effects on the network of subsequent events, while most events by themselves have negligible long-term consequences. In this context we would expect the loss of an important individual or resource in a network to have measurable consequences for the overall network, but minor events or the loss of a poorly connected individual, would have little long-term effect. This pattern can be seen in Figure 3, where the loss of a central node would cause a sharing network to either collapse, or go through a complete reorganization. We apply these concepts to household data from the eastern Aleutian and Alaska Peninsula region of Alaska and describe the results in Appendix 2.

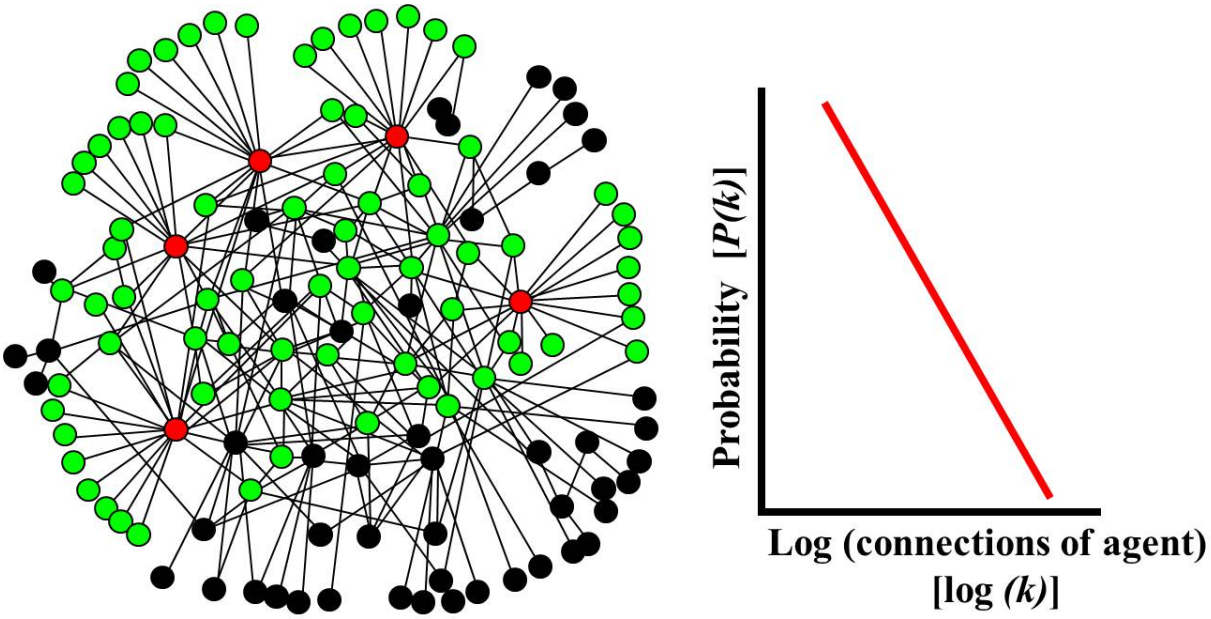

Figure 3. Example of a scale-free network and a chart showing the power-law distribution of the connections of agents, with those as central network nodes (red) having a disproportionate number of connections. Green nodes show a single connection to a central node, black more than one step to a central node. From Maschner and Bentley 2003:50, Figure 3.2. Adapted originally from Jeong et al. (2000:Figure 1 and Albert et al. (2000:Figure 1).

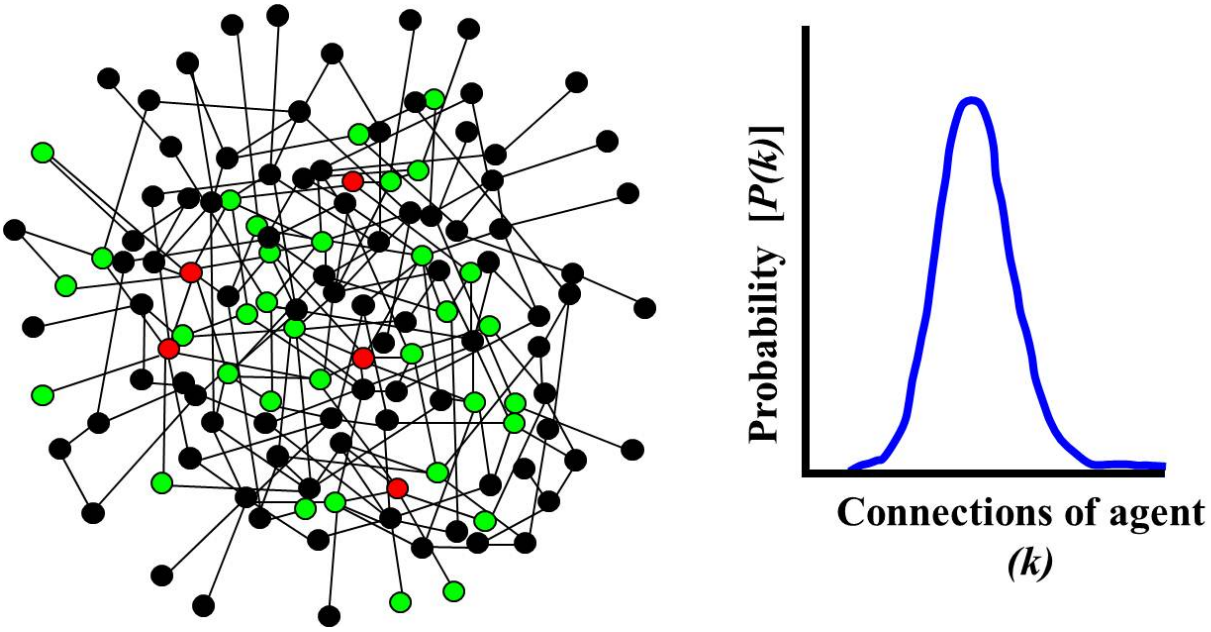

Figure 4. Example of a random network and histogram showing the normal distribution of the connections of agents where everyone is equally connected. Many fewer nodes (green) are connected directly to a central node (red), showing greater distance between any two nodes in the network. From Maschner and Bentley 2003:51, Figure 3.3. Adapted originally from Jeong et al. (2000:Figure 1 and Albert et al. (2000:Figure 1).

Scale and Time

Social network analysis depends on identifying the relevant social units. Foods, goods and people are circulating in wider networks, for example, salmon harvested by an Aleut fisherman could end up in his neighbor's house, a fine restaurant in Seattle, or in Japan. Changing the scale of analysis can be revealing. This project uses analytical tools that can shift between scales to determine relevancy.

Households are often the default economic unit in the field of anthropology (Wilk and Netting 1984). But the *household* moves in and out of fashion now as the primary economic level of analysis in ethnographic research. Households are difficult to define. They are fluid, movable, unbounded and may impose analytical limitations. Arctic households have also come under scrutiny, from re-examining the nuclear family unit in the high arctic (Bodenhorn 2000a, 2000b) to circular migration patterns between urban and rural Alaska, showing that both community and household as static entities is problematic (Lowe 2010). The household is particularly problematic in food security studies where the inputs and outputs of household units are highly variable. Nevertheless, households are important units of analyses as residential spaces that are shared, with common domestic resources and responsibilities between members. These units often include families, those that are genealogically linked, but not always. The household level of investigation requires that we map the flow, quantity, and range of subsistence foods and products, people, and cash inputs in and out of the household. This shows household composition and characteristics, their relative levels of productivity, harvest specializing behavior, seasonal variations in harvesting, and how households vary.

This study tracked harvesting and sharing behavior for a single year. Thus, this is a snapshot of short-term food sharing acts not long-term, although the obligations created between individuals were oftentimes years in the making. There are memory deficits for all types of harvesting and sharing activities, so we assume the harvest and sharing amounts reported are a minimum.

Petroleum Politics

Social science analyses of the intersections between indigenous peoples and petroleum development are increasing globally (Behrends, Reyna and Schlee 2011). Sawyer's work (1996, 2004) in the Ecuadorian Amazon, for example, describes a government appetite and approval of continual and expanding development despite toxic waste, oil spills, and local health problems. Where the Organization of Indigenous Peoples of Pastaza (OPIP) intervened and protested activities, ARCO searched for "friendly" communities to drill near, and represented themselves as dealing with local groups. The local view of the land is that it belongs to all, and consensus must be reached before development can occur. Proximity to oil wells does not constitute control or ownership of the land (see also Finer, Pimm and Ross 2008). Fentiman (1996) has examined oil activities' impacts on fishing villages in the Niger Delta and found extensive environmental and cultural degradation, outmigration, and health problems for local people, with no measurable benefits of oil industry activities to the fishing community. Work on the role of indigenous peoples and oil and gas exploration and development in Russia has also centered on alienation of lands, health consequences, and the potential for partnerships (Pika and Bogoyavlensky 1995; Roon 2006; Stammler and Wilson 2006; Vitebsky 1990; Wilson 2003).

Work on fisheries and oil exploration and development interactions and conflicts has occurred in North America (e.g. Cicin-Sain and Tiddens 1989; Glazier, Petterson and Craver 2006; Woodell, Forsyth and Gramling 1996). Funded by MMS, Glazier, Petterson and Craver describe drift gillnet fleet spatial conflicts with oil and gas activities in Cook Inlet, Alaska, and examine the potential for mitigation between these two industries. An analysis of the oil industry in North Alaska shows how it both supports and encumbers Inupiat whaling (Nielsen 1988). Following the Exxon Valdez oil spill disaster, there were studies of social disruption related to subsistence restrictions, commercial fishing closures, and community socioeconomic stress (Dyer, Gill and Picou 1992; Gill 1994), including litigation induced stress (Picou, Marshall, and Gill 2004).

This is not an analysis of the oil and gas industry. However, industry activities in other parts of the globe and other regions of Alaska influence perceptions in southwest Alaska. This broader literature contributed to our understanding of regional planning and assessment in the North Aleutian Basin.

Subsistence-Commercial

For Alaska's residents, significant portions of wild foods are obtained through hunting, fishing and gathering on public lands, and residents engage in mixed subsistence harvesting and income-generating activities. During the process and result of land claims in Alaska, future rights to land and resources were officially extinguished in return for land parcels and cash settlements made to newly formed Alaska Native regional and village corporations. The Alaska Native Claims Settlement Act (ANCSA) did not explicitly recognize Alaska Native subsistence rights, that is, the ability to hunt, fish, and gather wild resources for food, shelter, and other needs, including the sociocultural and cosmological matrices attached to these practices. The federal Alaska National Interest Lands Conservation Act (ANILCA) established a rural priority for subsistence users in 1980, which was later deemed unconstitutional by the State of Alaska which extends subsistence rights to all citizens, and federal entities assumed subsistence management on federal lands and waters. There continues to be an ongoing struggle over rural versus urban interests, federal and state control, and occasionally Alaska Native versus non-Native concerns. As Thornton states (1998), "To be an effective public policy, subsistence must not be viewed simply as an allocation scheme or as the preservation of archaic lifestyles in a changing world. Rather it should be understood as a means of sustaining and promoting healthy relationships between communities and their land and resource bases -- a "life-enriching process" as Nelson Frank puts it. Though rooted in the past, subsistence is dynamic and varied, adapting by necessity to changing technological, demographic, and socioeconomic circumstances."

There is a broad tendency in anthropology generally, and Alaska specifically, to "overdraw the contrast between monetary and nonmonetary economies and, as a result, assume that monetary/nonmonetary divisions are possible only between, not within, societies" (critiqued in Dove 1996:49). This tendency appears in management as well. A great deal of federal fisheries management, for example, draws boundaries between subsistence communities (e.g. that they are largely indigenous, with a relationship to the commercial side only made through the CDQs) and commercial communities (Unalaska, Kodiak, e.g. who have large processors and harbors, and the success of the communities is often measured in poundage landed and fisheries value). While recognizing the complexities of the state, the State of Alaska still generally divides its research

and management efforts along subsistence and commercial lines. Previous research is summarized below, demonstrating the value and shortcomings of these approaches. The present study assumes that all communities exhibit complex, intertwined economies.

Previous Subsistence Research

The ADF&G Subsistence Division has conducted several subsistence surveys in these villages over the years (e.g. ADF&G 2009; Davis 2005; Fall et al. 1997, 2007; Fall and Koster 2010; Scarbrough and Fall 1997; Turek et al. 2008; Veltre and Veltre 1982, 1983, 1987; Wolfe, Fall and Reidel 2009). A number of annual management reports contain subsistence information as well (e.g. Hartill 2009; Hartill and Keyse 2010; Tschersich 2009). These sources provide harvester characteristics, numbers, methods and locations for salmon, halibut, sea mammals and other species in each village, but lack a comprehensive appreciation of individual, local and regional dynamics. Detailed ethnographic work is generations old (e.g. Berreman 1953). Other sources reveal a rich heritage culturally, linguistically, and politically (Bergsland 1959, 1994; Black 1991, 1984; Jochelson 1993; Jones 1976; Laughlin 1980; Liapunova 1990, 1996; Snigaroff 1979; Veniaminov 1984). More current anthropological research has not been conducted, save for a few exceptions (e.g. Hudson 1998; Lowe 2006). These sources do not explicitly address subsistence issues or the role of wild foods in society. Nevertheless through these disparate studies, these communities have demonstrated that subsistence fisheries and hunting play strong roles in their lives.

Since 1980, the Division of Subsistence has conducted over 30 research projects in the communities of the study region and published approximately 55 technical papers containing data sets and descriptions of the areas. Harvest data also appears in the Community Subsistence Information System Database. Studies are baseline community harvest analyses (Fall et al. 1993; Fall and Morris 1987; Fall et al. 1996; Fall and Krieg 2006) and directed studies on particular species in these communities (Fall et al. 1998; Fall, Walker and Stanek 1990; Krieg et al. 1996; Wolfe et al. 1984; Wolfe and Mishler 1994; Wolfe, Fall and Riedel 2008). The baseline harvest studies are single year surveys of household harvesting and consumption. In the four study communities, every household (excluding group quarters since these are likely to be transient processor employees) uses wild foods. Figure 5 shows the average pounds harvested for each community by species category from these baseline studies.

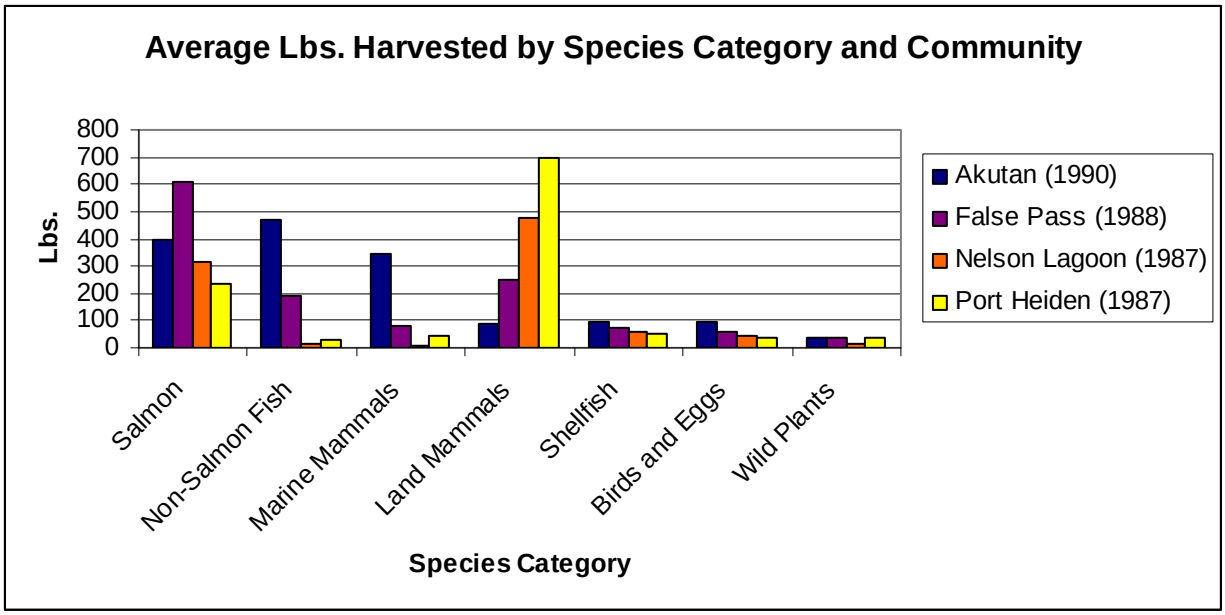

Figure 5. Baseline harvest data for estimated total pounds per species category by the four study communities, ADF&G Subsistence Division.

More frequent, and even annual, harvest monitoring programs occur for salmon, halibut, migratory birds, harbor seals and sea lions. The U.S. Fish & Wildlife Service conducts annual migratory bird harvest surveys in conjunction with the Alaska Migratory Bird Co-Management Council.[2] For the past 15 years, voluntary annual household surveys have been distributed for the purposes of collecting data on the average annual harvest of 236,000 migratory birds, including geese, ducks, swans, cranes, seabirds and shorebirds. The bulk of this harvest occurs in western coastal Alaska, from Kivalina to Port Heiden. Table 4 shows average harvests and egg collections for the study region.

NOAA/NMFS fund the monitoring of the Alaska subsistence halibut fishery for ADFG's Subsistence Division.[3] The subsistence harvests of Pacific Halibut are monitored through a voluntary mail-out survey to the holders of Subsistence Halibut Registration Certificates (SHARCs). The most complete report to date is from the 2006 survey (Fall, Koster and Turek 2007). Nelson Lagoon and False Pass are in regulatory area 3B, Akutan is in 4A, and Port Heiden is in 4E. The survey response rates from these communities were very low, but SHARC holders from these regulatory areas are high, with the majority in 4E. Those in 4E took 6,531 fish (equal to 70,743 lbs.). 3B SHARC holders took 2,762 fish (or 59,038 lbs.) and 4A took 1,503 fish (equal to 30,892 lbs.) (Fall, Koster and Turek 2007:58). Lingcod and Rockfish are also included in the survey. In 2006, 3B took 221 lingcod and 1,014 rockfish. 4A took 51 lingcod and 247 rockfish. 4E took 189 lingcod and 194 rockfish (2007:59).

[2] alaska.fws.gov/ambcc/ambcc/Harvest/subharvweb.pdf
[3] www.fakr.noaa.gov/ram/subsistence/halibut.htm

Table 4. Bird and Egg Estimated Annual Harvests for the Study Region. (Source: alaska.fws.gov/ambcc/harvest.htm).

Location & Year	Year-Round Estimated Annual Total Bird Harvests					
	Geese	Ducks	Swans	Cranes	Seabirds Shorebirds	Total Birds
Alaska Peninsula/Becharof NWR (1995-2000)	1039	2967	10	29	41	4086
Aleutian/Pribilof Islands	3319	5898	0	4	435	9656
	Estimated Annual Subsistence Egg Harvests					
Alaska Peninsula/Becharof NWR (1995-2000)	4	37	4	0	1657	1702
Aleutian Islands	0	112	0	0	8611	8782

The Alaska Native Harbor Seal Commission (ANHSC) partners with the Division of Subsistence and other Alaska Native organizations to monitor the subsistence harvests of harbor seals and Steller sea lions (Wolfe, Fall and Riedel 2008). 1993 and 2006 surveys of harbor seal and sea lion takes by Alaska Natives (Wolfe and Mishler 1994) included False Pass, Akutan and Port Heiden (Table 5). These data are based on sampled households and expanded to include estimated harvests for the whole community, hence there are fractions of sea mammals in their data. The 2006 data are fairly consistent with the 2009 data for False Pass for both species, but with two harbor seals taken in 2009. Akutan shows slightly more harvested in 2009 (5 sea lions and 4 harbor seals). Port Heiden shows one sea lion taken in 2009, which is fairly consistent with the 2006 data, but only six harbor seals taken in 2009, a significant decrease from the data below.

Table 5. Steller sea lion and harbor seal takes in 1993 and 2006 (Wolfe, Fall and Riedel 2008; Wolfe and Mishler 1994).

1993	# Households Surveyed	# Sea lions taken (includes struck & lost)	# Harbor seals taken (includes struck & lost)
False Pass	20	0	19
Akutan	26	23.4	20.1
Port Heiden	15	0	50.6
2006			
False Pass	13	0	0
Akutan	24	2.4	2.4
Port Heiden	25	0	23.8

Management Regimes

Management regimes are important to understand because the harvest of wild foods is regulated for most species and dictates timing, area, seasonality, and amounts harvested. This includes state, federal, commercial, subsistence, sport and personal use.

State & Federal Subsistence Management

Subsistence fisheries that occur in state waters are managed by the State of Alaska. Subsistence uses of wild resources are defined as "noncommercial, customary and traditional uses" for a multitude of purposes. These purposes include direct personal and family consumption as food, shelter, clothing, tools and/or transportation; making and selling crafts out of nonedible byproducts of subsistence harvested fish and wildlife species; sharing for personal and family consumption; and customary trade or barter (A.S. 16.05.940[32]). The Alaska Board of Fisheries identifies fish stocks that support subsistence harvests and adopts regulations that provide reasonable opportunities for subsistence harvests and uses to occur. If it becomes necessary to restrict harvests, subsistence fisheries have priority over other uses (A.S. 16.05.258).

For salmon, fisheries are managed for escapement to sustain future runs, subsistence opportunities, then commercial, sport and personal use opportunity to harvest. Escapement goals are set for numerous rivers in the study area. During the fishing season, managers track escapement trends against historical data and determine the best management strategy to meet the necessary goals. If there are no escapement information yet accumulated for a stream, in-river fish counting projects, test fisheries, and commercial and subsistence harvest estimates are used to calculate uncertainties in run sizes. The state annually reviews all escapement information and management performances. The Sustainable Salmon Policy specifies a review process of salmon stock statuses and stocks of concern. Stocks of concern fall into three categories: yield concern (stocks fail to meet expected yields); management concern (stocks fail to meet escapement goals); and conservation concern (stocks at risk of not rebuilding themselves). Stocks are a "concern" if they fail to meet management goals over 4 or 5 years. If this occurs, ADF&G, the Alaska Board of Fisheries, and user groups develop action plans and identify research needs with the goal of rebuilding the stock.

Subsistence hunting is also managed by the state and requires a permit. Migratory birds are managed by the state as well as the Alaska Migratory Bird Co-Management Council (AMBCC) under federal regulations. Subsistence hunting and disposition of marine mammals is under the federal Marine Mammal Protection Act (MMPA) and is managed by the U.S. Fish & Wildlife Service or the National Marine Fisheries Service depending upon the species. Only Alaska Natives who reside on the coast of the North Pacific Ocean or the Arctic Ocean may subsistence harvest marine mammals.

Pacific halibut are managed by the International Pacific Halibut Commission (IPHC). Federal regulations allow both rural and Alaska Native residents with customary and traditional uses of halibut to subsistence harvest. Akutan (4A), False Pass (3B), Nelson Lagoon (3B), and Port Heiden (4E) are eligible to participate in the Alaska subsistence halibut fishery. Since 2003, the National Marine Fisheries Service (NMFS) has issued Subsistence Halibut Registration Certificates (SHARCs) prior to fishing.

Issues in subsistence management identified by Fall and Shanks (2000:30-31) are still present today. Key issues for the area are gaps in harvest reporting and the lack of detailed harvest information needed to manage the fisheries. Data are often reported in aggregate form and dates of harvest are either missing or entered as a date range. Inconsistent information is an issue for

management. The factors that have made research difficult are also key factors in the ability for residents to support their households and to harvest their environments.

Sport Management

Sport harvesting and licensing are managed by the ADF&G Division of Sport Fish. Sport fishing guides are people who are licensed to provide sport fishing guide services to persons engaged in sport fishing (A.S. 16.40.299). These individuals provide direct assistance to sport fishermen to take or attempt to take fish for compensation. All saltwater and freshwater sport fishing charter vessels must be registered with ADF&G. Sport fishing guide operations keep records of their clients' catches though Charter Logbooks. Effort, harvest and catch estimates for guided anglers in the study region are included here for the study year 2009 (Table 6).

Table 6. Alaska Peninsula-Aleutian Islands sport fish harvest and effort estimates by fisheries and species, Survey Area R, 2009. Source: http://www.adfg.alaska.gov/sf/sportfishingsurvey/index.cfm?ADFG= area.

Area Fished	Anglers	Days Fished	King	Coho	Sockeye	Pink	Chum	Lake Trout	Dolly varden/Arctic char	Rainbow Trout	Arctic Grayling	Northern Pike	Smelt	Pacific Halibut	Rockfish	Lingcod	Pacific Cod	Other
SALTWATER																		
Unalaska Bay - Boat	606	2291	0	101	0	337	0	0	105	0	0	0	0	1308	319	0	307	0
Cold Bay Area - Boat	322	1666	0	175	0	0	0	0	45	0	0	0	0	1290	109	213	176	0
Other Boat	518	1121	26	417	0	23	0	0	0	0	0	0	0	685	0	85	180	0
Other Shoreline	497	2225	10	317	604	346	11	0	485	0	0	0	0	17	221	0	0	216
Saltwater Total	1839	7303	36	1010	604	706	11	0	635	0	0	0	0	3300	649	298	663	216
FRESHWATER																		
Naknek River above Rapids Camp	1586	5950	599	1625	3019	0	11	0	0	0	0	0	0	0	0	0	0	0
Naknek River below Rapids Camp	1586	6224	1543	2369	848	12	0	0	66	43	0	107	9254	0	0	0	0	0
Naknek Lake	412	2329	0	0	50	0	0	47	16	0	0	211	0	0	0	0	0	0
Naknek River and Tributaries	796	2347	137	331	487	0	0	10	0	17	35	42	0	0	0	0	0	0
American Creek	725	1112	0	0	56	0	0	0	152	177	0	0	0	0	0	0	0	0
Brooks River	1370	2513	0	72	238	0	0	0	0	0	0	0	0	0	0	0	0	0
Cold Bay Area (including Russell Creek)	624	4588	10	2421	1351	634	632	0	1305	0	0	0	0	0	0	0	0	0
Egegik River and Becharof System	414	1086	0	656	32	0	0	0	0	0	0	0	0	0	0	0	0	0
Ugashik System	481	868	21	233	34	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Alaska Peninsula / Aleutian Streams	1044	3773	480	1560	1547	164	48	10	645	0	0	8	0	0	0	0	0	259
Other Streams	86	277	0	113	0	0	0	0	34	0	0	0	0	0	0	0	0	0
Other Alaska Peninsula / Aleutian Lakes	351	3949	0	2276	413	1234	839	28	501	17	0	0	0	0	0	0	0	0
Freshwater Total	6397	35016	2790	11656	8075	2044	1530	95	2719	254	35	368	9254	0	0	0	0	259
Grand Total	**7417**	**42319**	**2826**	**12666**	**8679**	**2750**	**1541**	**95**	**3354**	**254**	**35**	**368**	**9254**	**3300**	**649**	**298**	**663**	**475**

Sport guide services operate on the Alaska Peninsula within the study area. Aleutian Adventures (aleutianadventures.com; nelsonlagoonadventures.com) is an APICDA outfitted and guided sport fishing and hunting operation that attracts sportsmen in the Nelson Lagoon area. Local men from Nelson Lagoon and the APICDA communities serve as guides for the operation. Hoodoo Sport Fishing Lodge and Adventures is located south of Nelson Lagoon on the Sapsuk River and offers expensive fishing packages for salmon, rainbow trout and dolly varden fishing. There is a great deal of tension between this operation and residents of Nelson Lagoon. From King Salmon,

several bear and moose hunting guiding services operate near Port Heiden. A few men from Port Heiden have worked as guides for these businesses. Moose meat is sometimes transported into the village after successful hunts because the hunter only takes the trophy head, and moose provide approximately 500 pounds of usable weight. Sport management is significant to the study area because it is often in conflict with local subsistence hunters and fishermen.

State & Federal Commercial Management

The villages for the study reside inside the state salmon fishing designations of Area M (Akutan, False Pass, and Nelson Lagoon) and Area T (Port Heiden). Salmon fisheries provide the major income source for many households. The state also manages Tanner crab fisheries on the Pacific side near False Pass, in which local fishermen harvest using pot gear and is usually conducted in January. The state manages sac roe Pacific herring fisheries on the north and south sides of the Alaska Peninsula in late May.

False Pass fishermen participate in State-waters Pacific cod fisheries to the south of the Peninsula using pot and jig gear. This fishery opens parallel with or after the Western Gulf of Alaska federal cod fishery closes. The state and federal management of Pacific cod represents complex joint agreements between agencies.

Federal management of commercial harvests occur in the Exclusive Economic Zone (EEZ) (3 to 200 miles offshore) of the Bering Sea and Aleutian Islands (BSAI) and are managed under Fishery Management Plans (FMPs). FMPs usually establish State/Federal cooperative management agreements that can defer fisheries management to the State of Alaska with Federal oversight. State regulations are then subject to the FMP, the Magnuson-Stevens Act, and other applicable Federal laws.

Halibut and sablefish fishing are regulated by the International Pacific Halibut Commission and managed through federal Individual Fishing Quotas (IFQs). Quota shares are held by individuals and are transferable. CDQs also hold halibut quota share allocations.

Many commercial fisheries occur within the proposed exploration and development zone. Groundfish, crab and scallop fisheries occur in the North Aleutian Basin Lease Sale area. Groundfish fisheries include trawling for Pollock, Yellowfin sole, Rock sole and Flathead sole, and trawl, longline and pot fishing for Pacific cod. Statistical areas 509, 516, and 512 overlap with the North Aleutian Basin area.

The federally managed Western Alaska Community Development Quota (CDQ) Program allocates a percentage of all Bering Sea and Aleutian Islands quotas for groundfish, prohibited species, halibut, and crab to eligible communities. These are coordinated through CDQ groups. For the study area, these groups are the Aleutian Pribilof Islands Community Development Association (APICDA) and the Bristol Bay Economic Development Corporation (BBEDC).

CONCLUSIONS

Previous research on regional harvesting behavior and capacities, management regimes, and social network analyses inform this study's approach to the social dynamics of harvesting (or

other means of acquisition) and types of distributions. This approach captures contemporary social circumstances and informs hypothetical linkages between oil and gas exploration and development activities and vulnerabilities of subsistence activities.

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CHAPTER 3. METHODS

ETHNOGRAPHIC METHODS

Ethnographic methods include interviews and observations to capture the points of view and behavior of the study participants (Denzin and Lincoln 2000). Data were collected that include local perspectives and insights, life histories, socioeconomic practices, genealogical information, qualitative assessments of subsistence and sharing, traditional ecological knowledge, land use patterns, and local-global interactions, that can later inform the interpretation of statistical data. The research relied on directed discussions that were open enough so that participants explored concepts and concerns not contained within the original question.

Signed informed consent was obtained before every interview, stressing that their participation was voluntary but extremely valuable, and that identities will be protected throughout this project and beyond.[4] It was important to point this out because some of the information collected could be viewed as sensitive. Remuneration for participants' time and effort was provided to the informants in order to contribute to the community and build support for the project.

Fieldwork in 2009 occurred in Akutan, Alaska (Figure 6), in March-April 2009; False Pass and Nelson Lagoon in August 2009; and Port Heiden in November 2009. A follow-up field trip was made to False Pass, Nelson Lagoon, and Port Heiden in April 2012. These trips consisted of making presentations about the research project, building local support, and were extended to include substantial ethnographic discussions. The study and the timeline were well-received in every community. Two researchers from the Alaska Department of Fish & Game Subsistence Division were in Akutan conducting a subsistence survey as part of the Bering Sea Integrated Ecosystem Research Program (BSIERP) project at the same time as this project's initial visit, and we worked to coordinate and collaborate on our efforts, sharing information.

[4] Consistent with Human Subjects requirements of informed consent, anonymity, and community coordination, Reedy-Maschner obtained approval of the research protocol and informed consent form from Idaho State University's Human Subjects Committee in March of 2009. This approval was renewed annually for the length of the study.

Figure 6. Reedy-Maschner presents the project goals and methods in Akutan, April 2009. Photo by Lisa Hutchinson-Scarbrough.

In preparation for the survey and analyses, the social dynamics of subsistence and commercial harvests at the community and household levels were investigated using open-ended discussions about people's lives: personal and family history, genealogy, economics, harvests, specialization, and how households might adjust their harvesting behavior within a season or between seasons depending upon need and environmental conditions. Topics also included household assets, access to resources, sharing patterns, levels of purchased food and goods, as well as individual desires and stresses as uses of the North Aleutian Basin change. Themes covered local economics, changes in harvesting and ecology, environmental hazards, political activities, and social processes relevant to activities that may accompany Outer Continental Shelf (OCS) oil and gas exploration and development. People preferred to discuss politics and economics in the context of questions about subsistence harvesting and behavior rather than keeping subsistence as the only focus, since it is intertwined with all facets of the communities.

Although the ethnographic portion of the study contract has, as its primary focus, detailed descriptions of distribution, reciprocity, networks and kin relations, sharing strategies, relative abundance, and the role of other foods and commodities, the research was limited by the focus of the informants themselves. Each of these topics was explored, but the foci of the discussions rapidly expanded to other economic, social, cultural and political issues that people found more pressing. Ultimately, projects involving diverse communities in disparate locales relying on local villagers who have their own lives, jobs, stresses and desires such as these four study villages require flexible time frames. These villages are best served when they are not treated as

laboratories, but as participating communities with valued interests, ideas and motivations, and can act as partners in interpreting study results.

SURVEY METHODS

The survey was developed, pretested, and submitted for OMB approval in 2008-2009. In early February 2010, the North Aleutian Basin survey was approved by the Office of Management and Budget (OMB) but with the specification that the survey be completed by March 21st so as not to conflict with the U.S. Census. Once the OMB approval number and statement were added to the survey, Reedy-Maschner began conducting the survey in Anchorage with members of the study communities who were "in town" for other meetings. Reedy-Maschner arranged travel to all four study communities and trained graduate student Crystal Callahan to assist with the survey. Travel began February 17, 2010, to the village of Akutan, followed by False Pass, Nelson Lagoon, and ending in Port Heiden on March 18. The research team was well received by local residents and survey participation was high in every community, ranging from 86 to 96 percent (Table 7).

Table 7. Survey Participation.

Village	Total Households	Household Able to be Surveyed	Households Surveyed	Households Refused/No Contact/ Advised Against/Out of Town/Other
Akutan	40	35	30 (86%)	10
False Pass	16	16	15 (94%)	1
Nelson Lagoon	24	24	22 (92%)	2
Port Heiden	29	23	22 (96%)	7
Totals	109	98	90 (92%)	19

Initially, Dr. Reedy-Maschner contacted the plant manager of Trident Seafoods in Akutan to discuss conducting the survey with known subsistence harvesters working at the processor. The U.S. Census from the same year counted 937 people living in group quarters, and these are likely the count of Trident employees at the time of the survey. Trident's manager was interested in the study and offered support for the project when the survey was to be conducted. In March 2010, Dr. Reedy-Maschner contacted the plant manager again to explain when the survey team would be in the community conducting the study. The manager stated that workers were doing double shifts to process the enormous volume of the pollock A-season catch, and were not available. When Dr. Reedy-Maschner pressed that they surely had time to themselves that Trident did not control, he stated that they did not.

This interaction highlighted labor issues. Transient migrant labor forms the bulk of the workforce in the processing sector. It is unknown what their overall role is in subsistence harvesting but they were often observed by villagers and members of this study team gathering (unregulated) wild foods, from sea urchins to salmon berries. This project sought to include their participation,

but could not gain the cooperation of the plant manager. It is unclear to the study team what the rights of transient labor are relative to subsistence and "free" time.

Perhaps as a consequence of this lack of cooperation, the Subsistence Division has reported that workers are not engaged in subsistence activities (http://seagrant.uaf.edu/conferences/2011/wakefield-people/presentations/fall-akutan-emmonak-togiak.pdf) or that they engage in subsistence at a very low level. Ultimately, the state does not know their level of engagement.

Because there was a limited time frame between OMB approval and survey completion, a single survey trip to each community meant that those traveling or otherwise unavailable were not surveyed. There were various reasons some households were unable to be surveyed. Those surveyed are representative of the communities, and the network data collections on those surveys include every member of the villages, but this resulted in the known exclusion of some key harvesters in Akutan and Port Heiden.

The following data elements were included in the survey (see Appendix 3):

Harvesting, Giving, Receiving, & Purchasing of:

- Salmon
- Freshwater Fish
- Marine Fish
- Shellfish and Intertidal Foods
- Sea Mammals
- Land Mammals
- Birds and Eggs
- Plants and Berries

- Harvest Locations for all Species
- Crews (Subsistence and Commercial)
- Employment
- Other Income Sources
- Household Expenses
- Subsistence Expenses
- Subsistence Equipment Owned
- Support Networks for Each Category
- Oil/Gas Opinions
- Wildlife Health

Upon returning from the field, survey forms were edited so that units of measurement, species designations, and other variables were standardized. This involved creating conversion factors for village based units such as raw fish, fillets, quart and gallon size Zip-loc bags, 5 gallon buckets, raw fish versus dried fish, etc. This was done using previous conversion indices created by the Alaska Department of Fish and Game and through our own research. Species designations were also standardized such as pogies = greenlings, chums = dogs, pushki = cow parsnip, etc. Then all species were catalogued using their taxonomic classification. A products list was also created so that we can capture the sharing of finished products, such as kippered and jarred silver salmon or mossberry pies (Table 8). These were converted into amounts by the database, but the product information was preserved.

Table 8. Product and unit possibilities for each species category provided in interviews.

	Product Possibilities	Unit Possibilities
Fish	jarred	pt jar
	whole, fresh	case
	whole, frozen	lbs
	strips	gallon ZipLoc bag
	fillets	quart ZipLoc bag
	smoked	gallon bucket
	kippered	cup
	dried	
	pickled	
	catch and release	
	ucela	
	chumela	
	chowder	
	roe (*chisu*)	
Shellfish & Intertidal	whole	lbs
	legs	gallon ZipLoc bag
	meat	quart ZipLoc bag
	frozen	bucket
	shucked	single serving
Sea Mammal	blubber	lbs
	oil (*chadu*)	pt jar
	liver	gallon ZipLoc bag
	shoulder	quart ZipLoc bag
	flipper	cups
	roast	
	unidentified cut	
	gut	
	soup	
	whole animal	

	Product Possibilities	Unit Possibilities
Land Mammal	whole animal	lbs
	shoulder	cups
	steaks	
	hind quarters	
	unknown cuts	
	roast	
	ribs	
	ground beef	
	sausage	
	stew meat	
	corned	
	liver	
	Akun beef	
	Sanak beef	
	soup	
	pelt	
Birds	whole	lbs
	plucked	
	breasts	
Eggs	egg	dozen
	cake	gallon
	pie	
	in waterglass	
Plants	whole, raw	handfuls
	jam	gallon ZipLoc bag
	pie	quart ZipLoc bag
	dried	cups
	stalks	lbs
	tea	qt jar
	jelly	pt jar

In order to compare household and community harvest data with the Subsistence Division of the Alaska Department of Fish & Game, we needed to replicate their methods of extrapolation. They use data from the households they sampled and expand it to the entire community. Using the total harvest reported in returned surveys divided by the number of returned surveys, they calculate the mean harvest per returned survey. They then multiply that number by the number of households in a community to get the total harvest for the community. Before expanding the data, they calculate the standard deviation, standard error, and confidence limit for each community.

The survey asked about household economics, expenses, assets, and equipment. It also asked about shared resources, for example, shared subsistence equipment, labor, repairs, and expenses. It also asked about sources of financial, travel, shipping, fishing and other types of information, and for people to name positive influential people in the community. These data supplemented the food sharing network analyses and vulnerabilities.

DATABASE CONSTRUCTION

The creation of the relational database provides the analytical foundation of all subsequent analyses, especially in regards to the movement of goods, services, and funds through the complex trading networks of the region. This database construction had four primary components. The first component involved translating Reedy-Maschner's genealogy of the region into a format suitable for database construction and analysis. This genealogy, which has the familial relationships for over 3,500 individuals spanning six generations, is currently maintained in the software program Family Tree Maker. Since this program is not an analytical tool, the first task was to disarticulate the data from the software and import it into an SQL database while maintaining all of the family relationships.

A suite of database entry forms were created in order to use the genealogical data to track transactions between individuals, families, businesses and other entities. These forms are set up so that any transaction involving the transfer of goods, materials, services, or most importantly foodstuffs, could be entered into the database while maintaining the kinship or other social relationships between the people involved. All of the transaction data were then inputted to the database.

The database entry forms for the harvest data were also created. These were built on top of the transaction database so that the individuals and their relationships are maintained while tracking the harvests of individual species. All possible species are now in this database, entered by both common names and through their taxonomic classification. Entry forms were added that capture employment, income, expenditure, and equipment use data, linking this information to the specific individuals so that we can track assets and expenses related to the subsistence harvesters and receivers. Survey data on oil and gas development, wildlife health, and additional comments have been summarized separately and can be linked to specific households at the end of the analysis, so investigations could be conducted as to whether, for example, if a key hunter expected to leave for employment in exploration and development.

MAPPING, GIS, AND TRADITIONAL ECOLOGICAL GEOGRAPHIES

The macroregion is a key level of investigation for producing coherent representations of social, economic and political formations across communities and landscapes. Maschner developed the concept of Traditional Ecological Geographies (TEGs) to highlight the importance of landscape in how indigenous peoples view regions of harvest (Maschner and Reedy-Maschner 2006). Following the classic place-name studies of the 1970s and 1980s (as championed in Alaska by

linguist James Kari), these types of analyses allow the researcher to think spatially at a scale far beyond the village and must encompass the greater harvest regions of several communities. There is a large degree of temporal continuity where people hunt and fish for particular species in certain seasons. When a family, community, or even a group of communities repeatedly use a number of areas for harvesting any species, and the traditional use of these areas becomes part of the local appreciation for the landscape, we can begin to address the concept of Traditional Ecological Geographies. This is distinguished from Traditional Ecological Knowledge studies by the fact that this is simply mapping where people go, and this study did not survey individual's particular ecological knowledge of any of these harvesting areas.

Surveyed individuals were asked to identify locations for harvesting species on local area maps. Most respondents drew their own lines on the maps, which ideally ensures better accuracy. They often identified cabins, commercial fishing areas, and other sites of use and interest. These maps were digitized for individual surveys and combined at the village level. In April and May 2012, Reedy-Maschner returned to three villages to verify the accuracy of the maps with the original interviewees, and conduct a number of interviews to check conclusions and other findings. Errors were corrected on the maps and digitally edited.

This project integrated these spatial data using a Geographic Information System (GIS). These data allow us to locate where people hunt and fish, where they move around within and between seasons, and how communities relate and differ regarding harvesting patterns (See Appendix 1).

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PART II

VILLAGE PROFILES AND SURVEY RESULTS

CHAPTER 4. NELSON LAGOON

INTRODUCTION

Owing to Nelson Lagoon's close proximity to the proposed offshore exploration, planning, and scoping, and residents' engagements with the planning process, the community requires more comprehensive treatment than the other study villages. Residents here would have seen the most changes to their village and landscape under the proposed plan. This chapter describes their community and use of land and sea areas using ethnographic materials and survey results.

The village of Nelson Lagoon is located on a thin sand spit between Nelson Lagoon and the Bering Sea on the north shore of the Alaska Peninsula (Figure 7). It is an Aleut village whose residents engage in commercial fishing and subsistence hunting and fishing. In 2010, the population was 52 (82 percent Alaska Native Aleut) (Census 2010). In 2010, 23 residents held 26 commercial salmon fishing permits, both drift and set gillnet (Figure 8). Residents are oriented towards salmon fishing as the primary economy, but it is a seasonal summer activity. The remainder of the year, residents focus on resources on land. Residents who are also avid trappers of furbearers and hunters of birds and caribou maintain cabins around the lagoon, up the major rivers, and along the Bering Sea coast. The village is situated in vegetated black Bering Sea sand dunes. People drive twenty or more miles up the coast to beach comb, whale watch, or picnic on the beach. Lakes down the coast get warm enough for swimming in the summer time.

RECENT VILLAGE HISTORY

The present location of Nelson Lagoon village has a short history, yet many of the residents and their ancestors inhabited and used the entire lagoon system prior to the formal establishment of the village. Arthur Johnson, ancestor to many in Nelson Lagoon, ran a saltery in the 1800s in Nelson Lagoon. Pacific American Fisheries bought the facility but never operated it. It was dismantled in the 1950s and lumber was used for houses in Nelson Lagoon. A Pacific American Fisheries cannery/saltery was built on Heart or Egg Island (both names were used), a tiny island in the lagoon across from the dock, and operated between 1906 and 1923. There were five commercial fish traps in the lagoon (later outlawed by the Statehood Act of 1959) and one in a channel that forms at low tide; a tender moved the fish to the cannery. A potable water barge also operated, bringing fresh water from upriver. This facility was then moved to Port Moller in 1911 under Pacific American Fisheries, which later became Peter Pan Seafoods, Inc. (PPSF) and residents and fishermen were scattered around the lagoon, coming together only during commercial fishing seasons. The modern town site of Nelson Lagoon grew up around a school beginning in 1960 with families from nearby Port Moller, Bear River, Herendeen Bay, and Ilnik

regions moving there. While there were two houses and approximately 15 people living on the Nelson Lagoon spit prior to its founding, the majority in the region lived in Herendeen Bay.

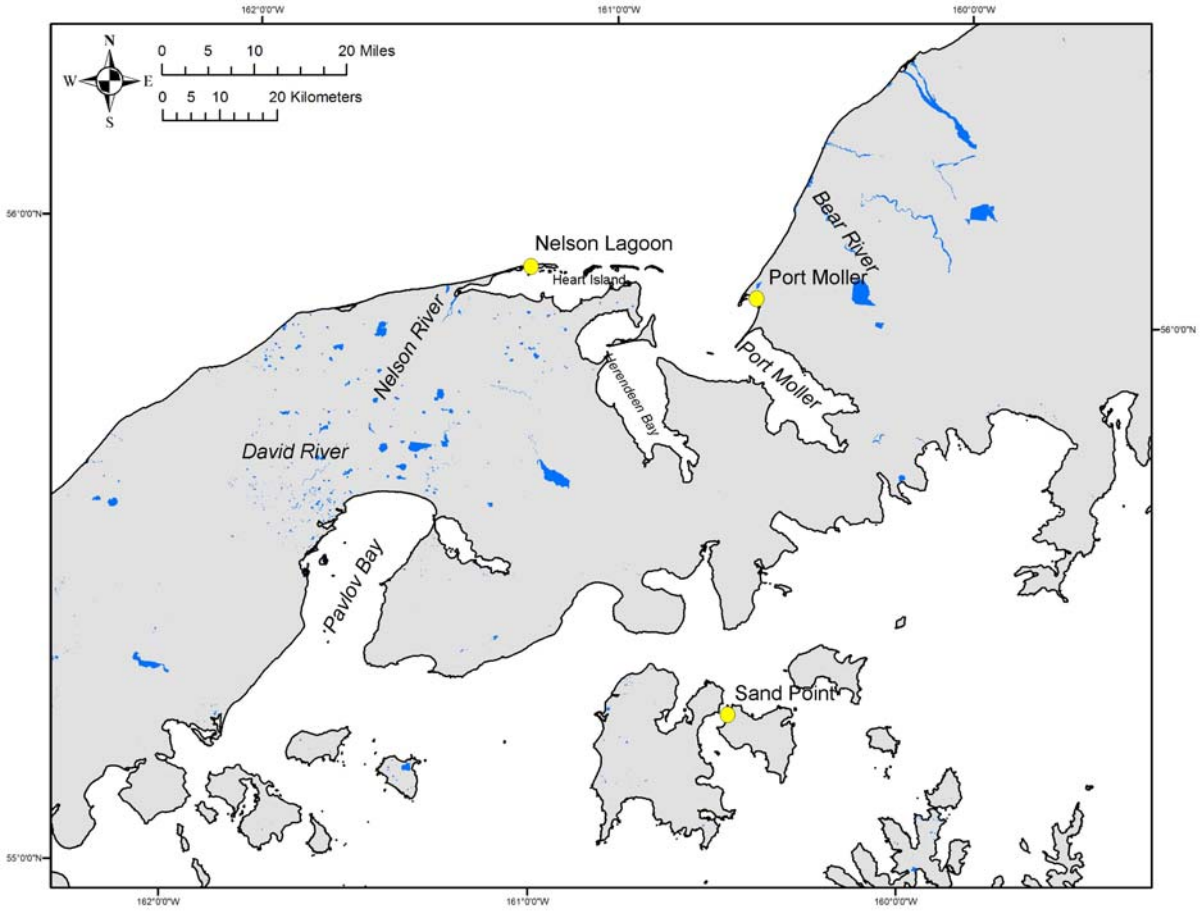

Figure 7. Regional map for Nelson Lagoon. Map drawn by B. Benson and H. Maschner.

Around the turn of the 20th century, Eskimos (eleven families and two single men) were relocated by the federal government south to the lagoon area because there was little food to harvest around their home, which is thought to have been on the Seward Peninsula (Culver 1917; Drucker 1985:5). They lived in Herendeen Bay, and had a school. They hunted, trapped, and worked in fish plants. Tuberculosis spread through the community and many died. Locals reported seeing their coffins eroding out of the bank. They did not interact with the Aleut and Scandinavian families who live in the area and were engaged in both trapping and fishing.

Herendeen Bay and Port Moller were serviced by a steamship *Catherine D.* in the 1930s and 1940s. People sent clothing orders out with the furs from trapping that they were sending to market. They also walked over the mountains to the coast across from Sand Point to meet a boat to send things out (and for mail). Men from Sand Point would also walk the trip overland for $25 per person to carry mail and supplies to a cannery in Herendeen Bay. In the 1950s four families lived in Herendeen Bay and operated two small fish canneries. At the end of the decade, they and others in the lagoon region began to coalesce around the modern town site of Nelson Lagoon.

In the early 1980s, Nelson Lagoon still had no store, post office or recreation center. They waited for the *North Star III* in the spring, the supply ship that brought in fishing equipment, housewares, lumber, vehicles, fuel, food, and other supplies. There was a community center that had a single phone for the whole village to make and receive calls; local calls were made by CB radio. It is also where they received mail.

Commercial fishing was the primary occupation, and 130 boats operated between Nelson Lagoon and Bear River for the sockeye salmon fishery in the 1980s, fetching $0.60 per pound at Peter Pan Seafoods in Port Moller.[5] The *Akutan*, a fish processing vessel, came into the Lagoon to buy fish, fillet and freeze them. According to several local people, this provided a solid income in the 1980s: enough to go on a two-week vacation, buy a winter's supply of groceries, buy a four wheeler and have money left over. Boats were typically 32 feet and were privately owned, which was an improvement from the decades before in which wooden cannery boats were leased from Pacific American Fisheries.

Figure 8. F/V Cynthia Jane, Nelson Lagoon, Alaska, March 2010. Photo by K. Reedy-Maschner.

POLITICAL LANDSCAPE OF NELSON LAGOON

Nelson Lagoon is a relatively newly established community, but is led by families who have been in Herendeen Bay and Port Moller for generations. Politically, leaders made the decision not to form as a second class city early in their establishment and hoped it would help maintain their sovereignty and their lifestyle. The village council manages community business. The Nelson Lagoon Corporation manages corporation lands and assets. Nelson Lagoon land claims

[5] This would be worth approximately $1.56 today, according to www.bls.gov/data/inflation_calculator.htm.

were pieced together by several local leaders who selected lands and then traded for better pieces later, for example, trading swamp lands to the U.S. Fish & Wildlife Service in exchange for good hunting grounds with easier access from the community.

Nelson Lagoon is part of APICDA which, in addition to several subsidiaries, manages a gear and vessel storage company for the salmon season with the Nelson Lagoon Tribal Council. In the future, APICDA may also pursue direct marketing of frozen fish from Nelson Lagoon, flying it directly from the village instead of Port Moller. This would involve putting a processor in the community. Currently there is an icing plant near the dock. The village gets one barge per year, and they pay large fees for it (amounts vary). They have experienced numerous fuel shortages of both gasoline and aviation gas because they only get this yearly barge and must plan ahead. The community sells aviation fuel for profit.

Land use conflicts between professional guiding operations and local subsistence users in Nelson Lagoon prompted a study of the Aleutians East Borough Coastal Management Program in 2000 (Stearns Planning & Design 2000). A Nelson Lagoon Special Use Area was established in 1991 as part of the Aleutians East Borough's coastal zone management plan as a biologically productive complex of habitats. The Port Moller State Critical Habitat Area and the Port Moller/Herendeen Bay/Bear River Special Use Area are also designated as significant habitat regions. The Sandy River Caribou Calving Area adjacent to these is also important. The Nelson Lagoon Special Area encompasses these calving grounds, the Nelson Lagoon Special Use Area and the Port Moller/Herendeen Bay/Bear River Special Use Area as locations with similar planning needs (Stadium Group 2001). This area was of particular concern because the Department of Natural Resources was continuously increasing the number of hunting and fishing commercial guide permits (Stadium Group 2001). The permits last five years, and are seen to conflict directly with recent poor subsistence and commercial fishing seasons. The increased number of non-resident users has changed resource availability for residents. Salmon, caribou, Emperor geese, ducks, bird eggs, and occasionally moose are the primary species used by Nelson Lagoon and there is worry that too many non-local harvesters are leaving too few resources for local people (Stearns Planning & Design 2000). The AEB Coastal Management Plan was seen as out-of-date with policies that are inadequate to address resource and land use conflicts and needed revision to give more local control. The Stearns Planning & Design (2000) report recommended that the AEB develop a use plan for the Nelson Lagoon Special Area that meets the requirements of the Alaska Coastal Management Program and that the AEB amend its own coastal management plan to include enforceable policies that limit permits and use of the area. The Alaska Legislature did not extend the Alaska Coastal Management Program in May 2011, and it is no longer in effect.

A sport hunter/fisherman built a lodge in the lagoon and local people see the operation as a threat to local subsistence food harvests. There are several sport fishing/hunting operations from the Bear River to Cold Bay that are also seen in this light. On the other hand, APICDA Joint Ventures manages a sport fishing business operated by local guides. A local man gained certification as a guide and APICDA hopes that other young people will be interested. They employ several local people in their camps. There is fear that, because caribou, geese, and other species' numbers are so low, the presence of sport hunters and fishermen further stresses the resources. With the exception of a few areas, such as the location of this lodge, Nelson Lagoon

Corporation is the only entity legally whose members are allowed to traverse above the mean high water mark on many of the area's streams and rivers.

The village is seeking funding and support to maintain the breakwater. Erosion concerns and an aging breakwater could change the lagoon system and alter the habitat. They have also secured funds to clean the beaches near the village by gathering and sorting debris, which was described by one local man as a "renewable resource."

DEMOGRAPHIC PROFILE

Nelson Lagoon is a small village that has recently experienced even more population decline (Figure 9). In 2012, the Aleutians East Borough School District announced that their school would close down. The parents of the few children there will need to pursue other options such as online programs, home schooling, or relocation. The only two high school children achieved early graduation in 2012 through online educational programs. Others of school age identified in the survey and the census as part of a household are already semi-transient and attend school in Anchorage (Table 9).

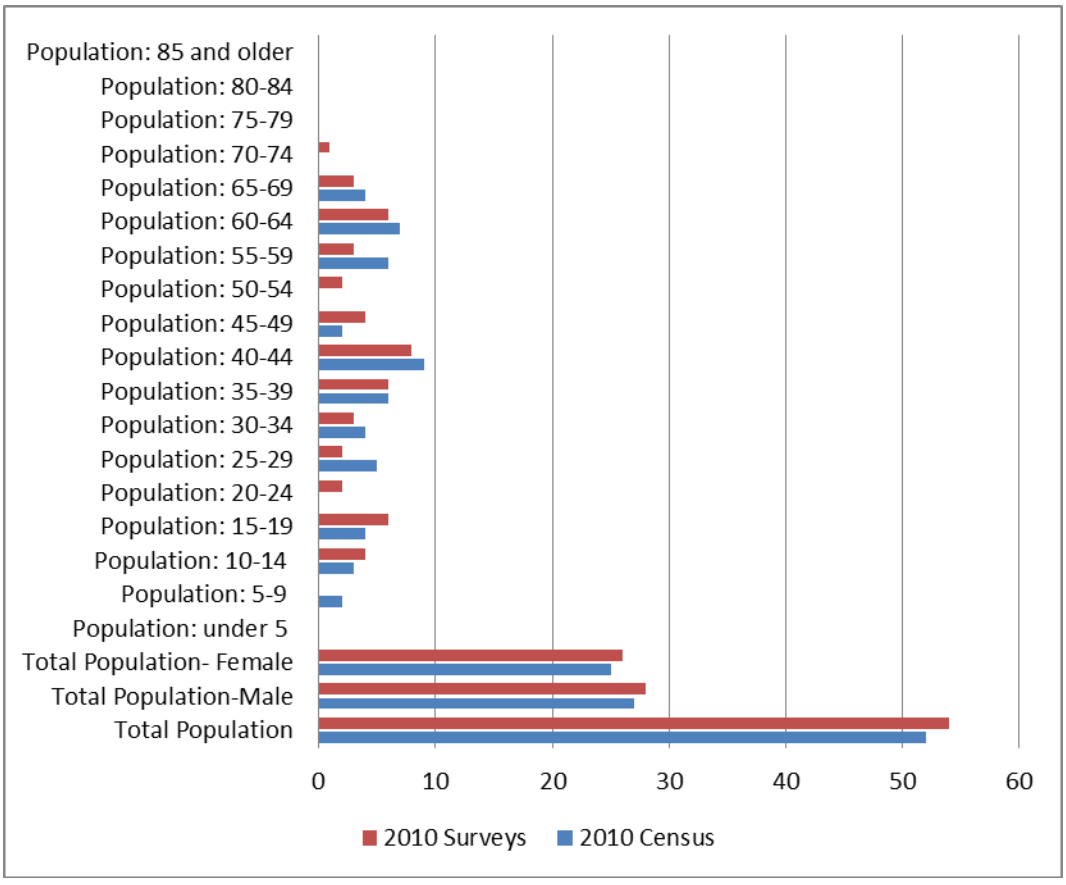

Figure 9. Nelson Lagoon surveyed population and U.S. Census population.

Table 9. Household Characteristics for Nelson Lagoon, 2010.

	2010 Census	2010 Surveys
Households:	22	22
Family Households:	14	18
with own children under 18	5	6
Husband-Wife Family:	12	18
with own children under 18	4	6
Male Householder	1	0
with own children under 18	1	0
Female Householder	1	0
with own children under 18	0	0
Non-family Households	8	3
Householder alone	5	3
Male	3	2
65 or over	1	2
Female	2	1
65 or over	0	0
Households w/ individs under 18	5	6
Households w/ individs 65 & over	4	4
Average Household size	2.4	2.45
Average Family size	2.7	2.72

FISHERIES AND ECONOMIC DEVELOPMENT

Ethnographic research began during the silver (coho) salmon fishery in Nelson Lagoon in 2009, which lasts from about August 15 to September 5. Nelson Lagoon has only drift gillnet and set gillnet permits because of the environmental conditions of the fisheries. There are approximately 30 local boats and, with no harbor; they anchor in "the river" during the fishing season. "The River" is a low tide channel that forms between sand bars in the lagoon. In the off season, the fishermen pull the nets and vessels out of the water and put them next to their houses outside or in garages, or store them in a boatyard or warehouse near the dock.

Approximately 18 boats owned by Area M fishermen of Russian ancestry, who reside primarily in Homer, are stored in Nelson Lagoon, whereas everyone else stores them in Port Moller in fenced enclosures. Silvers (coho salmon) are fished using six-inch mesh gear while sockeye are fished with 4 and 7/8" mesh because, as one local man observed, "the fish are getting smaller." In 2009, silver salmon were fetching $0.25 per pound, or about 84 percent less than in the 1980s. There were some sockeye, chum, and pink salmon mixed in to the silver salmon fishery, and these get sorted out by the fishermen before they are passed on to the tender. There is no harbor, but there is a Harbormaster who manages the use of the dock and upland facilities and maintains an office near the dock. The fuel company office is in the same building.

Peter Pan Seafoods in Port Moller can support about 400 employees working three shifts, but employee counts vary with fish abundance and processing needs. In 2009, there were

approximately 100 boats fishing for them (with each boat employing two to four people aboard as crew). The Port Moller North Peninsula fishery is dominated by a group called Concerned Area M Fishermen (CAMF). A few locals from the region are part of CAMF, but it is largely an outsider fleet, residing in other parts of Alaska and in Lower 48 states (primarily Washington). Only a few CAMF fishermen come in to Nelson Lagoon because Port Moller provides all fleet services and has its own airstrip. They are locally called the "Northern Fleet" or the "Moller Fleet." Because Nelson Lagoon is a terminal fishery, the fishery "on the outside," that is outside the lagoon, can have an impact on the fishery inside the lagoon. There is some resentment towards the fleet emanating from Nelson Lagoon due to concerns over interception of fish before they enter the lagoon, an increasing number of vessels fishing the area, their fishing capacity, and that many have jobs elsewhere. It is even more difficult when locals charge groceries and fuel to Peter Pan Seafoods and then fish all summer to try to pay that off. People have built up debt even before the season starts. If fishing is poor on the south side of the Peninsula, those fishermen from King Cove, Sand Point and False Pass may also come up to Nelson Lagoon and Port Moller to fish.

There are between 20 and 25 drift and set gillnet permits in the lagoon. Set gillnet sites are 1,800 feet apart as part of a fishermen's agreement. Approximately six fishermen use "stake nets" on the shore inside the back of Nelson Lagoon. It is difficult fishing because people move along the net and pick fish working around every stake. It is the only way to fish that shore.
There are three or four Nelson Lagoon women who fish out of skiffs running their own operations. Skiffs still deliver to the large tenders and it is dangerous to offload next to them. They use a crane to lift bags of fish out of boats. One woman described how she fished all day, but had to quit before her husband because it was "getting too late, so I had to come home and cook." One woman complained of so many flounders in their nets, "they are a pain in the neck. I wish we had a market for them." There are also several women who run large boats as captains in Nelson Lagoon.

There is not much opportunity for employment outside of fishing, tribal and corporation offices, or other local services. The Tide's Inn Café opened in August for the silver salmon season, but it is only open for short stints and is run by a woman who lives primarily in Anchorage. Other jobs include charter pilot, postal worker, teacher, water quality inspector, tribal environmental coordinator, janitor, and local hunting guide. There are also two privately owned hotels. There were two small enterprises of households selling smoked salmon in Nelson Lagoon. They use alder and cottonwood driftwood from the beach, which is a scarce resource. It is difficult for these types of enterprises because they have to market outside the village. Details on community economics are provided below.

SUBSISTENCE PRACTICES

The following presents survey data characterizing subsistence harvests and changes in Nelson Lagoon for the 2009 calendar year. Contemporary harvesting is juxtaposed with results of the previous Subsistence Division study from 1987.

As reflected in this project's survey results in Table 10, Nelson Lagoon residents describe themselves as "salmon eaters," and salmon represent the majority of food harvested, consumed

and shared. They net salmon in the lagoon and bring it home from commercial catches to smoke, dry, jar and freeze. They are also avid bird hunters, taking a large amount of ducks and geese annually to pluck and freeze. They harvest a large amount and variety of berries in and around the village, and take seagull and tern eggs from nests near the airport and Heart/Egg Island just across from the village dock.

Figure 10 shows that the major change between 1987 and 2009 is a major reduction in land mammal harvesting and more than double the salmon harvest for food. In pounds usable weight (Figure 11) salmon and non-salmon fish have become dominant over sea mammals, land mammals, and shellfish. These data are reflected in the usable pounds of these categories of harvest (Figure 12) and Figure 13 shows the estimated total in pounds usable weight harvested has been substantial. There has been a nearly 8,000 pound reduction in usable weight of land mammals, an 89 percent decrease (Figure 14). Further, these data show (Figures 12-14) that while in the 1980s there was still a sea mammal harvest in the village of Nelson Lagoon, there is no longer a sea mammal harvest today, a 100 percent reduction. These data are reflected in the average pounds harvested per household and the percent change for the categories of taxa. Based on the average pounds harvested presented in Figure 15, Figure 16 shows the percent change in pounds harvested demonstrating that marine mammals, land mammals, and shellfish have reduced while salmon, non-salmon fish, and wild plants have increased at the household level.

Table 10. Nelson Lagoon's Subsistence Harvests, 2009. Results of the North Aleutian Basin survey.

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
Birds/Eggs	Geese	5	25	100	75	225	45	14.58	4.53	85.47	32.6	10.23	4.33	245.45
	Ptarmigan	8	2.8	70	67.2	151.2	18.9	7.85	0.34	37.46	22.2	6.87	2.91	164.95
	Gull Eggs	11	1.8	34	32.2	114.2	10.38	3.62	2.31	18.45	12.01	5.19	2.2	124.58
	Mallard Duck	9	1	10	9	46	5.11	1.25	2.22	8	3.76	2.09	0.88	50.18
	Brant	5	2.4	7.2	4.8	24	4.8	1.07	1.82	7.78	2.4	1.09	0.46	26.18
	Goldeneye	6	1.64	8.2	6.56	23.78	3.96	0.98	1.44	6.48	2.4	1.08	0.46	25.94
	Pintail Duck	4	2.4	8	5.6	23.2	5.8	1.36	1.47	10.13	2.72	1.05	0.45	25.31
	Teal Duck	6	0.9	3	2.1	9.9	1.65	0.32	0.84	2.46	0.78	0.45	0.19	10.8
	Unknown Duck	1	3	3	0	3	3		3	3		0.14	0.06	3.27
	Eider	1	2.34	2.34	0	2.34	2.34		2.34	2.34		0.11	0.05	2.55
	Tern Eggs	1	0.9	0.9	0	0.9	0.9		0.9	0.9		0.04	0.02	0.98
	Total					**623.52**						**28.34**	**11.99**	**680.2**
Land Mammals	Wolf	2	175	700	525	875	437.5	262.5	-2897.88	3772.88	371.23	39.77	16.83	954.55
	Total					**875**						**39.77**	**16.83**	**954.55**
Non-Salmon Fish	Unknown Trout	2	216	216	0	432	216	0	216	216	0	19.64	8.31	471.27
	Halibut	2	57.6	76.8	19.2	134.4	67.2	9.6	-54.78	189.18	13.58	6.11	2.58	146.62
	Lake Trout	1	108	108	0	108	108		108	108		4.91	2.08	117.82
	Steelhead	2	14	70	56	84	42	28	-313.77	397.77	39.6	3.82	1.62	91.64
	Cod	1	32	32	0	32	32		32	32		1.45	0.62	34.91
	Black Bass	1	15	15	0	15	15		15	15		0.68	0.29	16.36
	Dolly Varden	1	2.8	2.8	0	2.8	2.8		2.8	2.8		0.13	0.05	3.05
	Total					**808.2**						**36.74**	**15.54**	**881.67**

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
Plants	Mossberries	13	2	400	398	698	53.69	31.12	-14.1	121.49	112.19	31.73	13.42	761.45
	Strawberries	18	0.12	80	79.88	312.28	17.35	5.24	6.29	28.41	22.25	14.19	6.01	340.67
	Salmonberries	13	0.16	120	119.84	253.16	19.47	8.74	0.43	38.52	31.52	11.51	4.87	276.17
	Wineberries	3	4	20	16	44	14.67	5.33	-8.28	37.61	9.24	2	0.85	48
	Petrushki	6	0.08	20	19.92	29.24	4.87	3.11	-3.13	12.87	7.62	1.33	0.56	31.9
	Cranberries	1	1.2	1.2	0	1.2	1.2		1.2	1.2		0.05	0.02	1.31
	Total					**1337.88**						**60.81**	**25.73**	**1459.51**
Salmon	Silver Salmon	14	100	1500	1400	4260	304.29	97.62	93.39	515.18	365.25	193.64	81.92	4647.27
	Red Salmon	18	30	600	570	3972	220.67	39.1	138.17	303.17	165.9	180.55	76.38	4333.09
	King Salmon	8	40	500	460	1300	162.5	56.24	29.5	295.5	159.08	59.09	25	1418.18
	Unknown Salmon	2	129.5	129.5	0	259	129.5	0	129.5	129.5	0	11.77	4.98	282.55
	Pink Salmon	1	12.5	12.5	0	12.5	12.5		12.5	12.5		0.57	0.24	13.64
	Total					**9803.5**						**445.61**	**188.53**	**10694.73**
Shellfish	Cockles	3	1.6	75	73.4	78.52	26.17	24.41	-78.87	131.22	42.29	3.57	1.51	85.66
	Sea Urchins	1	60	60	0	60	60		60	60		2.73	1.15	65.45
	Dungeness Crab	1	21	21	0	21	21		21	21		0.95	0.4	22.91
	Mussels	2	1.2	1.5	0.3	2.7	1.35	0.15	-0.56	3.26	0.21	0.12	0.05	2.95
	King Crab	1	2.3	2.3	0	2.3	2.3		2.3	2.3		0.1	0.04	2.51
	Razor Clams	1	1	1	0	1	1		1	1		0.05	0.02	1.09
	Total					**165.52**						**7.52**	**3.18**	**180.57**
All Resources	**Total**					**13613.62**						**618.8**	**261.8**	**14851.23**

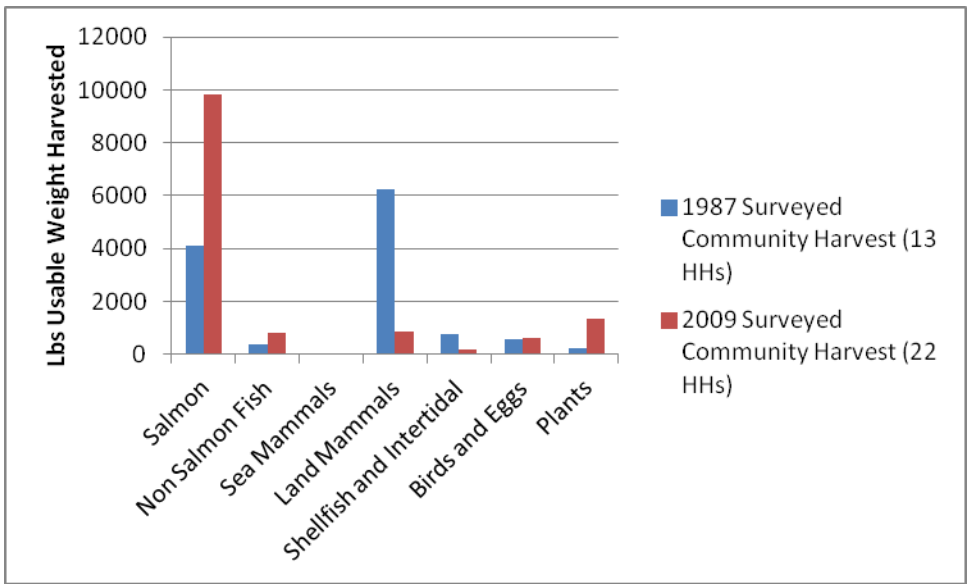

Figure 10. Nelson Lagoon harvests reported by total pounds usable weight between the 1987 Subsistence Division survey (for 13 of 18 households) and this project (for 22 of 24 households).

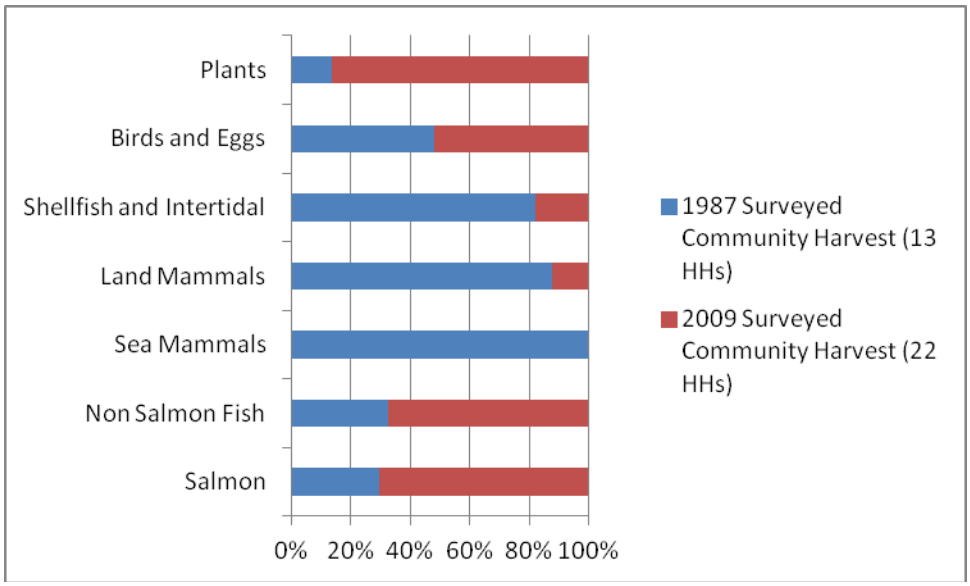

Figure 11. Percent of total pounds usable weight harvested by resource category in Nelson Lagoon between 1987 (13 of 18 HHs) and 2009 (22 of 24 HHs) (Source: ADF&G CSIS).

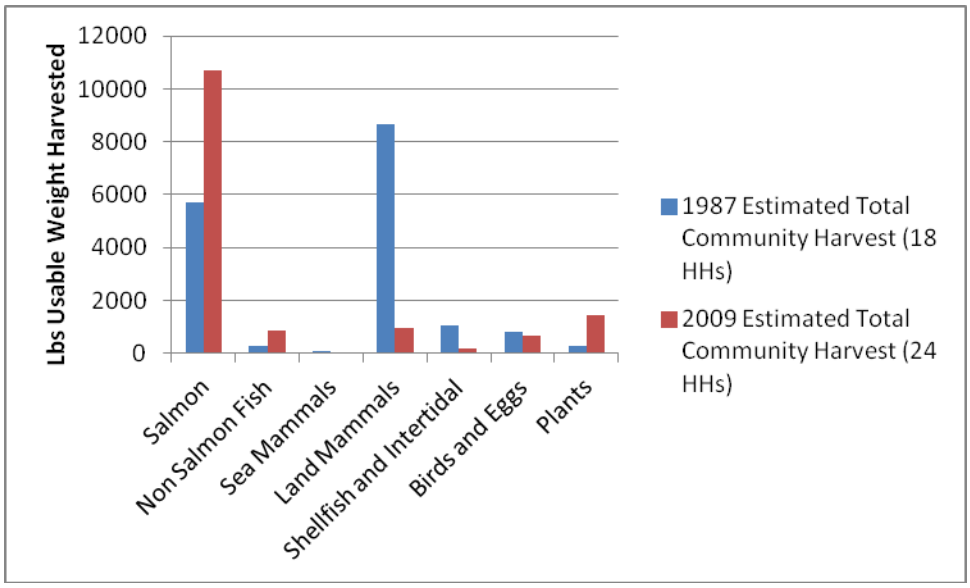

Figure 12. Using the Subsistence Division's harvest expansion method for the total community, these are estimated total community pounds harvested by species category between 1987 and 2009, Nelson Lagoon.

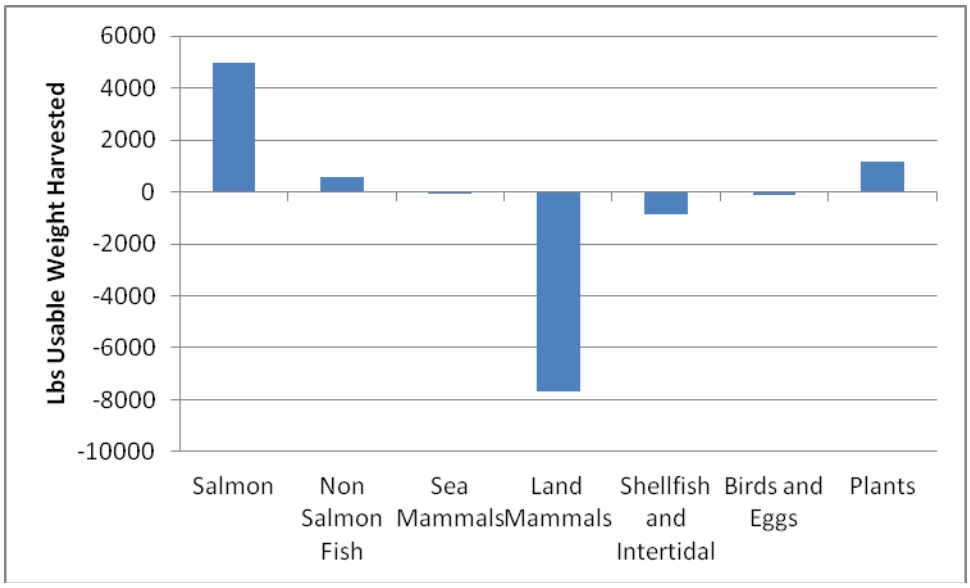

Figure 13. Change in estimated total pounds usable weight harvested by species category between 1987 (18 HHs) and 2009 (24 HHs), Nelson Lagoon.

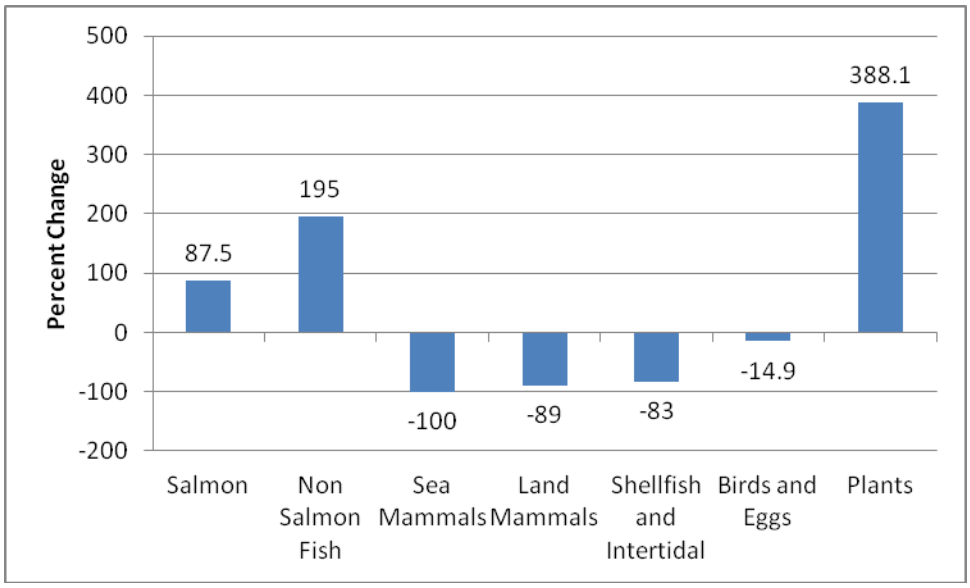

Figure 14. Percent change of estimated pounds useable weight harvested by species category between 1987 (18 HHs) and 2009 (24 HHs), Nelson Lagoon.

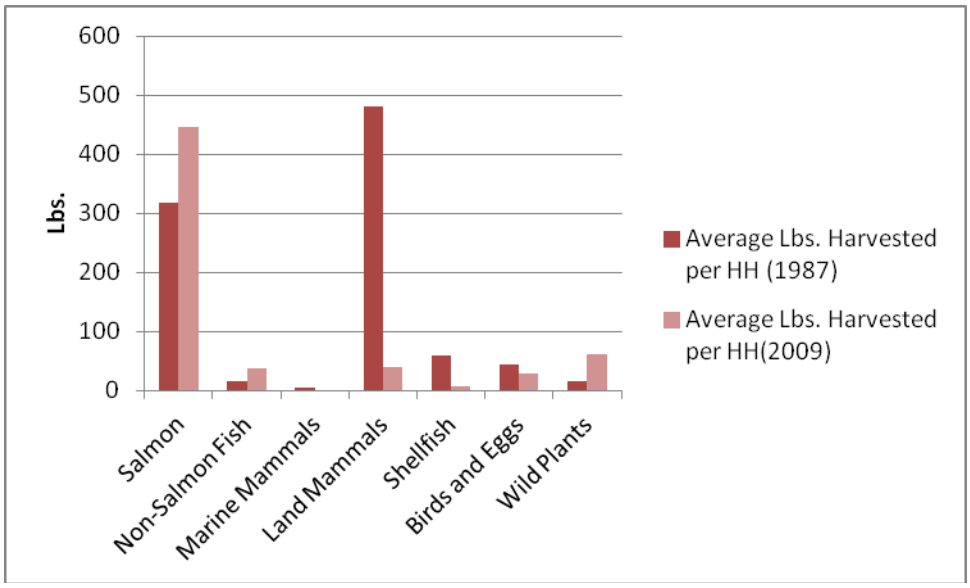

Figure 15. Average Lbs. Harvested per household in 1987 and 2009, Nelson Lagoon.

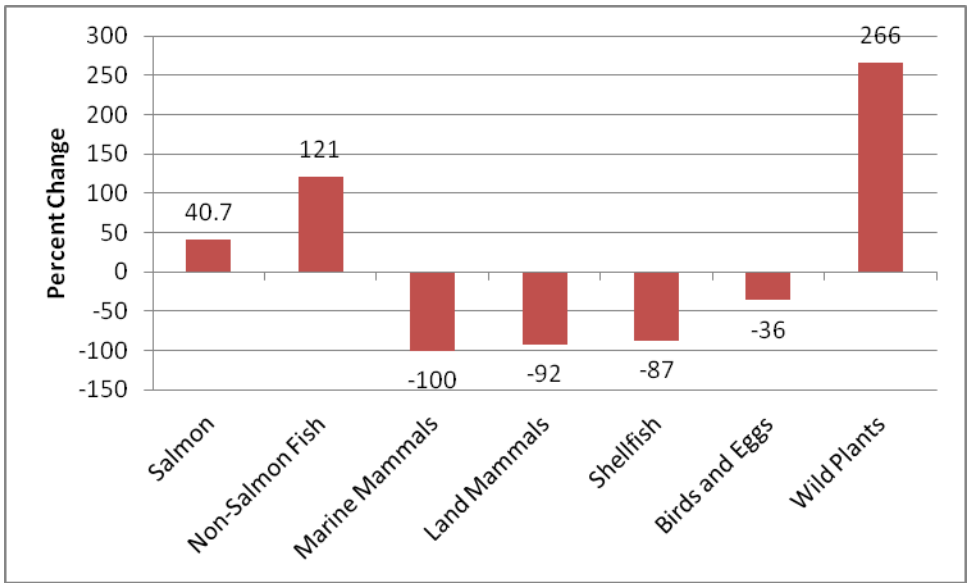

Figure 16. Percent change in Lbs. Harvested per household between 1987 and 2009, Nelson Lagoon.

Subsistence Security

Changes in top species harvested for Nelson Lagoon indicate a heavier reliance on salmon currently than many other species used in the past (Figures 17-21). The major changes between 1987 and 2009 in the top 10 species show the loss of caribou and the increased importance of all salmon species. Five of the 1987 top 10 harvested species in Nelson Lagoon are no longer top 10 in 2009: moose, caribou, cockles, king crab, and Emperor geese (Figures 17 and 18). These changes are also visible in the percent changes in pounds usable weight (Figures 18 and 19). Three of the top species hunted in 1987 are no longer harvested in Nelson Lagoon, two by regulation and one by access. Nelson Lagoon normally hunts the Southern Alaska Peninsula Caribou Herd. A mail out survey and interview study on the 1985/86 and 1986/87 hunting seasons (Fall, Walker and Stanek 1990) shows that hunting was done primarily in the months of August and again from January to March. Hunters motor their skiffs up the David River or drive south along the ocean beach and onto the tundra in ATVs. Averages of 3.2 caribou per hunter were taken in 1987 and meat was distributed to most of the community. Caribou meat was always the main red meat for the community, especially given the expense of shipping outside goods into Nelson Lagoon.

In responding to whether or not people uses less, the same, or more resources than in the past, the respondent data parallels the quantitative data showing the modern reduction in use of clams and land mammals. There is an exception: people say they are using (Figure 21) less salmon than in the past, but our data show they are using far more than in the 1980s (Figure 22).

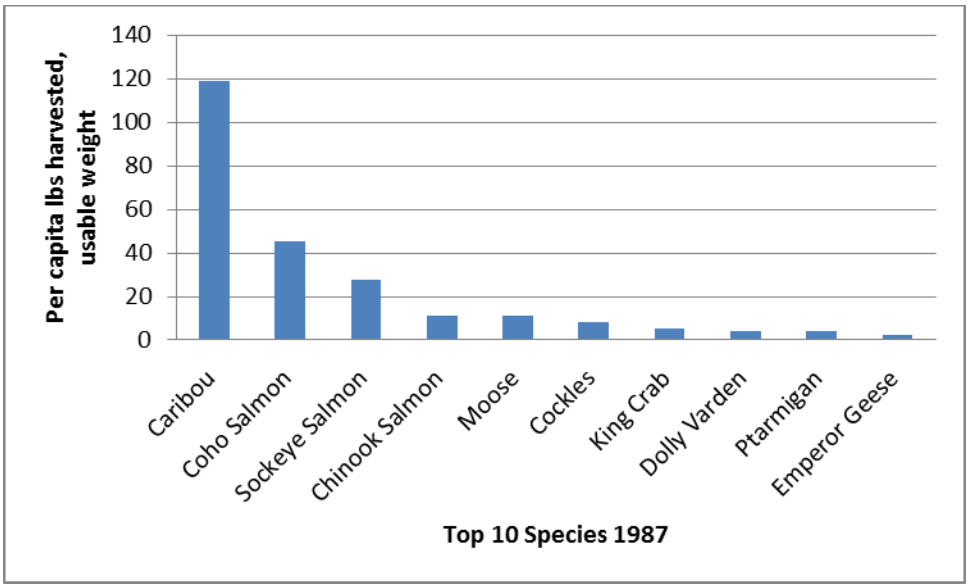

Figure 17. Top 10 species harvested by Nelson Lagoon residents in 1987.

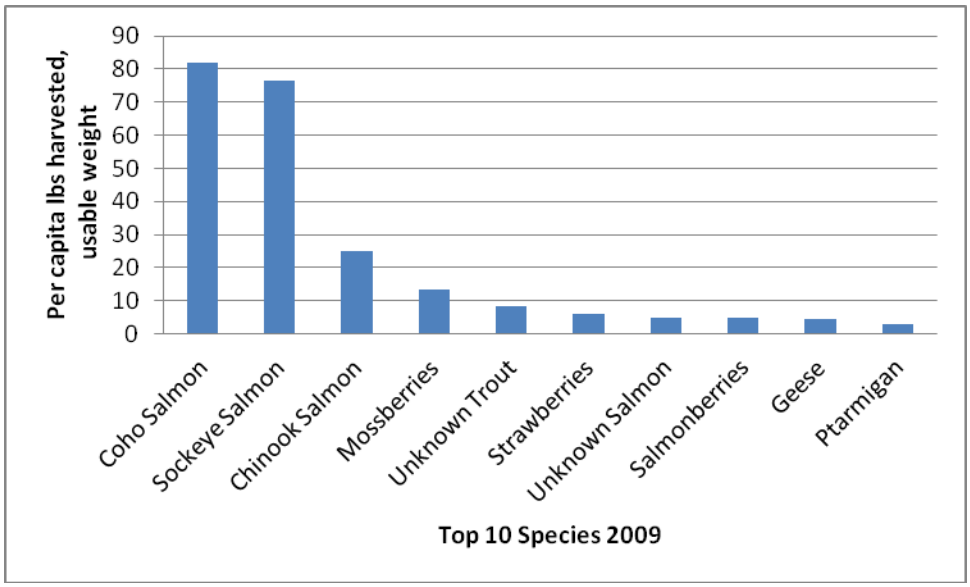

Figure 18. Top 10 species harvested by Nelson Lagoon residents, 2009.

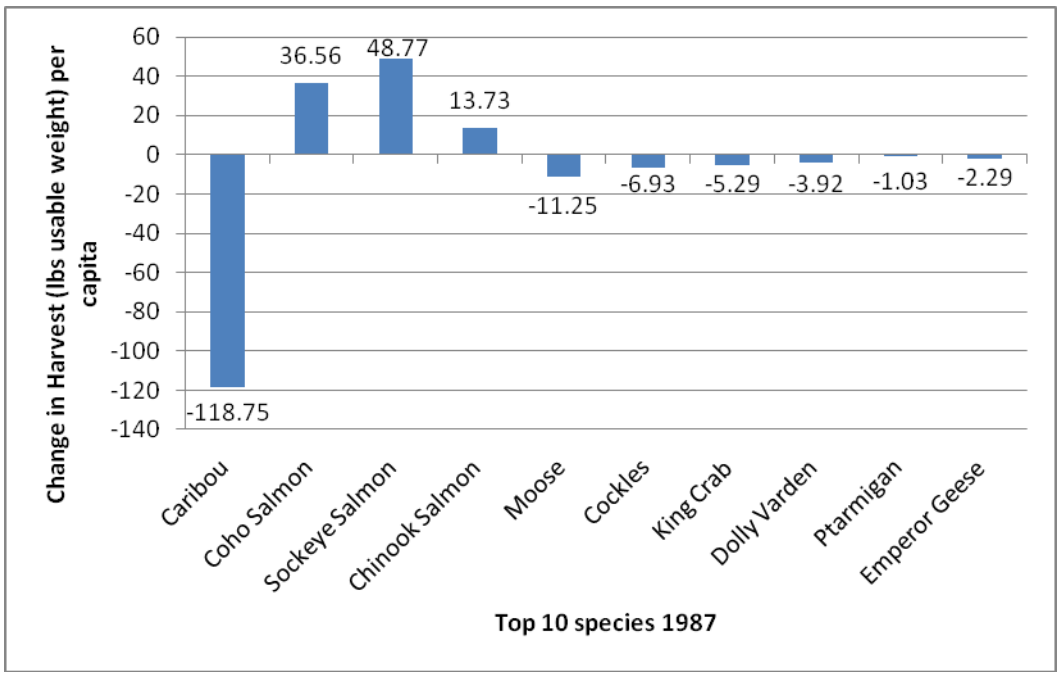

Figure 19. Change in 2009 (in pounds usable weight per capita) of ten resources harvested in the largest amounts in 1987, Nelson Lagoon.

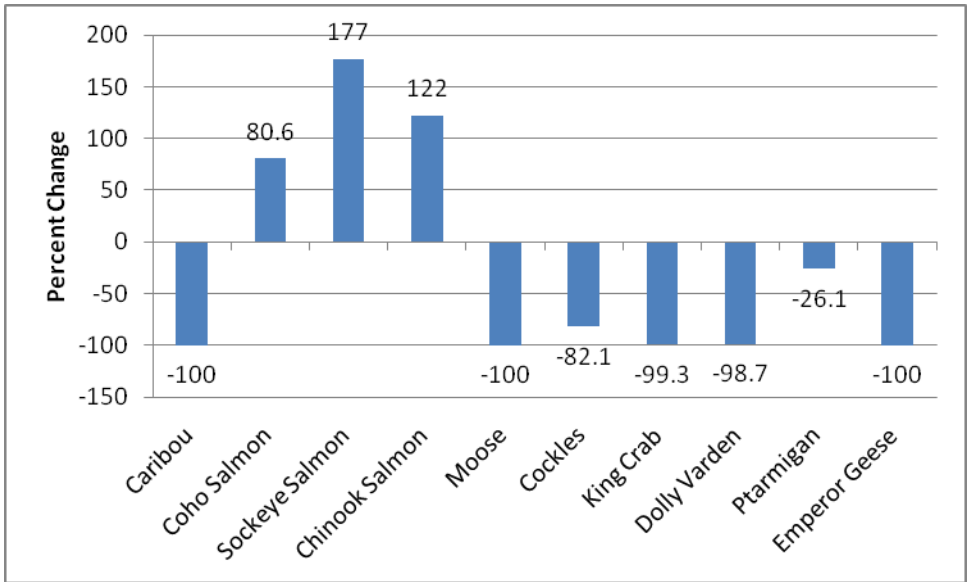

Figure 20. Change in 2009 (in pounds usable weight per capita) of ten resources harvested in the largest amounts in 1987, Nelson Lagoon.

Figure 21 Smoking coho salmon strips, Nelson Lagoon, April 2012. Photo by K. Reedy-Maschner.

The primary subsistence food for Nelson Lagoon used to be caribou and a top ten food for the community was Emperor geese. Today, hunting either specie is prohibited by regulation. There has been a cessation in the harvest of both, demonstrated in the 1987 survey and the 2009 data reported here. "The caribou ban really put a hurt on us," said one of these hunters in 2009. Caribou was the main food for decades. Moose are in the area, but are across the lagoon and up the mountainsides, and are difficult to access. People complain that they do not care for moose meat or beef. They believe the main reason the caribou are suffering is because of an overabundance of wolves.

Wolves can be hunted in wintertime, but many said it is so difficult that it needs to be done from the air. They see a lot of tracks but very few animals. Many commented that there were more wolves and bears than ever before. Wolves are getting braver, coming into town, and have taken dogs. Their food supply (caribou) is going down too. The local hunters and the U.S. Fish & Wildlife Service have hunted wolves and then seen calf survival go up the following year.

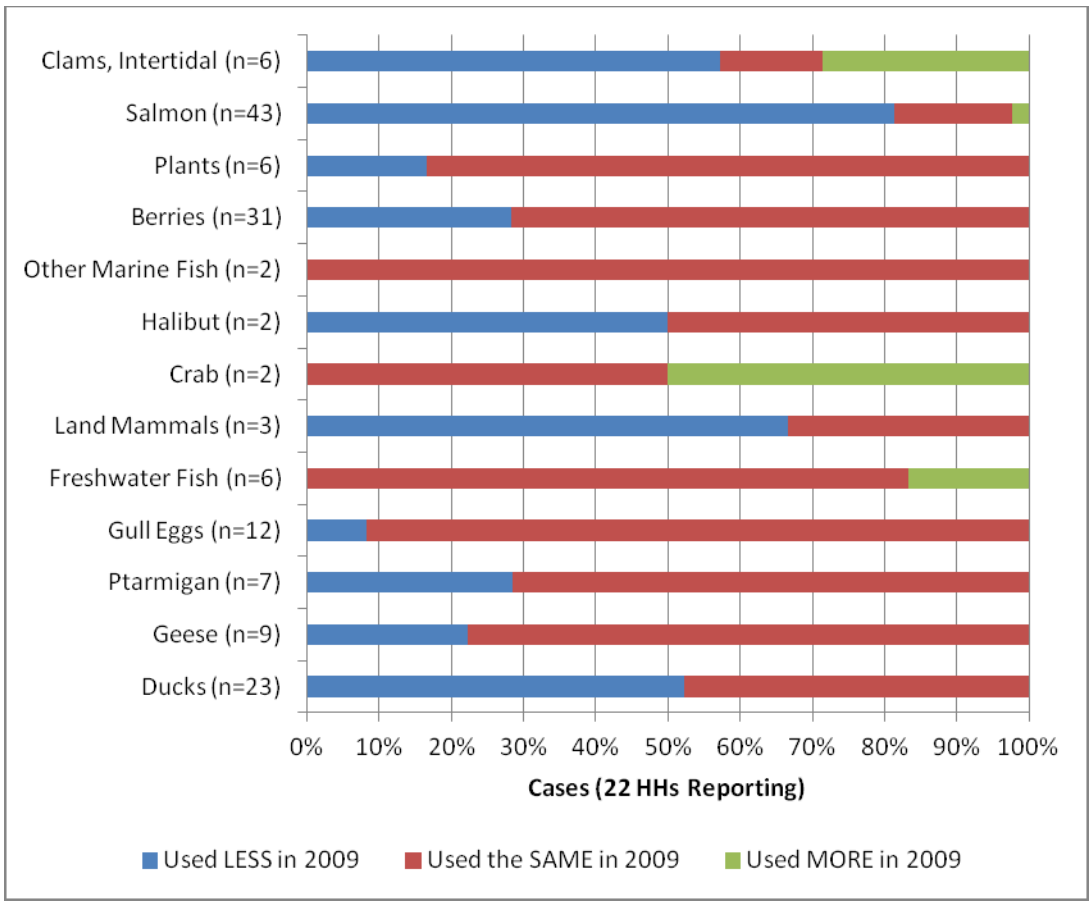

Figure 22. Nelson Lagoon's responses to whether people used less, same, or more of resources in 2009 that in the past.

Most terrestrial meat is ordered "from outside" now. Several families will coordinate to place large orders, which arrive by barge to Peter Pan Seafoods in Port Moller and then is flown over or brought over on tenders to Nelson Lagoon. Meat is primarily ordered from Mike's Quality Meats, SpanAlaska, and Sam's Club in Anchorage and dry goods, produce, and cheeses are ordered from Fred Meyer, also located in Anchorage. Food is also ordered from Rogge and QFC in Seattle. Food is also air freighted from King Cove or Cold Bay whenever planes are flying. All of these shipping options are very expensive. Some residents make trips to Anchorage several times a year to load up on basic food and supplies, while others rely on relatives outside the village to ship necessities to them. There was a small store in Nelson Lagoon up until 2008 but it carried mostly snacks and soft drinks.

Purchased wild foods represent a fraction of the overall acquisition of these foods, but it is the primary way that people from Nelson Lagoon obtain crab and codfish (Figure 23). Seven of the 22 surveyed households bought frozen processed cod fillets from Peter Pan Seafoods in King Cove, totalling 320 pounds. Sixteen of the 22 surveyed households bought cases of frozen processed king and tanner crab from Peter Pan Seafoods in King Cove, totalling 925 pounds. Other purchased shellfish are bidarkis and clams from friends as small scale customary trade. In addition, three households purchased frozen processed sockeye salmon fillets from Peter Pan Seafoods in Port Moller in 2009 totalling 220 pounds. Two of these households are elders who

are unable to fish and put up fish for themselves and a third household purchased the salmon for reasons of convenience. This was a surprising finding because so many of the local people have direct access to salmon fishing in the lagoon. One elder also paid his nieces to harvest 16 pounds of wild berries for him since he is physically unable.

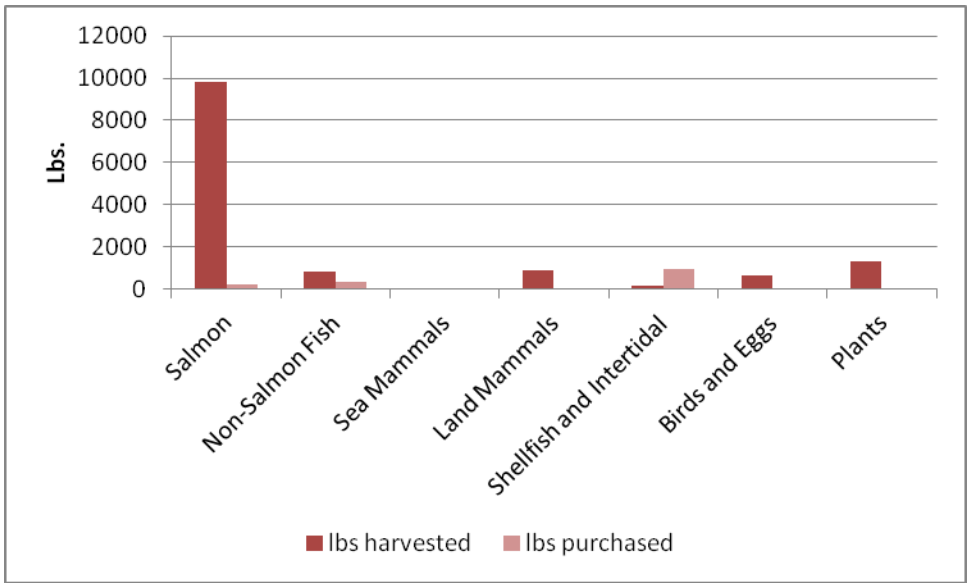

Figure 23. Nelson Lagoon Lbs. of Wild Foods Harvested and Purchased, based upon 22 of 24 households, 2009.

Bird hunting has been a mainstay in the village. Nelson Lagoon was included in a bird and egg use study by the Subsistence Division (Fall et al. 1998). The 1996/1997 survey found that birds are of great importance to the community. 92.3 percent of households used birds and eggs, with 23 hunters and 33 gatherers supplying the village. Only 7.7 percent said their bird and eggs needs were not met, and cited conflict with a wage job. They harvested 17.6 pounds per person mostly between the months of September and November, which is a significant increase from the 12 pounds per person from the previous 1986/1987 survey. Largest quantities were of Emperor geese, ptarmigan, mallards, goldeneyes, teals and gull eggs. The 2009 survey found that they were back to 12 pounds per person for bird and egg harvests.

There was no hunting season for Emperor geese during this study, and they fear that "outside hunters" will come in and hunt them if it does open up because of the sport operations in the area. There used to be a prevalence of eiders and saltwater ducks, but they "died out." Several men hunt mallards, pintails, teals, goldeneyes, canvasbacks, and other ducks in the fall. Very few people gather seagull eggs anymore because the outer islands where they nested washed away, and those who do compete with foxes and bears to gather them.

There is infrequent sea mammal harvesting in Nelson Lagoon. One reason given is that Scandinavians who intermarried with the indigenous population had not been interested in them, so now their descendants are not either. Only one household appears to be interested in harvesting sea mammals but has not done so in recent years due to health problems.

Berries are harvested by the many gallons, especially salmon berries, moss berries, and wild strawberries. These are found near the village, and their abundance depends on the quality of the spring.

Subsistence salmon fishing supports every household at various levels. Families generally put up fish by freezing, smoking and salting. The majority of fish are smoked. Salting is done to prepare salmon for pickling. Families share the processing labor, especially since there are only a few smokehouses in the village. Poor commercial fishing affects subsistence in a negative way. Rather than retain more subsistence fish, instead, people in Nelson Lagoon tend to "deliver every one you got for every penny," according to one local fisherman. This was put in more concrete terms, since daily living is so expensive. "One fish equals one gallon of gas; three fish used to buy a whole drum." The price of fuel ($5.71 per gallon of gasoline in 2009) negatively affects harvesting range.

In response to the question, "Did you get enough for your needs last year?," most residents of Nelson Lagoon responded that they did get enough of all resources except land mammals (Figure 24).

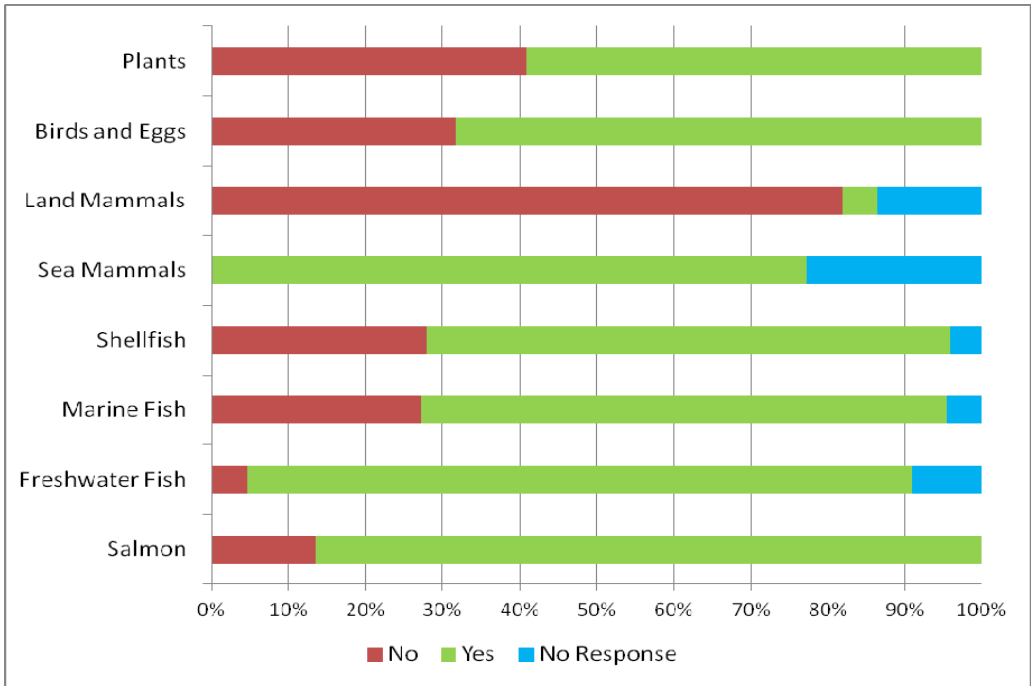

Figure 24. Responses to the question, "Did you get enough (resource) for your needs last year?", in percentages of Nelson Lagoon households (N=22), 2009.

The "30/70 rule" identified by the Subsistence Division, where 30 percent of a community's households harvest approximately 70 percent of that community's subsistence (in pounds usable weight), was tested for Nelson Lagoon using a Pareto chart (Figure 25). For the households surveyed, Nelson Lagoon harvests closely fit this rule, where approximately 30 percent of households account for 70 percent of the community's total harvests. This is also true when only considering the harvests of five species of salmon (Figure 26).

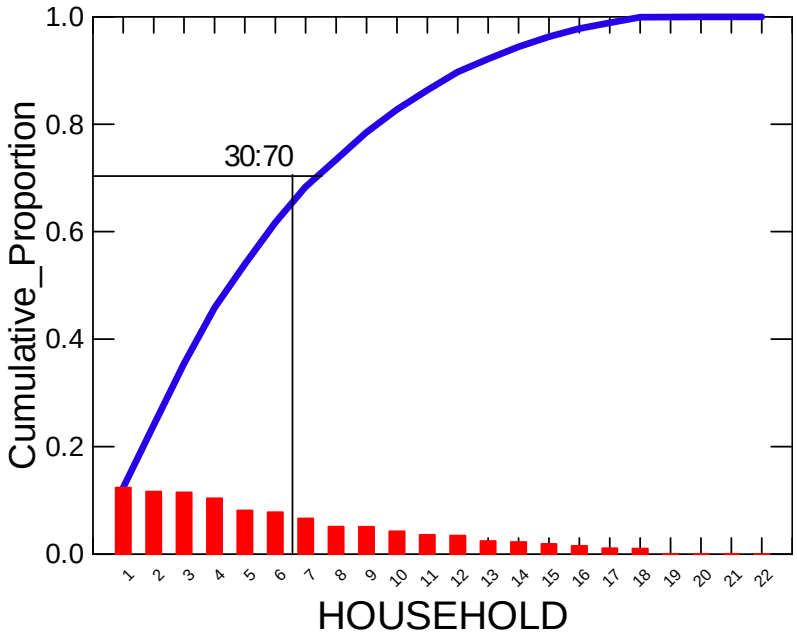

Figure 25. Pareto chart for Nelson Lagoon showing that harvesting patterns closely fit the 30/70 rule.

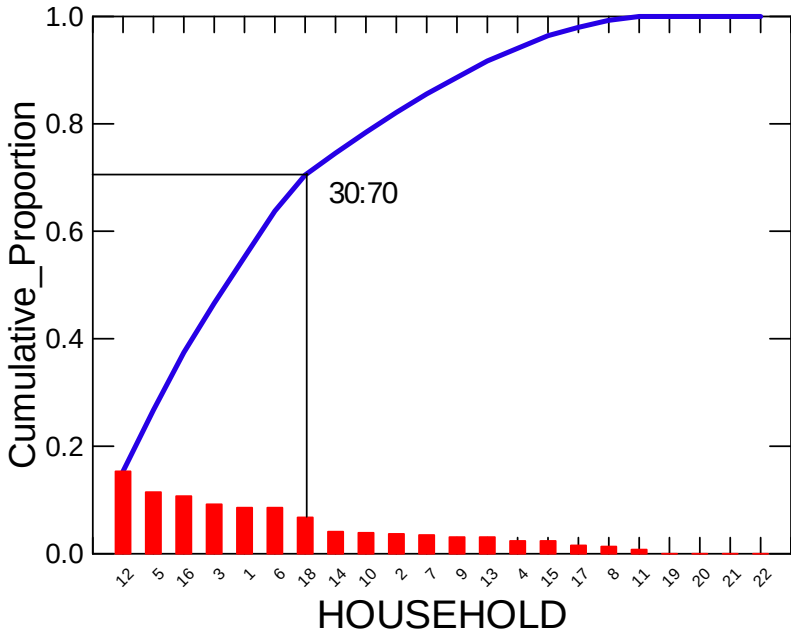

Figure 26. Pareto chart for salmon harvesters, showing 30 percent **of households in Nelson Lagoon harvest 70** percent **of the community's total harvest.**

Figure 27 shows the differences in pounds of wild foods harvested versus pounds received in the 22 surveyed households in Nelson Lagoon. There are significant differences between households, with one household harvesting no wild foods and one stating that they received nothing. Of the 16,078 total pounds of wild foods entering households, 2,889 pounds (or 18 percent) were received through sharing and are the products of social relationships.

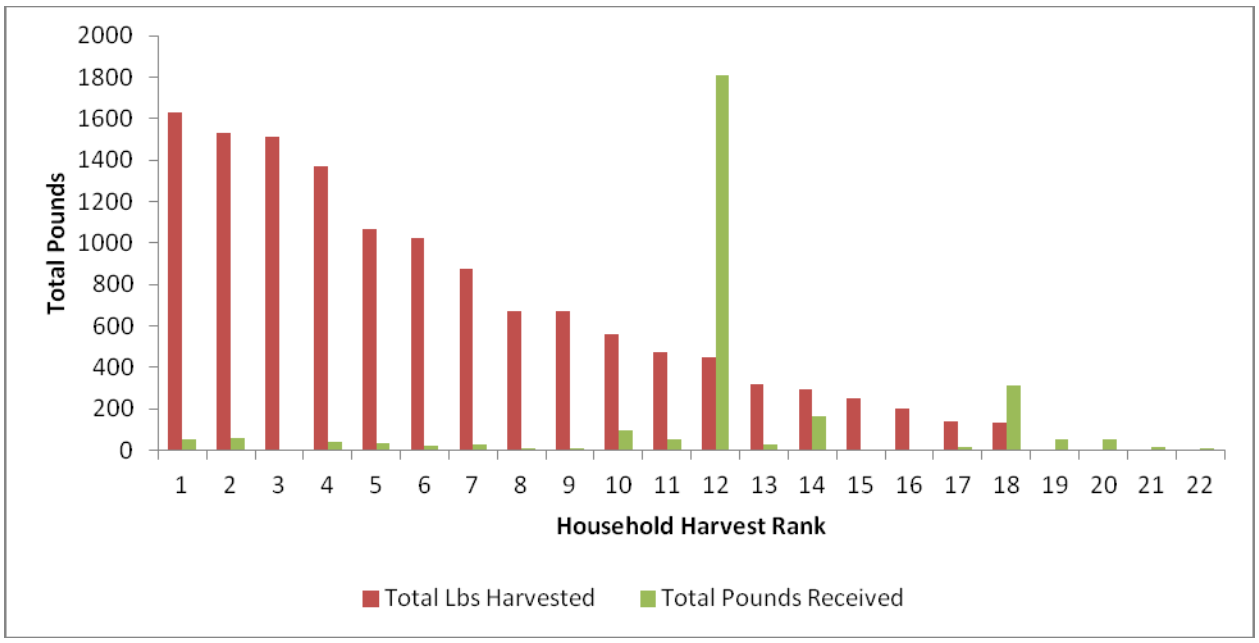

Figure 27. Total pounds wild foods harvested versus total pounds received by household, Nelson Lagoon.

Spatial Information

In the 2009 and 2010 interviews, some members of the Nelson Lagoon community lamented that they do not have better access to more commercial fisheries closer to the village that could diversify the economy. Commercial salmon boats and skiffs provide a good deal of access, constrained by the price of fuel, weather, and other factors.

There is a series of cabins and camps all through the lagoon and along the beach, that are situated primarily on Alaska Native allotments, Nelson Lagoon Corporation property, and/or near set gillnet sites.[6] One man counted nine of these. They all have stoves and radios in them and are kept open and clean, available to anyone who needs a respite. A family has a huge homestead in Herendeen Bay that is as large and as equipped as their house in Nelson Lagoon. This was built on combined family Alaska Native allotments. Occasionally, locals will lead guided bear hunts or sport fishing from there. While locals might call it "camping," it is a "big, beautiful fully functioning house in the middle of nowhere," according to one family member. A Nelson Lagoon man also owns 160 acres and the runway at David River, and uses it "to get away from town." Pilots moving sport hunters pay him a fee to land there. The David River runway is left over from PanAmerican and Exxon oil companies exploring on the Alaska Peninsula in 1980s. It periodically becomes a base camp for subsistence hunting expeditions by local people. All geographic data and maps are presented in Appendix 1.

Crews and Cooperative Hunting and Fishing

Many subsistence and all commercial activities require crew members. Activities that can be done alone (e.g. berry picking) still require group efforts in areas where there are bears and wolves, as it does in Nelson Lagoon. Oftentimes these crews carry firearms. Data were gathered

[6] Set gillnets are fishing nets set out in a stationary site in the path of moving fish. Seine nets are laid out around milling fish from a boat using a skiff, then closed at the bottom and lifted onto the boat.

by species/method, crew captain, season, and crewmembers, however not everyone provided these data, some do not crew at all, and some crews were highly variable. For variable crews, many people were listed as participating; however, they may or may not be cooperating together in every harvesting opportunity. Commercial fishing crews were much more fixed, and frequently were immediate family members.

Networks

Sharing is a key feature of subsistence activities in Nelson Lagoon. Figure 28 illustrates a portion of sharing activities for a commercial fishing woman in Nelson Lagoon described in an interview. This figure shows the flow of certain goods between her and part of her social network, and does not capture the sharing between these other individuals that also occurs. It also includes friends and family from outside the community, which is very common in every community. These networks easily incorporated researchers who, in 2012, moved a subsistence box from a niece in False Pass to an aunt in Nelson Lagoon on a charter flight.

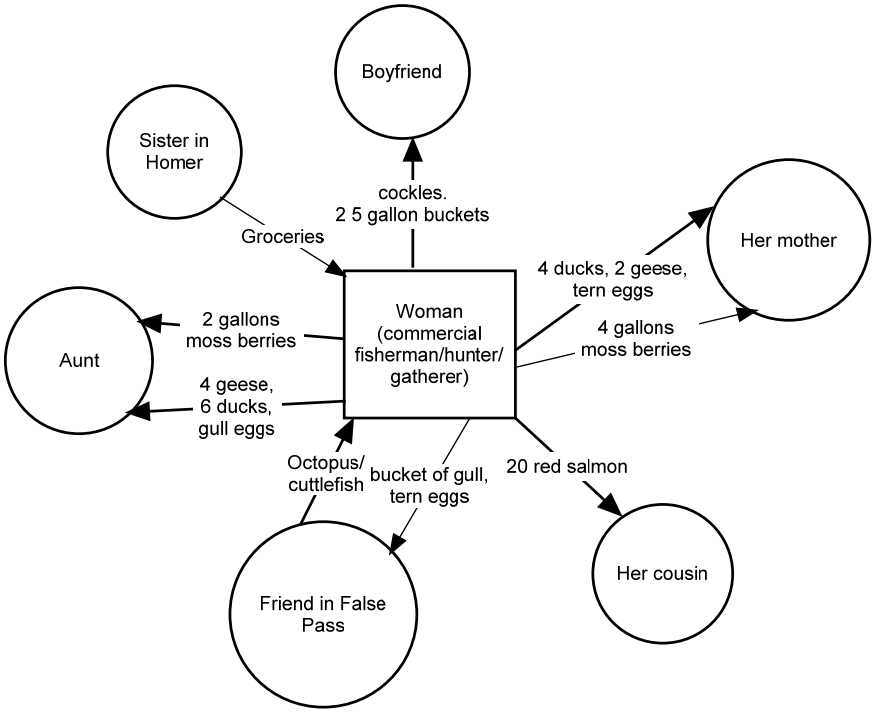

Figure 28. Partial sharing activities of a woman in Nelson Lagoon, 2009.

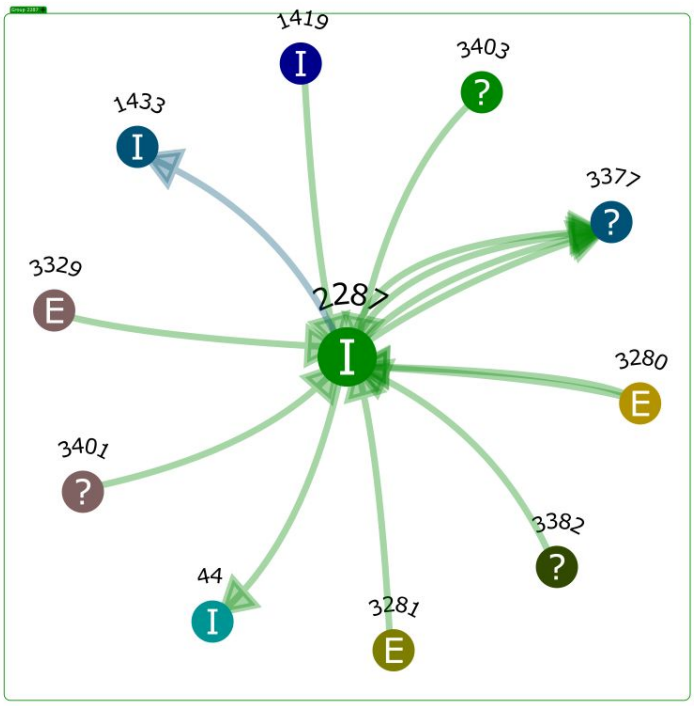

Figure 29. Network of the same individual from the 2009 survey data. I=Individual, E=Entity/Business, and ?=unknown source. Numbers are codes distinguishing between identities.

More comprehensive network data and analyses are presented in Appendix 2.

Environmental and Harvest Abundance Issues

While a comprehensive treatment of environmental and species observations appears in Section III, this section introduces some issues facing Nelson Lagoon. Nelson Lagoon is concerned about erosion since they are located on a sand spit that "changes every day." The Nelson Lagoon Corporation has invited geologists, coastal geomorphologists and the U.S. Army Corps of Engineers (USACE) to study the problem, since "we are on an island sometimes" when there is an extreme high tide and the section between the lagoon and Bering Sea is breached. Concern over a failing breakwater could dramatically affect the stability of the village site and the habitat for many species within the lagoon.

Other environmental and resource changes observed:

- People described huge piles of seaweed on the beaches now, so thick that that people cannot drive through them. Seaweed used to be really thin.
- Millions of birds fly into the lagoon in the spring and fall. Geese eat tiny clams the size of a fingernail by stepping on the sand and pushing them up out of the sand, and can gain several pounds in a week. One theory for the decline of Emperor geese is that snow geese (or whitefronts) are overtaking Emperor geese feeding areas and egg laying areas on the Kuskokwim.
- There are more sea otters in the lagoon. They come up on shore and dogs have to be restrained because they will kill the otter pups. As described below in the section on Port Heiden, if the sea ices up on the Bering Sea side, the sea otters

will head across land to the Pacific Ocean, a distance of approximately 30 miles. Because they are defenseless, wolves, foxes, dogs and humans get them.

- There are also many more jellyfish today than in recent decades. They are a nuisance, getting caught in nets.
- There are also lots and lots of flounders which are, again, a nuisance to fishermen targeting salmon. One woman stated that she wished they had a market for them.
- Porcupines are becoming scarcer.

Community Economics

The following general comments apply to all four study villages. Because this is a voluntary survey, and every piece of data is self-reported, there are many known errors. Some individuals were reluctant to report actual incomes, while others clearly under- or over-reported incomes. For example, expenses are higher than incomes reported in a few cases. A few household cases with obvious errors were removed before general statistics were applied to income and expense data.

An employment profile has been generated from the 22 households surveyed (Table 11). The majority of adults listed more than one job title and income source. Because the local fishermen (including women who fish) are primarily fishing only the salmon season (given the lack of other nearby fisheries), they often had other jobs as well. Fifty-two separate jobs were identified by 38 adults from these 22 households, or 1.4 jobs per person.

Table 11. Job types identified by Nelson Lagoon residents.

Fisherman	15
Service Provider	8
Maintenance	4
Bookkeeper/Billing Agent	3
Business Owner/Service Manager	2
Cook	2
Corporation/Tribal Administrator	2
Health Aide	2
Janitor	2
Teacher	2
Beach Cleanup/Environmental Technician	1
Environmental Director	1
Harbormaster	1
Postmaster	1
Sport Guide	1
Substitute Teacher	1
Teacher's Aide	1
VPSO	1
Watchman	1
Administrative assistant	1

The main employers for Nelson Lagoon are as self-employed commercial fishermen and crewmen, APICDA, Eastern Aleutian Tribes, and the Aleutians East Borough School District.[7] Local government, fisheries, and services provide the bulk of the income in Nelson Lagoon (Table 12). Even though there are more fishermen in this community than in the others, earnings directly from fishing are lower than earnings from non-fishing employment. Directed fishing earnings presented for Nelson Lagoon are from nine captains and three crewmen (Figure 30). The crewmen are all employed with local captains. These are all salmon fishermen, with only one fishermen deriving earnings from moonlighting in cod fishing in the Gulf of Alaska.

Table 12. Reported earned and other income, Nelson Lagoon, 2009.

	Households Reporting	Total Income	Average per HH
Earned Income			
Local Government	10	239562	23956
Federal Government	2	23000	11500
Fisheries	11	464150	42195
Retail	1	25000	25000
Services	16	493294	30831
Education	2	133000	66500
Other	4	75120	18780
Total Earned Income		**$1453126**	
Other Income			
Alaska Permanent Fund Dividend	20	61570	3079
Native Corporation Dividend	18	42487	2360
Unemployment	1	8400	8400
Food Stamps	1	1360	1360
Social Security	4	70260	17565
Pension	1	1500	1500
Total Other Income		**$185577**	
NELSON LAGOON TOTAL		**$1638703**	

[7] In June 2012, the Aleutians East Borough School District announced it could no longer support a school in Nelson Lagoon and would not open in the fall.

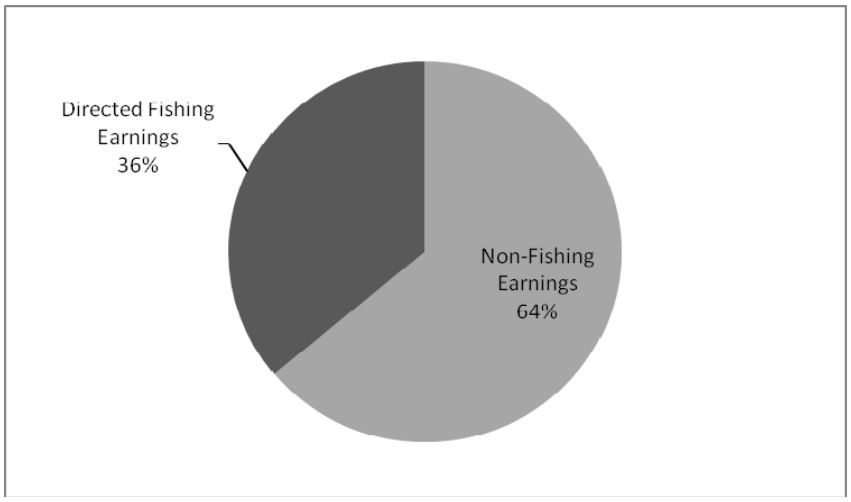

Figure 30. Relative percentages of fishing versus non-fishing earnings, based upon 22 of 24 total households, Nelson Lagoon, 2009.

The Permanent Fund Dividend and dividends from Alaska Native corporations represent 6 percent of the total income sources. Public assistance funds from state and federal sources represent another 6 percent. Only a few households were dependent upon public assistance (Figure 31).

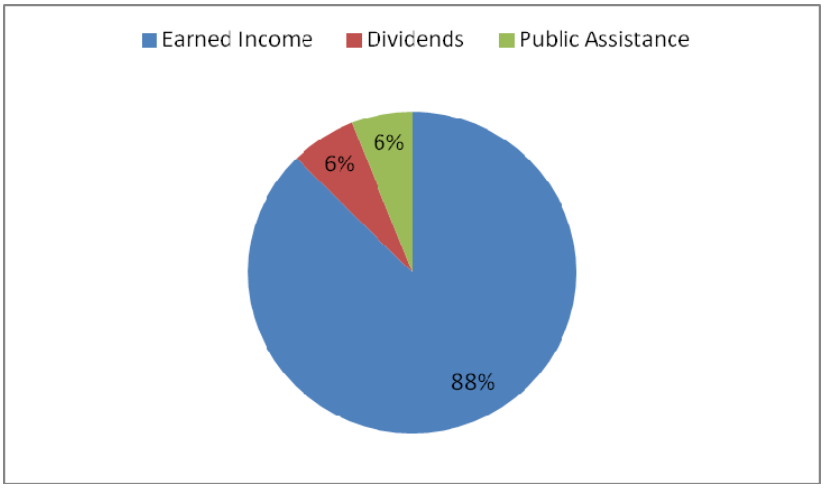

Figure 31. Nelson Lagoon income sources, 2009.

Expenses and Expense Networks

Household Expenses

Nelson Lagoon residents were asked to itemize their annual household expenses (Figure 32). These data are presented below.

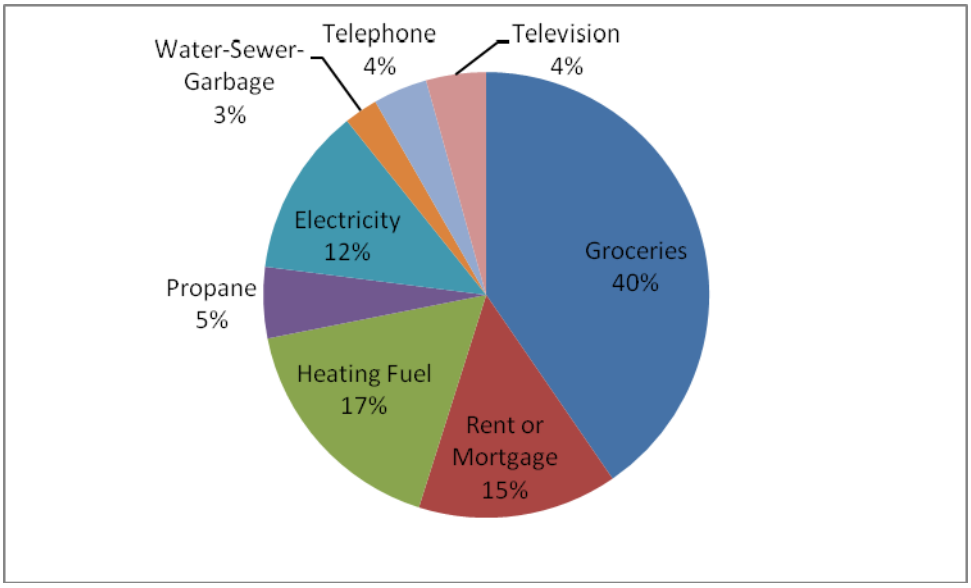

Figure 32. Relative Percentages of Household Expenses for Nelson Lagoon.

Groceries

Most food arrives by air with extra freight charges. For groceries, freight charges were $27 per box on PenAir freight from Cold Bay in 2010. Of the 22 households surveyed, average grocery expenses were $12,357 per household. Grocery expenses reported ranged from between 5 percent to 41 percent of households' total incomes.

Rent or Mortgage

Only nine of the 22 surveyed households reported having to pay rent or mortgage on their homes. The majority own their homes outright. These nine households pay $4,425 annually or $369 per month.

Heating Fuel

Nelson Lagoon households spent an average of $5,192 annually on heating their homes. Heating oil has averaged $5 per gallon in the village. Several people mentioned how living close to a source of natural gas could provide significant relief if the petroleum company was willing to invest in gas lines to the village.

Propane

Eighteen of 22 households used propane. Propane is used in stoves in the village and is used to fuel stoves, lights and refrigeration out in cabins. The price averaged $300 per 100 lb. tank, and the average household expense was $1577. The village landfill has a large stack of rusted spent tanks because it is more costly to repair tanks than import new ones. The village would like to build a fuel farm.

Electricity

Households pay an average of $3741 in electricity provided through the Nelson Lagoon Electric Cooperative. Residents prepay for electricity and use is monitored electronically for each household.

Water-Sewer-Garbage
An average of $748 is paid for water-sewer-garbage services for households annually. There is no garbage collection service but a landfill monitored by the Environmental branch of the tribe. Potable water is sourced from a lake 10 miles south of the village and connected to all homes through pipes. Water quality is sampled weekly and sent to Anchorage for testing by a local resident.

Telephone
Households pay an average $1,204 annually on telephones. At the time of the survey, the majority of households had landlines. Many residents have switched to cell phones since the survey was conducted.

Television
Every surveyed home had at least one television. Residents pay an average of $1,331 on satellite television annually.

Subsistence Expenses

Gasoline
Respondents were asked to provide costs for subsistence activities. When asked about gasoline purchases, some had a difficult time separating automobile fuel costs around the village from subsistence trips. An average of $2,558 was spent by households, but this number is confounded by some households reporting all gasoline purchases.

Ammunition
The survey asked about ammunition purchases for subsistence hunting. Of the 12 households that reported these purchases, they paid an average $258.

Supplies
Five households reported purchasing extra subsistence supplies at $507 each. These included items such as berry pickers, XTRA Tuff boots, and nets.

Expense Networks

The primary expense shared was for grocery expenses (Figure 33). Six households reported sharing grocery expenses with 16 other people by contributing to their households. These were immediate family members spread between households, and often shared large grocery orders. Two other households reported paying two others' household expenses, typically when a family member fell short on a monthly bill.

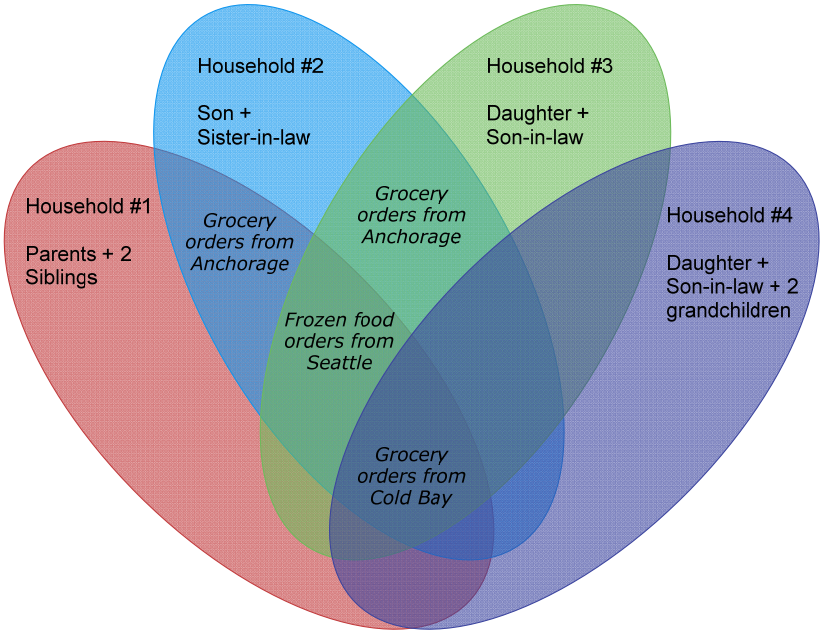

Figure 33. Grocery sharing between four households, Nelson Lagoon.

Subsistence Equipment Owned, Shared, Purchased

In order to assess assets and harvesting capacity, surveys asked about equipment owned or accessed, newly purchased, and how these items are shared (Table 13). In Nelson Lagoon, skiffs are used in commercial fishing inside the lagoon, but also allow access to subsistence fishing and hunting grounds around the lagoon system and up the rivers. Of the 22 households surveyed, 15 reported owning at least one skiff, and one reported owning 5. Villagers surveyed owned a total of 38 skiffs. Twelve households also owned 36 working outboard motors. Thirteen of the households surveyed owned 22 snowmobiles, and 14 households owned 26 working 4-wheelers. All of these are part of subsistence equipment that gets shared. New items purchased in the survey year were two 4-wheelers, one snowmobile, and one truck.

Cars and trucks are not essential to getting around the small village, and not every household owns one because they are expensive to maintain. Sixteen of 22 households reported owning 32 operating trucks and cars. These were also part of subsistence equipment, allowing people to drive along the beach to various hunting, fishing, and gathering sites.

Table 13. Equipment used in subsistence harvesting reported by Nelson Lagoon in 2009.

Equipment Type	Total	Households (of 22)	Average per Household with Equipment Type	Average per Household in Village
Skiffs	38	15	2.5	1.7
Outboard Motor	36	12	3.0	1.6
Commercial > 30' Boat	16	13	1.2	0.7
Snow Mobiles	22	13	1.7	1.0
ATVs; 4-Wheelers	26	14	1.9	1.2
Cars(s) or Truck(s)	32	16	2.0	1.5

.

Two households reported actively helping two other individuals with subsistence expenses, in this case fuel only.

POSITIVE INFLUENCE ON COMMUNITY LIFE

Sixteen different individuals were mentioned as having a "positive influence on community life," including the general category of Elders. Six individuals named themselves. These are primarily current or former community leaders and/or elders, and many of them are key nodes in the network section in Appendix 2.

SUMMARY

- Nelson Lagoon relies on the commercial salmon industry as its economic base, which is experiencing a variety of difficulties for local participation, including interception and low returns in the lagoon.
- The closure of caribou and goose hunting has severely undermined the subsistence harvesting culture of the community. Approximately 20 caribou and hundreds of geese used to be shared across the village annually. There has been an 89 percent reduction in pounds harvested between 1987 and 2009.
- 30 percent of the households account for 70 percent of the total community's harvests.
- Of the 16,078 total pounds of wild foods entering all Nelson Lagoon households, 2,889 pounds (18 percent) are the result of social relationships other than the household's own harvests through cooperative hunting and fishing.
- Several wild foods (including regional seafoods) are purchased because of subsistence closures, the lack of seafood variety around Nelson Lagoon, and the capacity of some households to hunt and fish.
- Nelson Lagoon residents are "salmon eaters," taking 445 pounds per household, and 10,694 pounds in the community in 2009. There is a 40.7 percent increase in household salmon harvests from 1987.
- There is a 121 percent increase in household non-salmon fish harvests, a 87 percent reduction in household shellfish harvests, and a 36 percent reduction in household harvests of birds and eggs between 1987 and 2009.

- Only one household seeks out sea mammals for hunting but has not harvested any in recent years. There was a 100 percent reduction in marine mammal use between 1987 and 2009.
- The community experienced a 388 percent increase in wild plant harvests between 1987 and 2009.
- Commercial fishing is the mainstay of Nelson Lagoon, with both men and women as captains in the fleet, hiring primarily family members as crew.
- The village has experienced a 37 percent population decline between the 2000 and 2010 censuses, and the closure of the school during this project.
- Average annual costs of living are higher in Nelson Lagoon than in other communities (21 percent higher than Port Heiden, 23 percent higher than False Pass, and 45 percent higher than Akutan) with propane and groceries largely responsible for this difference.
- Nonlocal sport hunting and fishing operations are considered to have negatively affected Nelson Lagoon's subsistence activities. The village has also cornered a portion of the sport market for themselves.
- Nelson Lagoon leaders were optimistic about the revenue sharing that could potentially result from oil and gas exploration and development, but support for the overall project is mixed within the community.

CHAPTER 5. PORT HEIDEN

INTRODUCTION

Port Heiden is an Alutiiq Native village located on the north side of the mouth of the Meshik River within the Lake and Peninsula Borough (Figure 34). In 2010, Port Heiden had a resident population of 102 (78 percent Alutiiq) (Census 2010) (Table 14, Figure 35). It is the most remote community in Bristol Bay and is accessed by air through King Salmon. The village is spread out for miles with multiple housing subdivisions and new construction occurring regularly. "Ray's Place" is the local name for the community center that houses the health clinic, city office, Village Corporation office, tribal IRA Native Council of Port Heiden office, and an office of the Bristol Bay Health Corporation. It is also a true community center where people drift in and out to visit and work and the coffee is always on. Thirteen residents hold commercial salmon fishing permits. Port Heiden is also a member of the Bristol Bay Economic Development Corporation, which is the local CDQ program. Port Heiden is eight miles from the Aniakchak Caldera National Wildlife Refuge.

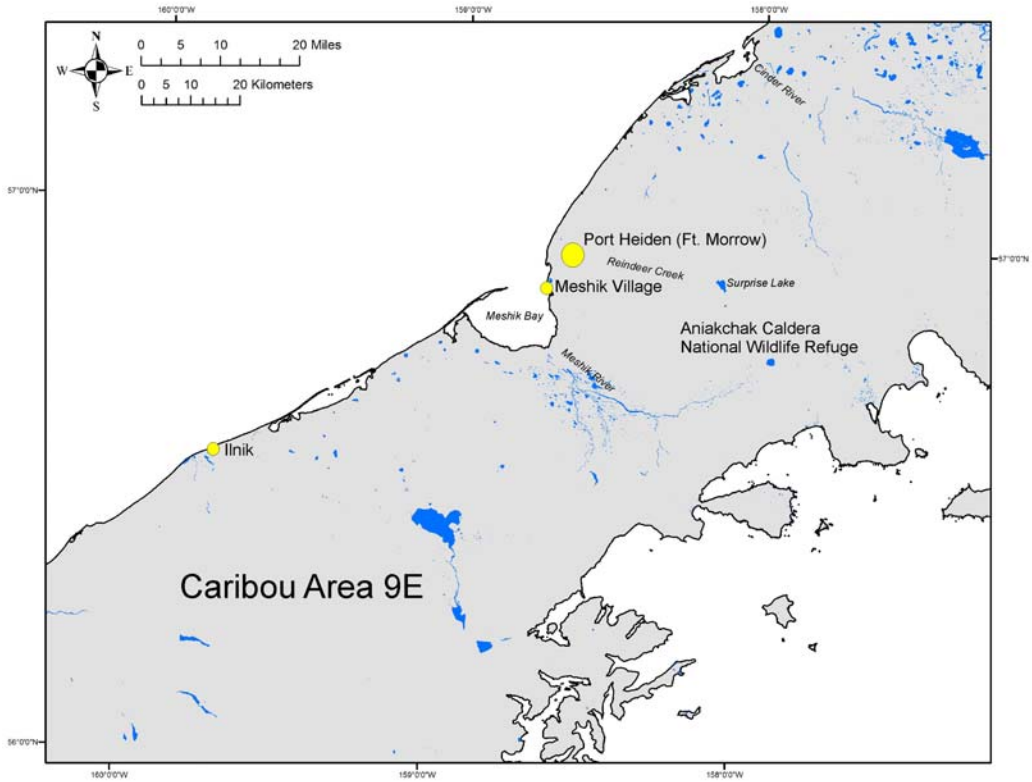

Figure 34. Regional map for the Port Heiden area. Map drawn by B. Benson and H. Maschner

Table 14. U.S. Census and Survey Population.

	2010 Census	2010 Surveys
Households:	35	22
Family Households:	24	17
with own children under 18	11	11
Husband-Wife Family:	17	16
with own children under 18	10	10
Male Householder	4	0
with own children under 18	1	0
Female Householder	3	1
with own children under 18	0	1
Non-family Households	11	5
Householder alone	10	5
Male	9	4
65 or over	2	0
Female	1	1
65 or over	1	1
Households w/ individs under 18	15	11
Households w/ individs 65 & over	8	2
Average Household size	2.9	3.13
Average Family size	3.6	3.76

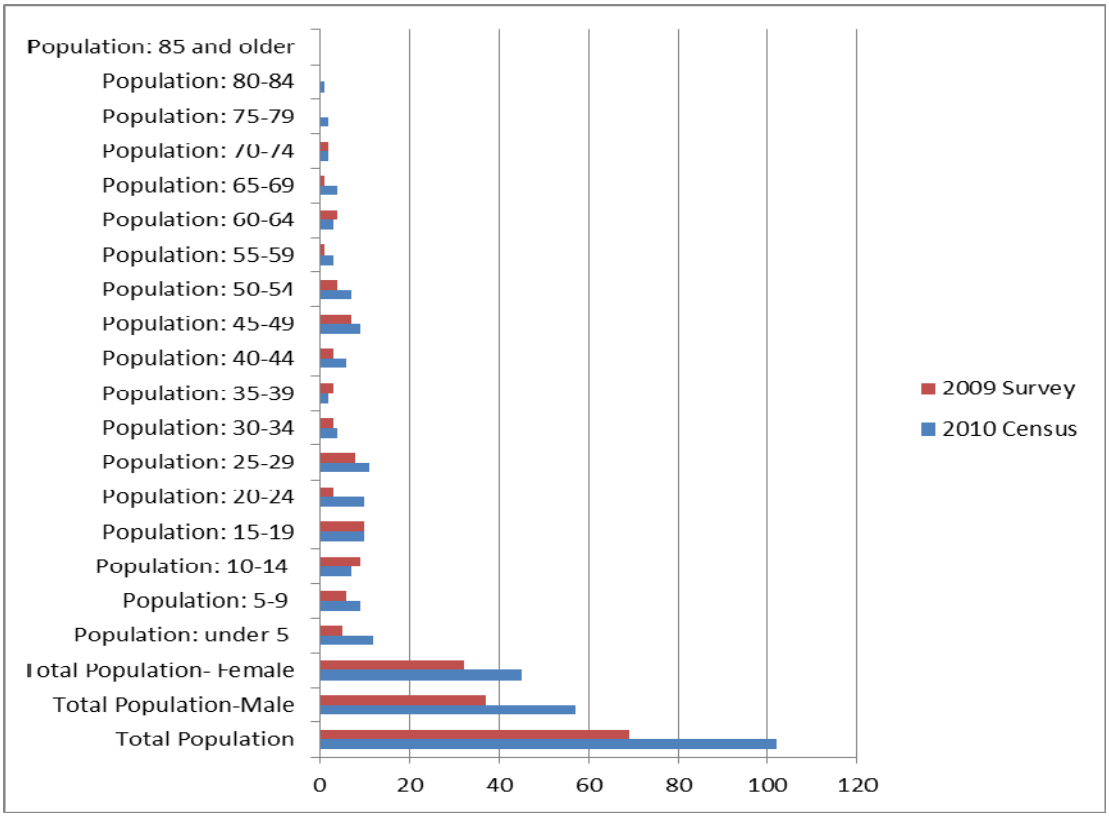

Figure 35. Port Heiden surveyed population and U.S. Census population.

RECENT VILLAGE HISTORY

During World War II, the U.S Army Air Corps built Fort Morrow in 1941 as an airfield for Alaska defense near the Meshik village site and housed 5,000 personnel. Fort Morrow covered several square miles and contained hundreds of buildings. The base was closed after the war and largely dismantled.

In the 1950s, sections of the former Fort Morrow were acquired by the U.S. Air Force, who constructed a White Alice Communication Site (WACS) in nearby Port Heiden. These sites were part of an Air Force telecommunication system in Alaska during the Cold War for both military and civilian uses. Port Heiden also had a Distant Early Warning (DEW) line radar station constructed there as part of the system to detect possible attacks from the west. The WACS was operated in Port Heiden until 1969. The site was then converted into a Radio Relay Site (RRS), which became obsolete in the 1970s; the site was abandoned in 1978.

The old village of Meshik became vulnerable to erosion and people began moving from the village site on the shoreline to higher ground in the 1970s and 1980s. They spread out along the roads left over from these old government sites. Community leaders renamed the new village Port Heiden after the WACS site and incorporated in 1972.[8]

POLITICAL AND ECONOMIC LANDSCAPE OF PORT HEIDEN

Port Heiden resides within the Lake and Peninsula Borough and residents are members of the Bristol Bay Native Corporation. The local village corporation, city, and tribal council are all housed in the same building and cooperate closely on political and economic development projects. Most houses are located on city land, since Alaska Native allotments are all at some distance from the village. This was described as "like a land trust" since people chose areas where they like to hunt and fish. Port Heiden has many empty, uninhabitable houses all over the area after people abandoned them and upgraded to new homes.

Fuel and power costs are high. Residents and businesses pay 75 cents/kilowatt for power. Some families use 500 kilowatts per month. Heating fuel costs are 17 gallons for $100, or $5.88 per gallon. There are frequent deliveries because people can only pay a little bit at a time. Several people have installed wind turbines at their homes to offset high power costs. Ray's Place also has a wind turbine.

Port Heiden is eight miles from the Aniakchak Caldera National Wildlife Refuge. Surprise Lake formed within the Aniakchak Caldera, and is the only volcano with an active salmon run. Port Heiden gets about a dozen hikers per year to the caldera. In the summer of 2009 there was an emergency where some hikers' camp gear blew away. Port Heiden has a volunteer search and rescue effort but it is made of "our men" and they were all out fishing. The Coast Guard instead was called in for the rescue. Port Heiden has plans to set up a more formalized emergency

[8] www.commerce.state.ak.us/dca/commdb/CIS.cfm?comm_boro_name=Port Heiden

response team that would supply food, gear, health care and other assistance to distressed hikers, and perhaps bring local income.

Through the National Park Service Historic Preservation Fund, the tribe is pursuing a plan to designate a Tribal Trail that would run from the Port Heiden airport to Surprise Lake. The trail would serve as a well-known mapped route that tourists can follow or return to for assistance or rescue. They are also interested in supporting bird watchers, since there are many species that migrate through Port Heiden, especially the marbled godwit (*Limosa fedoa)* which migrates from Australia through Hawaii and to Port Heiden.

Other new local development and construction projects will include a washeteria building and a water filtration system.

ETHNICITY

Port Heiden exists on a cultural border between Alutiiq and Aleut and their ethnonyms reflect this. Although some elders speak a Yup'ik dialect called Sugpiaq, English is the common language, and most residents call themselves Aleut instead of Alutiiq (Crowell, Steffian and Pullar 2001; Kresge et al. 1974; Partnow 2001). Those to the west were called "True Aleuts" by some in Port Heiden. Most call themselves Alutiiq or Yup'ik. "Gainkuk" is the local term for Russian Aleut. There are also Athapaskans and Aleuts who have married into the community, as well as many non-Alaska Natives. The non-Native population is less than 40 percent. Even the Alaska Native population acknowledges many facets of ethnicity, including Swedish, Norwegian and Danish heritage.

COMMERCIAL PRACTICES

Meshik had a saltery for processing both fish and skinning and salting seal skins for commercial sale (Figure 36). There are no longer any processing facilities in the village, although a group out of Copper River plans to build a fish plant in Port Heiden, supported by the Bristol Bay Economic Development Corporation. There is an ice making facility for preserving fish.

Port Heiden exists on a commercial fisheries boundary. The fishermen of the village fish to the east in the Ugashik district of Bristol Bay even though the Area M boundary is above Meshik Bay. Most have no intention of switching to Area M because it is cost prohibitive and they would have to learn a whole new style of fishing, but some are considering the change. They are concerned with how Area M fishermen may affect the Ugashik District's catch rates. People reported a drop in fish availability for subsistence after the Area M line was moved north of them.

Figure 36. The old saltery in Meshik village, Bering Sea shore, November 2009. Photo by K. Reedy-Maschner.

There are approximately twelve local fishing captains with Area T drift permits. They store their boats and skiffs on land in Port Heiden, since there is no harbor. There are also three set gillnet permits fished by both men and women. Set gillnet fishing is considered more difficult because of the low volume of fish and the dangers of delivering fish in a skiff next to a tender and because wakes of the larger boats can swamp them. Setnetters put anchors on the beach to hold them steady. Drift fishermen have a different skill set requiring more knowledge of mechanics, reading the ocean, water and sandbars, and finding the hot spots for fish. Trident Seafoods does not accept set gillnet fish anymore because they are picked at low tide in the mud, and the plant is unhappy with this, so they deliver to other tenders in the bay. Processors put people on limits when they have got a "big plug" of fish.

Commercial fishing is seen as a tradition that must be kept alive. If a person owns a boat or permit, there is a sense of duty that the owner must fish these. With new employment offered in Port Heiden working to remediate soil at the White Alice site, a few men who took these jobs were criticized for not fishing even though the permits were still fished by relatives. Some consider commercial fishing a "sacrifice industry" because it requires sacrificing family time to earn money. Port Heiden's fishermen hope to be able to fish closer to home near Meshik Bay, and have lobbied the Alaska Board of Fisheries to consider allowing overlap areas with Area M fishermen.

SUBSISTENCE PRACTICES

All subsistence harvesting and sharing practices are highly valued (Table 15). For example, community subsistence nets set out next to the village are open to anyone who wants to pick the nets. In this way, multiple households are guaranteed some fish, even if they do not have the resources to harvest for themselves. Quantity concerns appeared in relation to getting sockeye and chum for several residents who observed fewer fish in the subsistence nets. Some residents go to Chignik and transport sockeye back, or relatives ship it over in totes, because it is hard to get locally.

Most people travel to Reindeer Creek located to the north up the beach because it is more accessible and all five species of salmon are found there. Meshik River is fished for salmon, and is also a primary area for seals, clams and non-salmon fish. Coho (silver) salmon are fished at Cinder River. A silver salmon derby is held at North River every year where there is competition to catch the largest coho salmon.

Salmon are considered to have a local flavor. “The fish taste muddy here, but I like our fish,” said one woman. Another said that Chignik fish taste better, cleaner, whereas Kuskokwim fish are oilier. The women claim that even though the fish might be prepared the same way, you can tell where they come from by their taste. Several people have smokehouses, and sometimes will share the labor and the fish for smoking, processing them together. Salt fish is also desired, especially among elders. Salt fish makes a nice breakfast with sourdough pancakes. People will put up a couple buckets of salt fish while they are commercial fishing because tenders keep salt to cool water for Refrigerated Seawater Systems (RSW) and it is available to them. Another prized food for the Alutiiq is “old redfish,” or spawned out sockeye or silver salmon. It is the “number one delicacy,” according to one woman in Port Heiden. Others called it simply “old fish” and added king salmon to the list. Caviar from old fish is also good, and is squeezed out of the fish. This fish also comes into the community via Chignik relatives and friends and they say that their fish has a different taste.

There is a “blackfish,” also called *naynays*, which is a type of whitefish that lives in cold ponds all times of the year. They can be partially frozen and still be alive. They are eaten frozen or raw, and can also be boiled and eaten with seal oil. This was called “starvation food” by the elders because it is available all year and can be caught with little fish traps or dipnets. “The lakes here are more like ponds,” said one woman. They have sticklebacks and blood suckers in them. Candlefish are caught there as well, and are slightly smoked and dried.

Table 15. Port Heiden's Subsistence Harvest Data, 2009.

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
Birds/Eggs	Goldeneye Duck	1	0.82	0.82	0.00	0.82	0.82		0.82	0.82		0.04	0.01	1.08
	Scoter Ducks	1	0.90	0.90	0.00	0.9	0.90		0.90	0.90		0.04	0.01	1.19
	Gull Eggs	1	1.80	1.80	0.00	1.8	1.80		1.80	1.80		0.08	0.03	2.37
	Pintail Duck	1	8.00	8.00	0.00	8	8.00		8.00	8.00		0.36	0.12	10.55
	Sandhill Crane	1	8.40	8.40	0.00	8.4	8.40		8.40	8.40		0.38	0.12	11.07
	Mallard Duck	1	12.00	12.00	0.00	12	12.00		12.00	12.00		0.55	0.17	15.82
	Teal Duck	1	12.00	12.00	0.00	12	12.00		12.00	12.00		0.55	0.17	15.82
	Unknown Duck	2	3.00	45.00	42.00	48	24.00	21.00	-242.83	290.83	29.70	2.18	0.70	63.27
	Brant Geese	6	2.40	24.00	21.60	62.4	10.40	3.38	1.72	19.08	8.27	2.84	0.90	82.25
	Geese	3	15.00	25.00	10.00	65	21.67	3.33	7.32	36.01	5.77	2.95	0.94	85.68
	Ptarmigan	15	1.40	49.00	47.60	185.5	12.37	3.39	5.09	19.65	13.15	8.43	2.69	244.52
	Canadian Geese	5	6.30	210.00	203.70	277.2	55.44	39.19	-53.37	164.25	87.63	12.60	4.02	365.40
	Total					**682.02**						**31.00**	**9.88**	**899.03**
Land mammal	Arctic Hare	1	5.60	5.60	0.00	5.6	5.60		5.60	5.60		0.25	0.08	7.38
	Porcupine	1	8.00	8.00	0.00	8	8.00		8.00	8.00		0.36	0.12	10.55
	River Otter	2	3.00	15.00	12.00	18	9.00	6.00	-67.24	85.24	8.49	0.82	0.26	23.73
	Wolverine	1	35.00	35.00	0.00	25	35.00		35.00	35.00		1.14	0.36	32.95
	Beaver	2	80.00	200.00	120.00	280	140.00	60.00	-622.37	902.37	84.85	12.73	4.06	369.09
	Caribou	1	600.00	600.00	0.00	600	600.00		600.00	600.00		27.27	8.70	790.91
	Red Fox	1	600.00	600.00	0.00	600	600.00		600.00	600.00		27.27	8.70	790.91
	Brown Bear	2	350.00	700.00	350.00	1050	525.00	175.00	-1698.59	2748.59	247.49	47.73	15.22	1384.09
	Wolf	2	525.00	525.00	0.00	1050	525.00	0.00	525.00	525.00	0.00	47.73	15.22	1384.09
	Moose	2	540.00	1080.00	540.00	1620	810.00	270.00	-2620.67	4240.67	381.84	73.64	23.48	2135.45
	Total					**5256.6**						**238.94**	**76.18**	**6929.15**
Non-Salmon Fish	Rainbow Trout	1	2.80	2.80	0.00	2.8	2.80		2.80	2.80		0.13	0.04	3.69
	Cod	1	3.20	3.20	0.00	3.2	3.20		3.20	3.20		0.15	0.05	4.22
	Yellowfin Sole	1	10.00	10.00	0.00	10	10.00		10.00	10.00		0.45	0.14	13.18
	Black Rockfish	1	15.00	15.00	0.00	15	15.00		15.00	15.00		0.68	0.22	19.77
	Flounders	1	50.00	50.00	0.00	50	50.00		50.00	50.00		2.27	0.72	65.91
	Smelt	1	84.00	84.00	0.00	84	84.00		84.00	84.00		3.82	1.22	110.73
	Dolly Varden	5	1.40	140.00	138.60	316.4	63.28	31.48	-24.12	150.68	70.39	14.38	4.59	417.07
	Halibut	4	76.80	172.80	96.00	464.8	116.20	20.45	51.11	181.29	40.90	21.13	6.74	612.69
	Total					**946.2**						**43.01**	**13.71**	**1247.26**
Plants	Wineberries	2	0.08	0.16	0.08	0.24	0.12	0.04	-0.39	0.63	0.06	0.01	0.00	0.32
	Fireweed	1	1.00	1.00	0.00	1	1.00		1.00	1.00		0.05	0.01	1.32
	Wild Rice	1	1.00	1.00	0.00	1	1.00		1.00	1.00		0.05	0.01	1.32
	Wild Rhubard	2	0.08	1.00	0.92	1.08	0.54	0.46	-5.30	6.38	0.65	0.05	0.02	1.42

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
	Petrushki	1	2.00	2.00	0.00	2	2.00		2.00	2.00		0.09	0.03	2.64
	Pushki	2	0.16	2.00	1.84	2.16	1.08	0.92	-10.61	12.77	1.30	0.10	0.03	2.85
	Cranberries	1	3.00	3.00	0.00	3	3.00		3.00	3.00		0.14	0.04	3.95
	Blueberries	1	4.00	4.00	0.00	4	4.00		4.00	4.00		0.18	0.06	5.27
	Tundra Tea	3	1.00	4.00	3.00	6	2.00	1.00	-2.30	6.30	1.73	0.27	0.09	7.91
	Salmonberries	2	0.16	8.00	7.84	8.16	4.08	3.92	-45.73	53.89	5.54	0.37	0.12	10.76
	Beach Greens	4	0.08	24.00	23.92	26.24	6.56	5.83	-11.99	25.11	11.66	1.19	0.38	34.59
	Mossberries	11	0.16	40.00	39.84	140.32	12.76	3.35	5.29	20.22	11.11	6.38	2.03	184.97
	Total					**195.2**						**8.87**	**2.83**	**257.31**
Salmon	Pink Salmon	5	5.00	37.50	32.50	107.5	21.50	6.10	4.55	38.45	13.65	4.89	1.56	141.70
	Chum Salmon	1	271.00	271.00	0.00	271	271.00		271.00	271.00		12.32	3.93	357.23
	Coho Salmon	17	11.56	173.40	161.84	1161.78	68.34	11.43	44.10	92.58	47.14	52.81	16.84	1531.44
	Sockeye Salmon	16	15.54	1554.00	1538.46	4983.16	311.45	103.85	90.10	532.79	415.39	226.51	72.22	6568.71
	Chinook Salmon	16	33.26	1862.56	1829.30	5853.76	365.86	119.19	111.82	619.90	476.75	266.08	84.84	7716.32
	Total					**12377.2**						**562.60**	**179.38**	**16315.40**
Marine Mammal	Steller Sea Lion	1	200.00	200.00	0.00	200	200.00		200.00	200.00		9.09	2.90	263.64
	Sea Otter	4	58.50	97.50	39.00	312	78.00	11.26	42.17	113.83	22.52	14.18	4.52	411.27
	Ring Seal	1	850.00	850.00	0.00	850	850.00		850.00	850.00		38.64	12.32	1120.45
	Harbor Seal	6	56.00	560.00	504.00	1792	298.67	95.55	53.06	544.28	234.04	81.45	25.97	2362.18
	Total					**3154**						**143.36**	**45.71**	**4157.55**
Shellfish	Surf Clam	2	0.05	7.50	7.45	7.55	3.78	3.73	-43.56	51.11	5.27	0.34	0.11	9.95
	Horse Clam	2	4.00	7.50	3.50	11.5	5.75	1.75	-16.49	27.99	2.47	0.52	0.17	15.16
	Cockles	8	0.96	30.00	29.04	64.26	8.03	3.52	-0.30	16.37	9.97	2.92	0.93	84.71
	Total					**83.31**						**3.79**	**1.21**	**109.82**
All Resources	**Total**					**19540.53**						**1031.57**	**328.91**	**29915.52**

People scavenge beaches for glass balls for crafts and walrus tusks for carving. No one from Port Heiden hunts walrus, but they will collect dead ones that have washed up on the beach and boil them down for dog food. Walrus reside on Round Island, which is a protected area. One household gets walrus meat from friends in Togiak, trading berries from Port Heiden's berry patches. Berries are favorite subsistence foods. Berry patches (moss berries, cranberries, wineberries, and high bush salmonberries) are family secrets. Mossberry abundance is down from previous years. People talked of "no blackberries," (referring to mossberries) but this really means very low quantity; for example, it took one lady one hour to gather a quart.

The residents of Port Heiden eat a beach herb that is sometimes called Alaska spinach. It has a red flower and is called *qurrkiq* locally. Other beach greens are boiled down and sautéed in butter. They eat fiddlehead ferns too, but these are not found in any abundance. Fireweed blossoms are picked and made into jelly using sugar and pectin. They also gather an herb called "Tundra tea" (*Caa'uq*, more commonly known as Labrador tea*)* which is acknowledged as good medicine but dangerous if one drinks too much. Chamomile is found locally too.

Both sea and land otters are hunted and trapped, and described in terms of pelt utility. Land otters are smaller and about 30 land otters are needed for a woman's coat. Sea otters are hunted frequently and their pelts are very valuable, requiring 20 for a family to have coats. Over several years with hard winters (especially 2006-2007 and 2011-2012), sea otters have suffered. Sea otters need water to keep their pelts clean in order to stay warm. There was so much sea ice that they could not get to the water and tried to cross land approximately 30 miles to the Pacific side. Many of them died because of the journey and predation by wolves, foxes, dogs, eagles and crows. Local people found many near death and took about 17 of them to make hats and mittens out of their fur. The media picked up this story and "portrayed us as monsters."

One Steller sea lion (SSL) has been taken in Port Heiden in recent memory. They prefer to hunt and eat subadults to the larger Steller sea lions. Seal fat (from Phocid sp.) and seal oil are eaten regularly. Seal meat is considered essential food for women who have just given birth. A bearded seal was caught in the area one year, but is a very rare sight.

People used to get tons of clams, but now they state that there are too many sea otters. "We like 'em like that," said one lady nodding towards a sea otter pelt, one that was seven feet long, shot by her brother. Cockles are the most common bivalve, but they are lost to sea otters and other unknown processes. There used to be a lot of sea urchins too, but not anymore. The people call sea cucumbers "assholes" because of their appearance and their sediment eating behavior, and only a few people eat them. People also harvest snails and shrimp for consumption.

"Part of the Native style of life is sharing," said one local man, as he described how intertwined he and his family's harvesting and food sharing activities are with other friends and family. He and his girlfriend get pike, freshwater trout and beluga from friends and family in Bristol Bay. Many people also share equipment with relatives. Sharing networks are strong within the village, but also extend into other communities such as Chignik Bay, Aleknagik, Perryville, Pilot Point, and Dillingham. Smelts from Naknek and Pilot Point will be sent down. Jarred fish is also sent

out to relatives in Alaska universities and outside the state. Fish, razor clams, pinkneck clams, butter clams, cockles, steamer clams, halibut, black bass, crab, sea urchins, octopus, bidarkis, gumboots, red snapper and cod are also sent over from the Pacific side villages of Chignik Lake, Chignik Bay, Chignik Lagoon and Perryville.

There was a great deal of discussion about all the foods people *used to* get. Caribou, beluga whale, rabbits, beaver and beaver tail… "Everyone came from the Pacific side to hunt caribou here," said one man, because of the alders and larger hummocks on the Pacific side. It was easier to hunt near Port Heiden. Caribou hunting is now completely closed (Tier II). Several people read the regulations and found that caribou may be hunted for "ceremonial purposes."[9] Funerals qualify for this, so caribou will be hunted for the potluck part of the ceremony. If there are several deaths, they can harvest one for each deceased person, and will wait to do it all together. These ceremonial hunts are also used to teach youth to hunt caribou, since there is a worry that children will not learn the skills while the hunts are closed. Hunters will take children out to practice hunting seal first.

"Caribou used to come by the thousands, now it's by the tens. You used to hear them before you see them." They used to import no meat at all. People report ordering more store bought foods now that caribou hunting is closed, but most agree that they consider that beef is inferior to caribou and harder for them to digest. One family paid $1000 on beef in 2009, including freight. Another man with a large family spent $4000 on beef in 2012 and "I don't even like it." "We had come to expect it. I never thought we'd never have caribou. Have to buy meat now."

Wolves are contributing to their decline. One man mentioned that he took a small group of teenagers moose hunting and they found 14 caribou carcasses from a wolf kill, since wolves will kill for sport as well as food. Wolves select for the choicest parts of the animals too. There is some tension with biologists over the caribou management. Locals report that the caribou are rebounding through their counts of calves in the herd. Dillingham relatives will sometimes send caribou meat if they are allowed to hunt.

Pilot Point participated in a pilot project to bring in musk ox and Port Heiden is interested in something similar. There used to be semi-domesticated reindeer in Pilot Point and one woman stated that her Alutiiq grandfather was a local herder in Pilot Point. There was a concern over caribou-reindeer hybrids in Port Heiden because of an economic experiment near Pilot Point. "Up north they are short. They are true caribou."

Wolves are a huge concern for the people of Port Heiden. Two women reported getting chased. Five dogs have been killed so far. Five moose were taken in Perryville by wolves. They can be hunted, and the limit is 10 wolves per day, but they are difficult to hunt.

Moose are hunted on the plateau, which is a wide long hill behind the village. It is treated somewhat as a substitute for caribou, although people complain about "trying to get used to moose." In one family there are five households (about 50 people) and it only takes two moose to feed them all. They grind the tough meat into hamburger. Some sent it out for it to be made into summer sausage, polish sausage and "hotdogs." They also eat moose innards when they are fresh

[9] This is the only village in the study that took advantage of this.

by first boiling and then frying the heart, liver and kidneys, and eating the meat with sourdough pancakes. People also make corned moose, which is prepared like corned beef in a salty brine. Moose meat is also dried in a dehydrator and made into jerky. Guides come from all over and make an impact on the moose. Sport hunters only want the trophy heads and pelts, so the guides will fly the meat into the village, and this helps families. This practice is waning too, however. It typically goes to elders and lower income people first.

The previous baseline study from 1987 compared to 2009 data show the dearth of land mammals hunted now compared to previous years (Figures 37 and 38). This is seen in both pounds usable weight and the total community harvest levels (Figure 39). Both changes in estimated total pounds and the percent change in estimated total pounds reflect the region-wide reduction in access to caribou and the concomitant shift towards salmon in these communities (Figures 40 and 41). Port Heiden also has experienced a significant increase in the use of sea mammals as an alternative to their access to terrestrial mammals. These same community data are reflected at the household level (Figures 42 and 43).

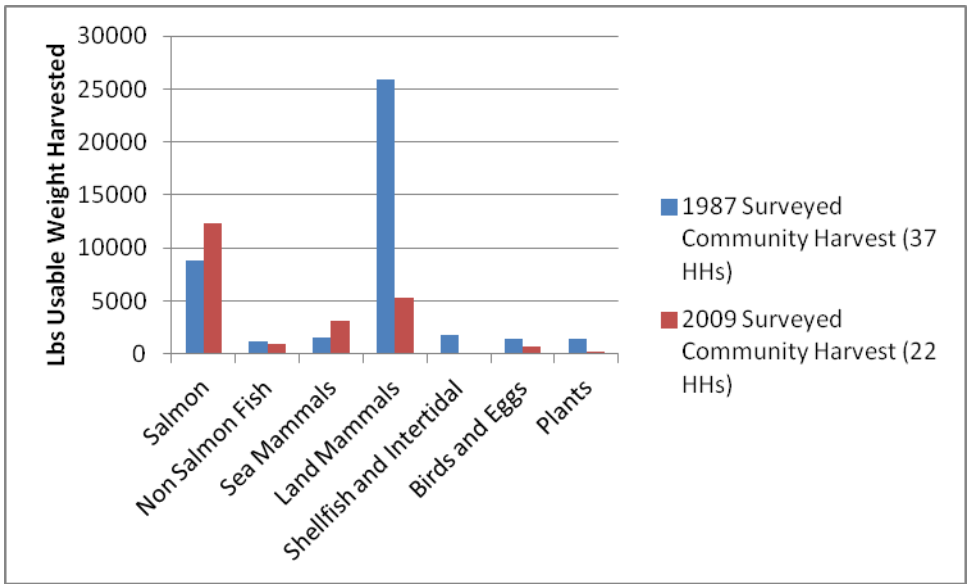

Figure 37. Pounds usable weight harvested by species category between the 1987 Subsistence Division survey (37 of 37 HHs) and this project (22 of 29 HHs), Port Heiden.

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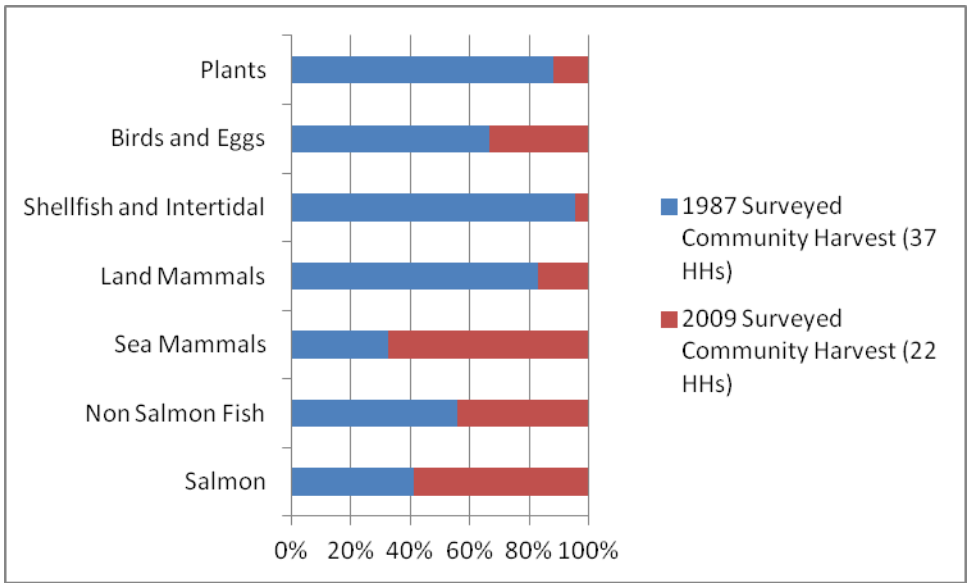

Figure 38. Percent of total pounds usable weight harvested by resource category in Port Heiden between 1987 (37 of 37 HHs) and 2009 (22 of 29 HHs) (Source: ADF&G CSIS).

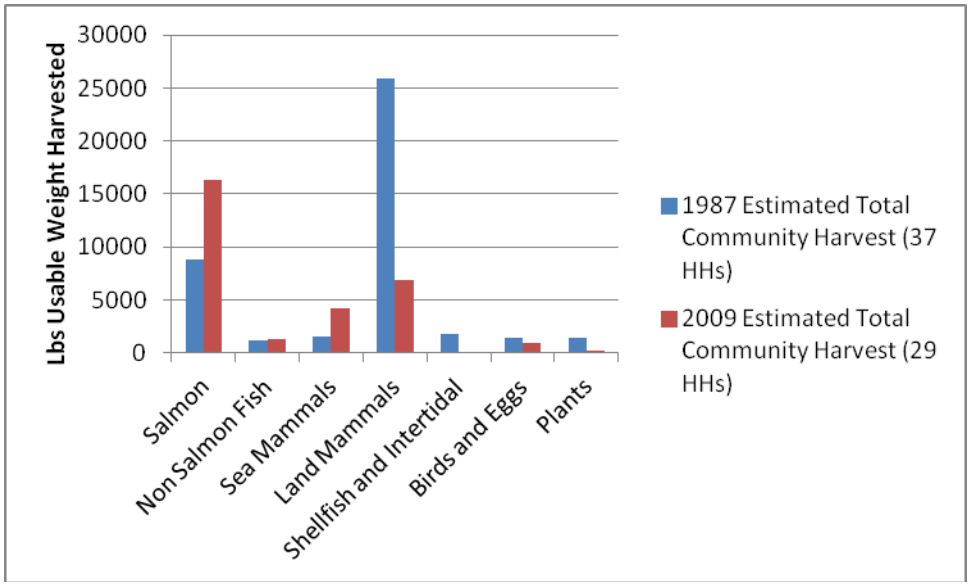

Figure 39. Estimated total community harvest levels for 1987 and 2009 by species category, Port Heiden.

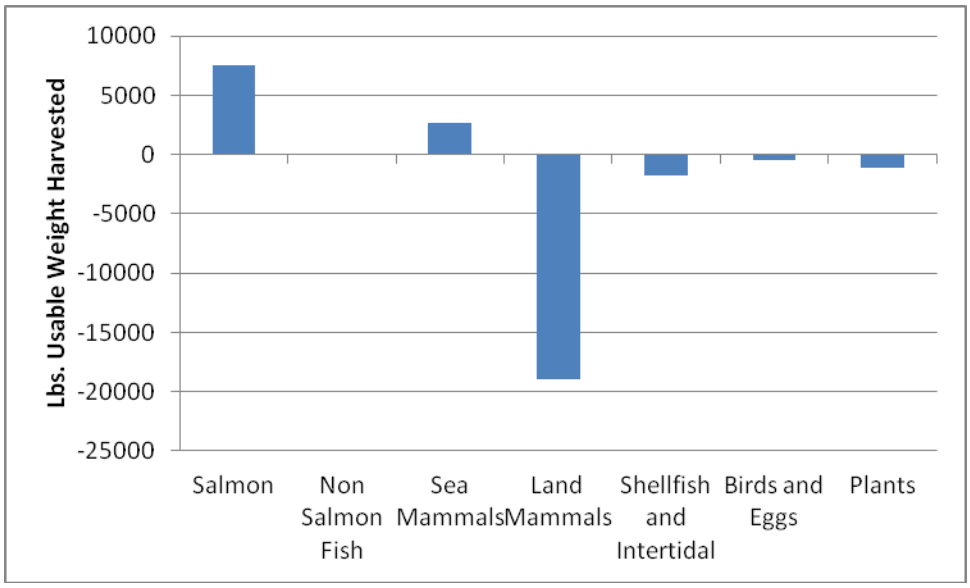

Figure 40. Change in estimated total pounds usable weight harvested by species category between 1987 and 2009, Port Heiden.

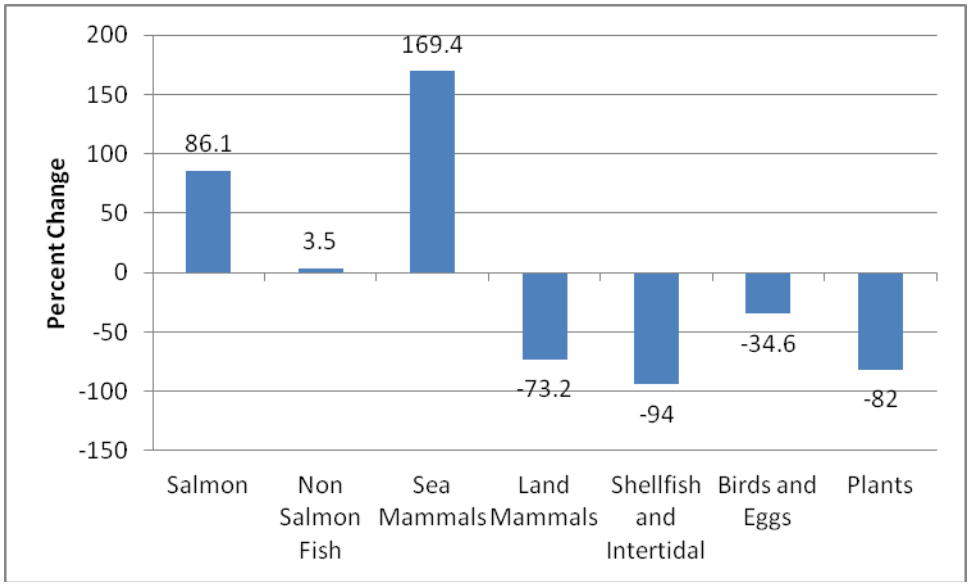

Figure 41. Percent change of estimated total pounds usable weight harvested by species category between 1987 and 2009, Port Heiden.

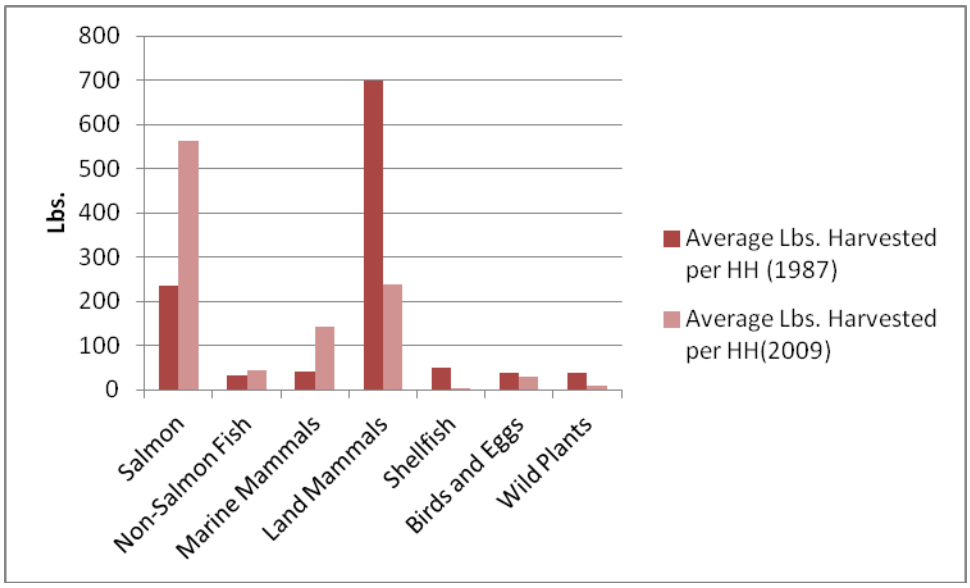

Figure 42. Change in average pounds harvested per household between 1987 and 2009, Port Heiden.

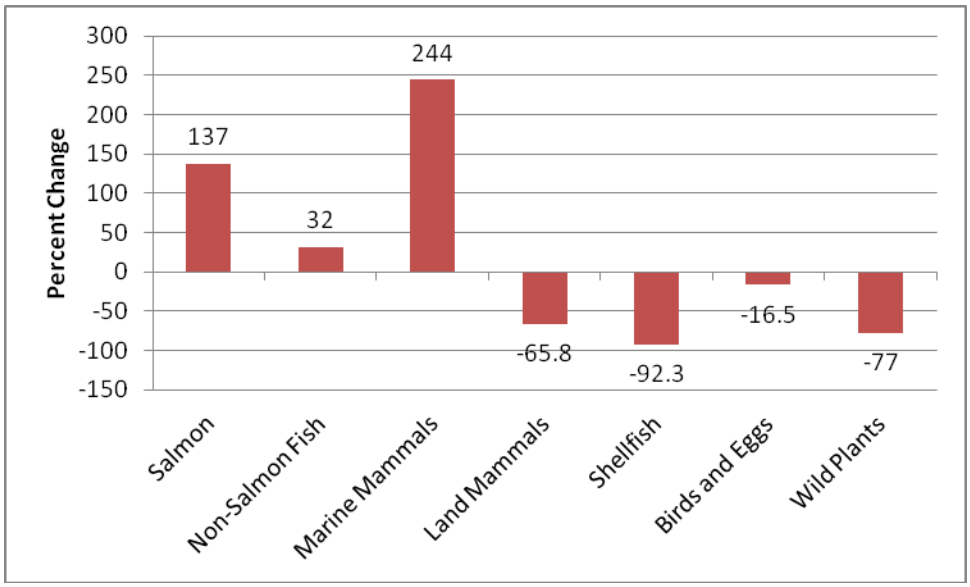

Figure 43. Percent change in Lbs. Harvested per household between 1987 and 2009, Port Heiden.

Subsistence Security

Because caribou hunting is closed, and moose are very sparse now because of sport hunting pressure, hunters have moved on to hunting bear for food. Regulations do not require them to salvage the meat but they will take orders from elders and others who like select parts of the bear, and bring those portions home from a hunt. In 2009, brown bear ranked sixth in top ten harvests, but the entire animal is generally not consumed, only choice parts. Respondents said usually young bears, approximately 300 pounds, taste the best.

When comparing the top 10 species harvested between 1987 and 2009, a number of important changes have occurred. The overwhelming dominance of caribou in 1987 has been replaced by

chinook salmon, sockeye salmon, and harbor seal (Figures 44 and 45). These data are reflected in pounds per capita harvested and the percent change per capita harvested between these two time periods (Figures 46 and 47).

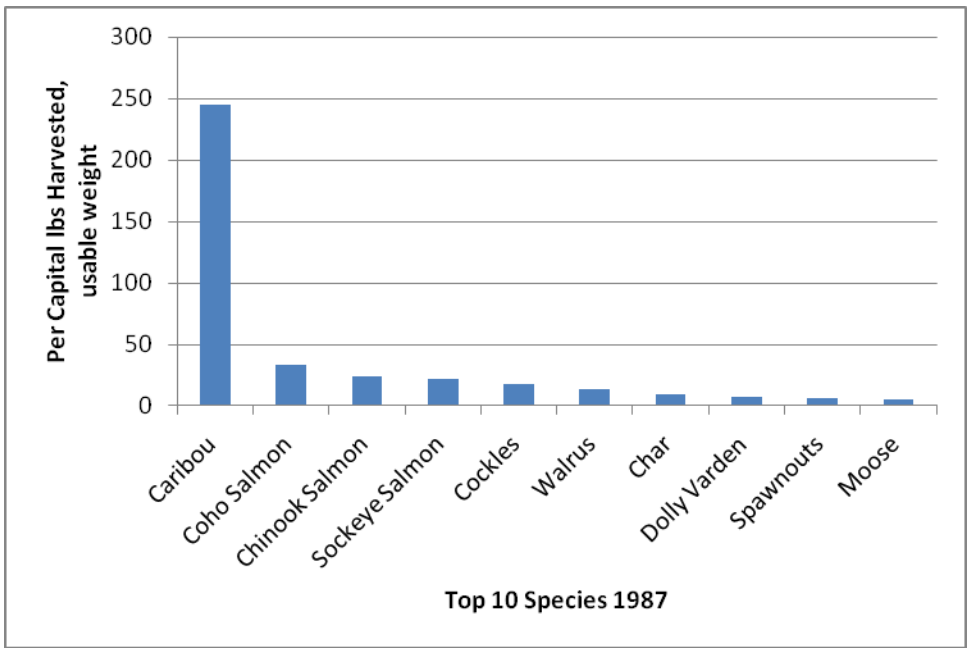

Figure 44. Top ten species harvested in 1987, Port Heiden.

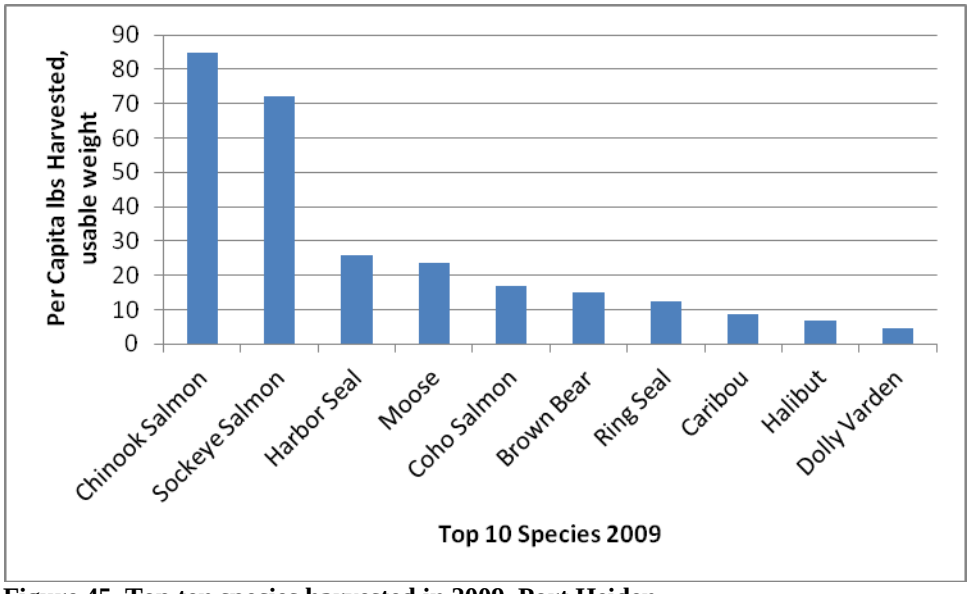

Figure 45. Top ten species harvested in 2009, Port Heiden.

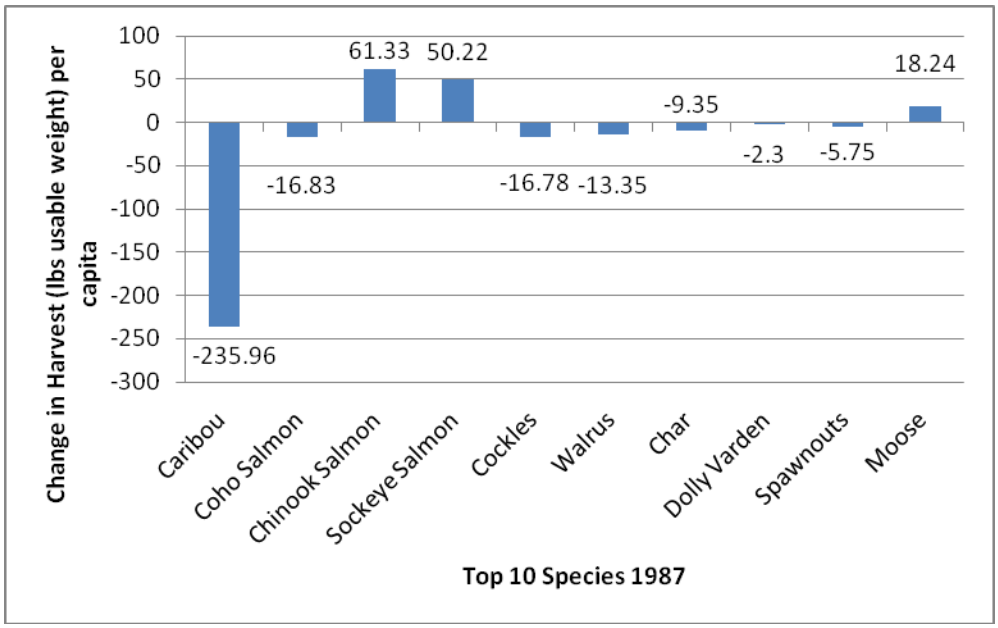

Figure 46. Change in pounds usable weight harvested per capita in 2009 for the top ten species harvested in 1987, Port Heiden.

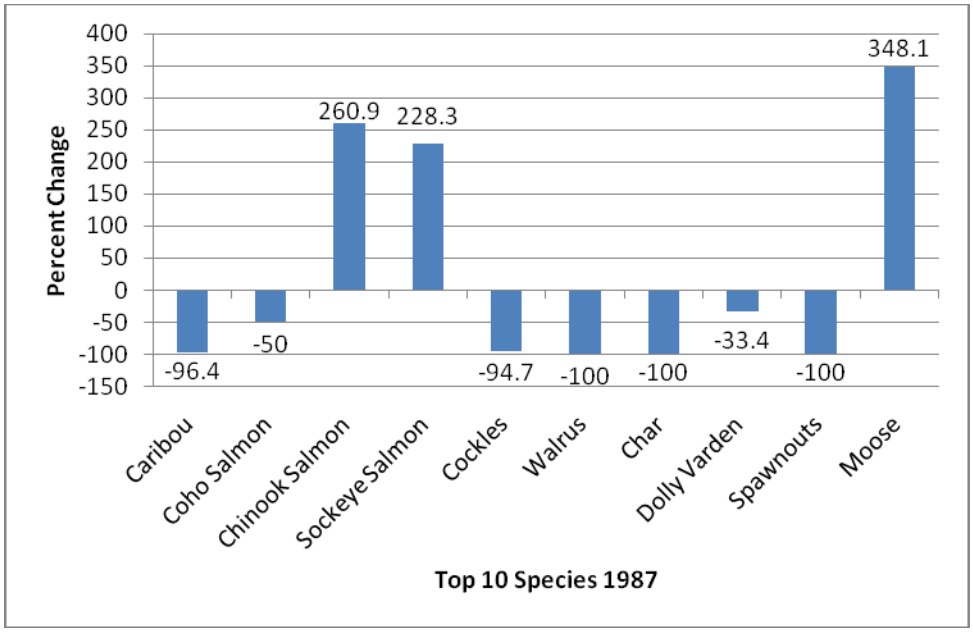

Figure 47. Percent change in per capita harvest in 2009 for the top 10 species harvested in 1987, Port Heiden.

There is a community-wide emphasis in making sure that children learn how to harvest this landscape and use wild foods. For example, a local man recently ran a culture/subsistence camp where he took 14 children to Strogonof Point and taught them about harvesting numerous species and living in the wild, and told stories about his own adventures. This man stated that uncles should teach, not the fathers, because they will be too soft on the children. For this camp, he taught them the rules of hunting and what not to take in a certain year, for example, never take any animal when they are pupping, calving or hatching. He also taught about medicines in teas and roots; they have to be used in moderation because they are strong.

Port Heiden also hosts Culture Week, also known as Carnival, in early March in which people from all over the Lake and Peninsula Borough come to Port Heiden for a big celebration. These weeks are also for recording elders' stories and listening to one another. There is singing, eating, language sessions, crafts, skin sewing, and dancing, among other celebrations. Other nearby villages hosts similar Carnivals and invite Port Heiden to attend.

Many households are not getting enough land mammals (caribou and moose) due to sport pressure and population problems, plants (berries in this case, due to a poor spring), or shellfish (cockles/clams) due to sea otters (Figure 48). When asked whether or not people used less, the same, or more of certain resources, the significant responses for 2009 were less clams, berries, and gull eggs (Figure 49).

Wild foods that are used in Port Heiden are mostly hunted, fished or collected. There were instances of people purchasing canned clams from Anchorage and from the local store to supplement the lack of clams found in the area. Figure 50 reflects those purchases compared to others.

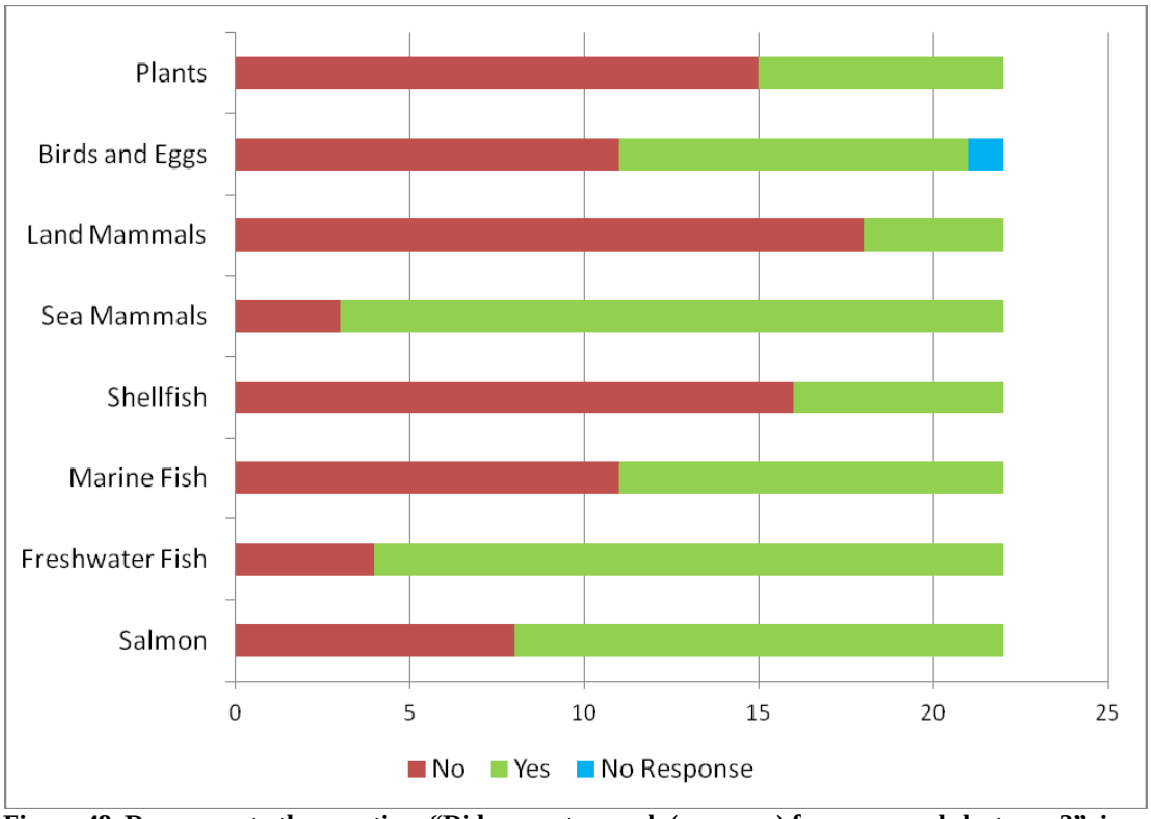

Figure 48. Responses to the question, "Did you get enough (resource) for your needs last year?", in percentages of Port Heiden households (N=22), 2009.

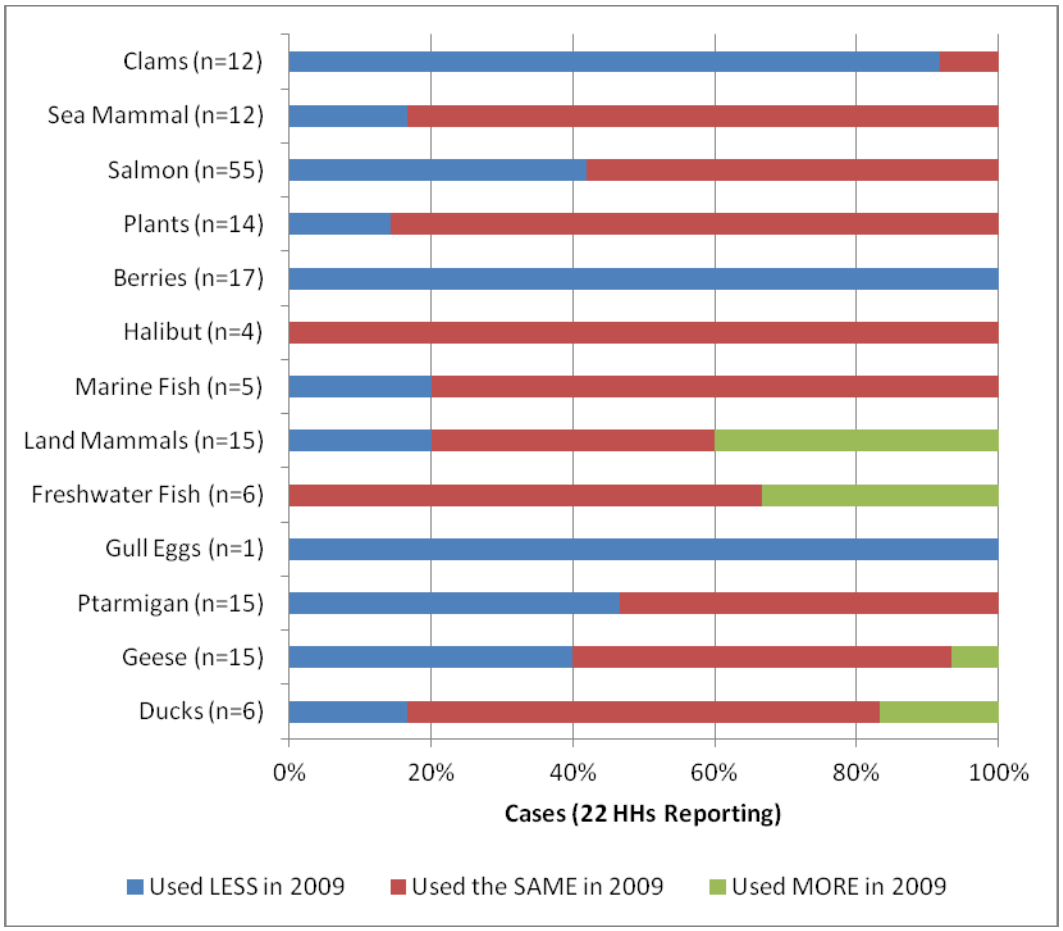

Figure 49. Port Heiden's responses to whether people used less, same, or more of resources in 2009 that in the past.

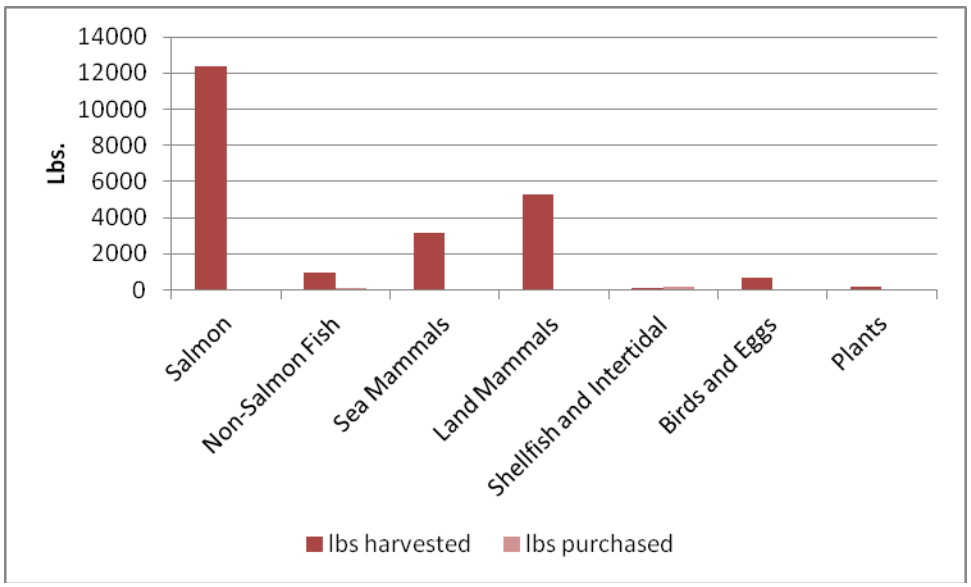

Figure 50. Port Heiden Lbs. of Wild Foods Harvested and Purchased, 2009.

The "30/70 rule" identified by the Subsistence Division, where 30 percent of a community's households harvest approximately 70 percent of that community's subsistence (in pounds usable weight), was tested for Port Heiden using a Pareto chart (Figure 51). For the households surveyed, Port Heiden demonstrates a higher concentration of harvests, where approximately 30 percent of households account for 81 percent of the community's total harvests. When considering the keystone species category of salmon (Figure 52), 30 percent of households are responsible for just over 70 percent of the community's total harvests.

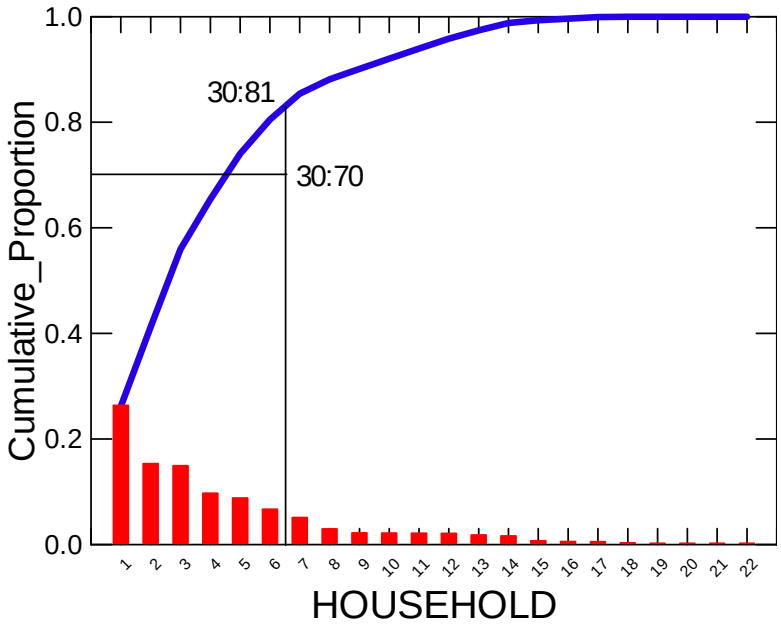

Figure 51. Pareto chart showing Port Heiden's household harvests, where 30 percent of the households are responsible for 81 percent of the harvests.

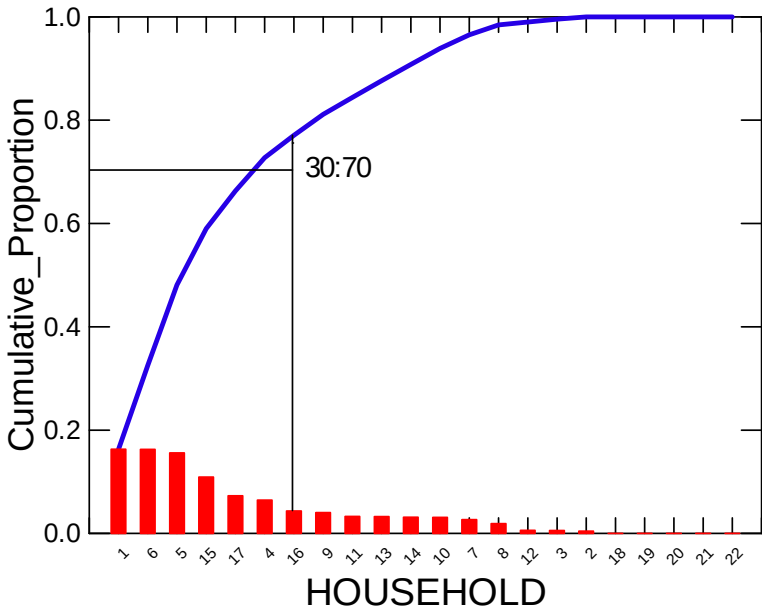

Figure 52. Pareto chart for salmon harvesters showing that about 30 percent of the households harvest 70 percent of the salmon in Port Heiden.

Figure 53 shows the total pounds of wild foods harvested by each household next to the total pounds of wild foods received. Three of the 22 surveyed households harvested no wild foods, and all received at least some. Of the 29,784 total pounds entering all Port Heiden households, 8,492 (28.5 percent) were received through sharing and are the products of social relationships.

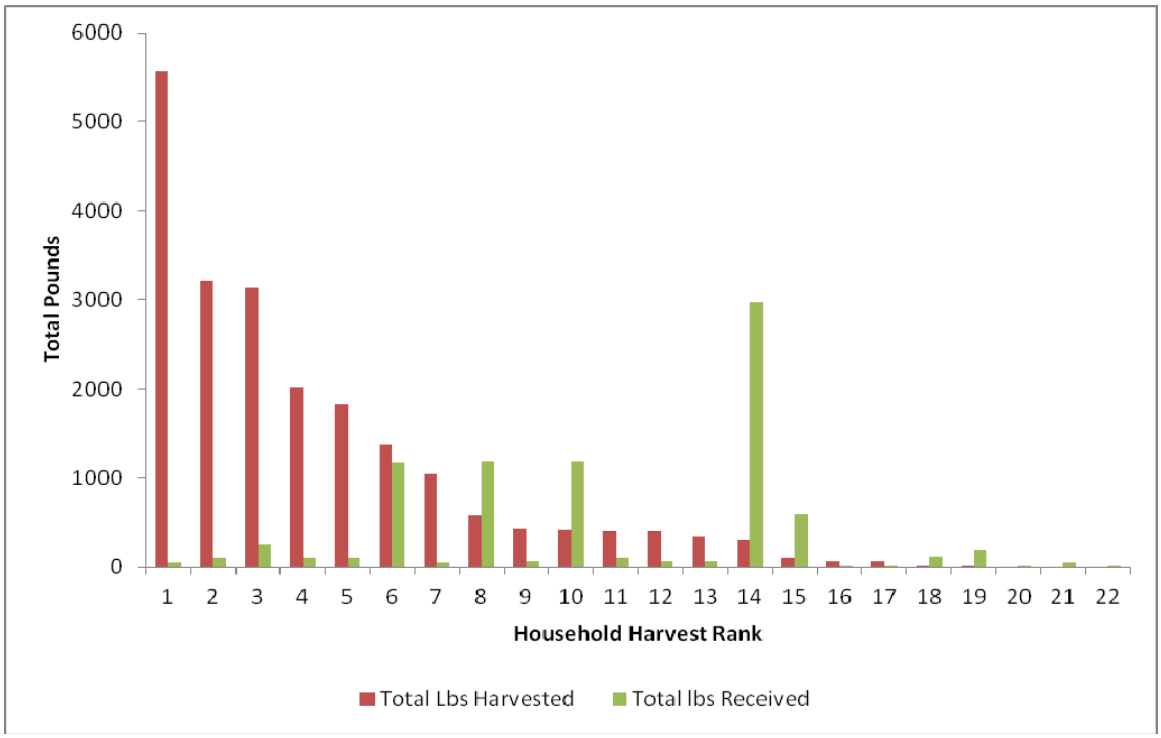

Figure 53. Total pounds of wild foods harvested versus pounds received by household, Port Heiden.

Crews and Cooperative Hunting and Fishing

Hunting is usually done in groups of men, or in family groups. To take a moose, a minimum of three hunters need to be working. Families tend to fish together, dig clams, pick berries and hunt ducks and geese together. Members of the largest family in Port Heiden talked about their "production line processing" after fishing and hunting expeditions. Generally, hunters and fishermen work cooperatively and share the results of their harvests.

Networks

Figures 54 and 55 show examples of the flow of foods for a hunter and fisherman from Port Heiden using interview data in 2008 and survey data in 2009. This is a highly subsistence-active individual who is responsible for providing certain foods to many households. In addition, this man harvests all five species of salmon, numerous birds, clams, seals and sea otters, and dolly varden for his own household. More comprehensive network data analysis is found in Appendix 2.

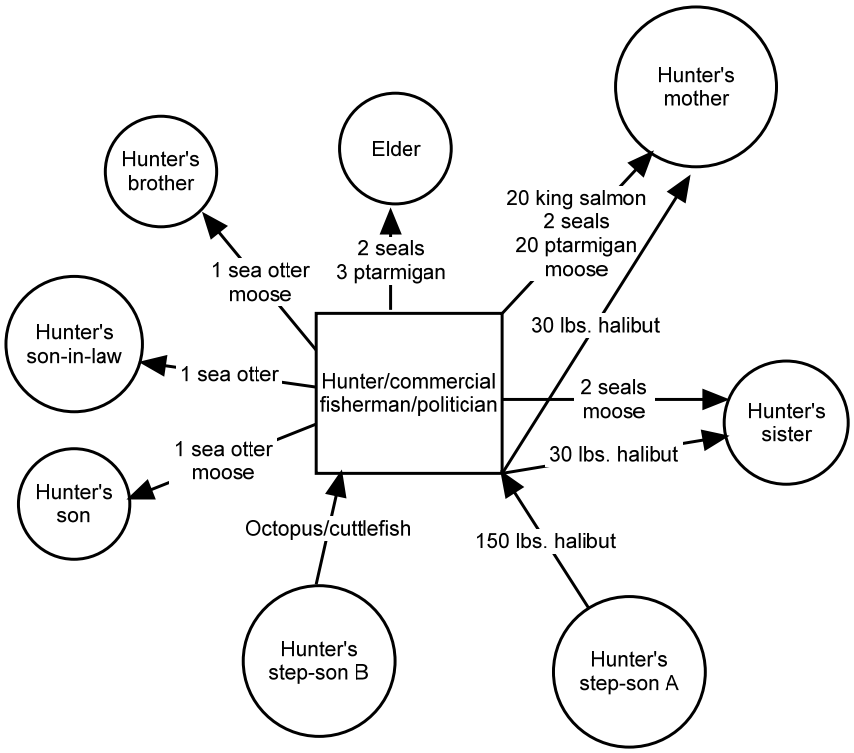

Figure 54. A sample of the flow of foods between households for one Port Heiden hunter/fisherman in 2008.

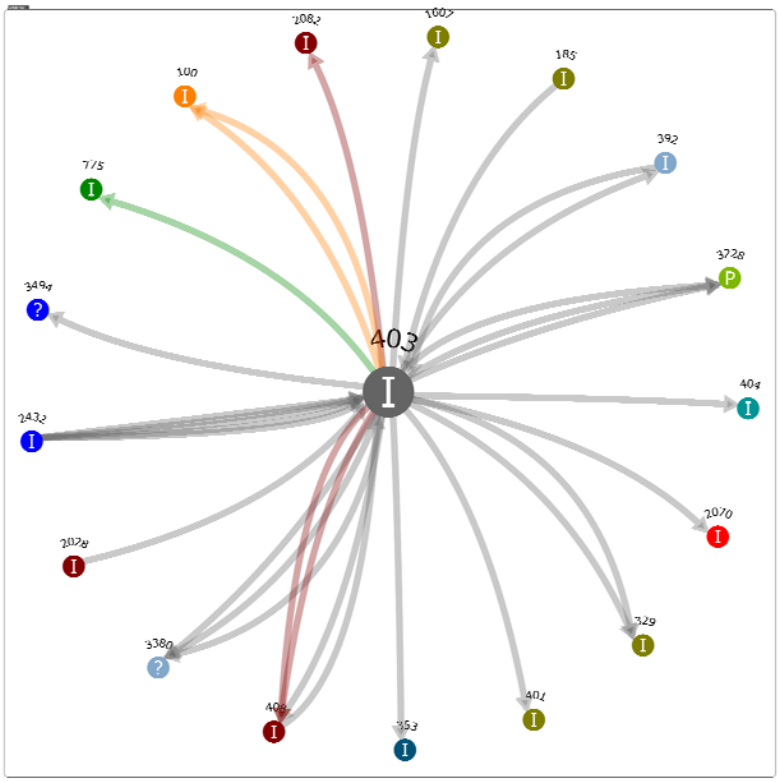

Figure 55. Sharing network for the same individual as in Figure 54 for 2009. Colors are added only to distinguish between lines. I=Individual, P=Processor, and ?=unknown/unidentified source. Numbers are codes distinguishing between identities.

Spatial Data

Port Heiden residents make use of the entire landscape and waterways between Aniakchak and Bristol Bay for subsistence and recreation using 4-wheeler trails and also traveling on foot. All spatial and geographic land use data are presented in Appendix 1.

COMMUNITY ECONOMICS

Fishing income only represented 24 percent of the household incomes in 2009 (Figure 56). This is partly because there were temporary jobs in soil remediation of the old White Alice site nearby which provided good wages. Directed fishing earnings in Port Heiden reported here are from six captains and four crewmen. The crewmen are all employed with local captains. These are primarily salmon fishermen. Forty adults named 85 separate job titles in Port Heiden, or 2.1 jobs per adult (Table 16). The majority of income in Port Heiden comes from a combination of local government, services, and fisheries (Table 17). More than 88 percent of the income in Port Heiden is earned income. Only 12 percent in composed of dividends or public assistance (Figure 57).

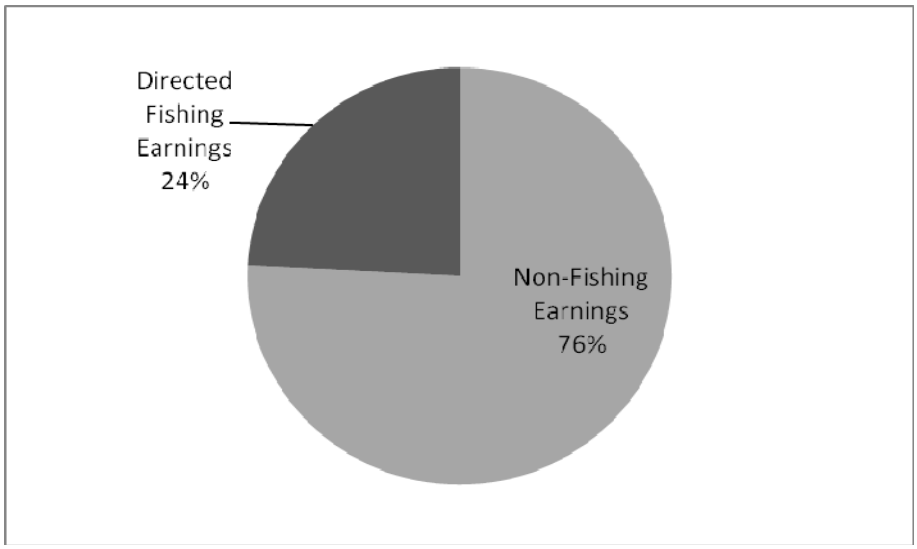

Figure 56. Port Heiden household incomes for fishing and non-fishing earnings, 2009. This does not take into account returns to the village from CDQs.

Table 16. Job titles identified by Port Heiden survey participants.

Heavy Equipment Operator/Laborer	15	Sport Guide	2
Fisherman/Crewman	13	Tribal Children Service Worker	2
Beach Cleanup	8	Airport Maintenance	1
Beach Cleanup	7	Airport Manager	1
Handyman	4	Administrative Asst.	1
Tribal/Corporation Administration	3	Coach	1
Janitor	3	City Clerk	1
Retail Clerk	3	Postmaster	1
Babysitter	2	Flagger	1
Bookkeeper/Billing	2	Fuel Deliverer	1
Bus Driver	2	Teachers Aide	1
Health Aide	2	Meter Reader	1
Cook	2	Business Owner	1
Environmental Director	2	Tank Farm Manager	1
		Peninsula Airways Agent	1

Table 17. Earned and other income, Port Heiden, 2009.

	Households	Total Income	Average per HH
Earned Income			
Local Government	16	608960	38060
Federal Government	6	155500	25917
Fisheries	11	454450	41314
Retail	6	91000	15167
Services	13	275320	21178
Education	1	1000	1000
Transportation	1	32000	32000
Other	1	7000	7000
Construction	1	2000	2000
Total Earned Income		**$1627230**	
Other Income			
Alaska Permanent Fund Dividend	20	80905	4045
Native Corporation Dividend	16	23653	1478
Unemployment	4	13400	3350
Workers' Compensation	1	12000	12000
Food Stamps	3	14850	4950
Social Security	4	45960	11490
Pension	1	27009	27009
Child Support	4	16500	4125
WIC	1	1926	1926
Total Other Income		**$236202**	
PORT HEIDEN TOTAL		**$1863432**	

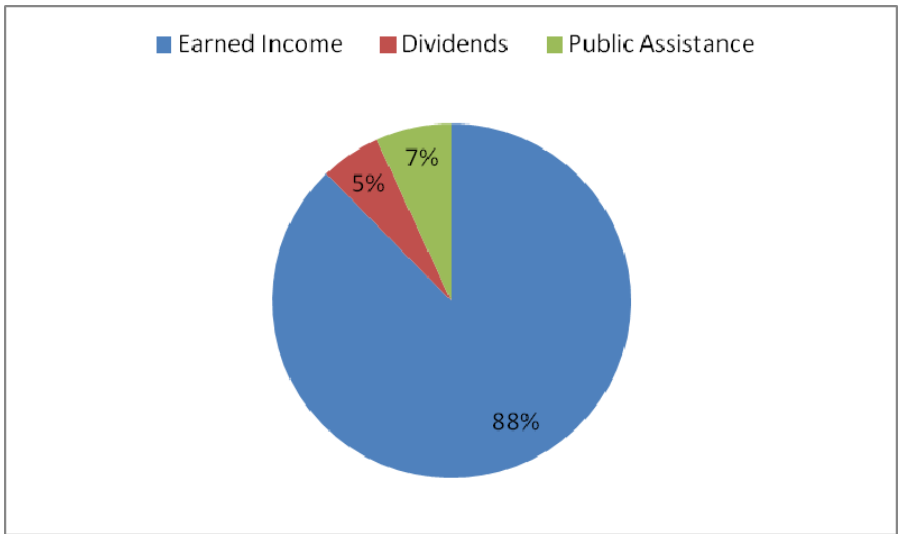

Figure 57. Port Heiden income sources, 2009

EXPENSES AND EXPENSE NETWORKS

Household Expenses

Groceries

There is a grocery store in Port Heiden, Jack's New Meshik Mall, where many grocery purchases are made and through which outside orders are coordinated. Households will also order independently. Households in Port Heiden spent an average of $10,409 on groceries (Figure 58). Grocery expenses reported ranged from between 5 percent to 41 percent of households' total incomes. Many large orders are shared between family members (Figure 59).

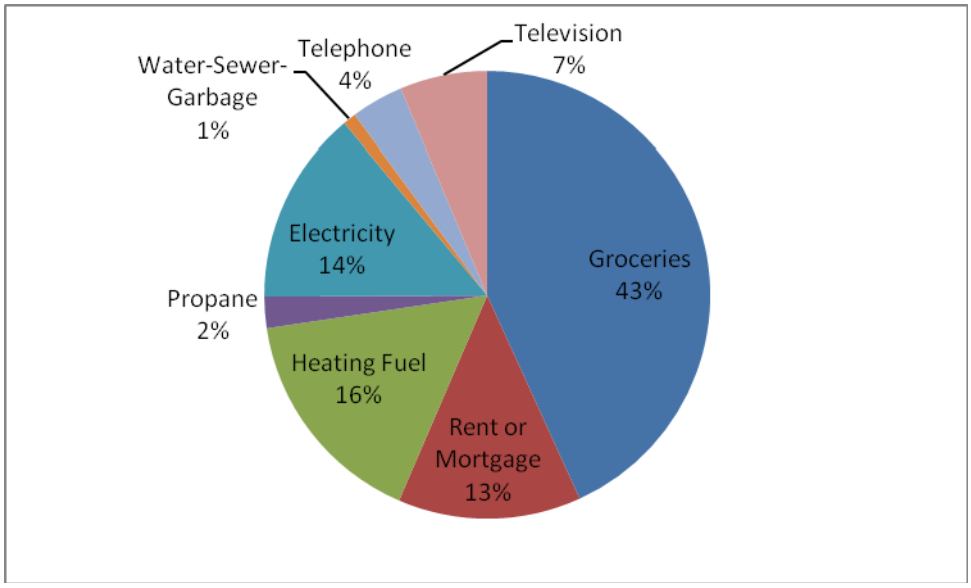

Figure 58. Relative Percentages of Annual Expenses, Port Heiden.

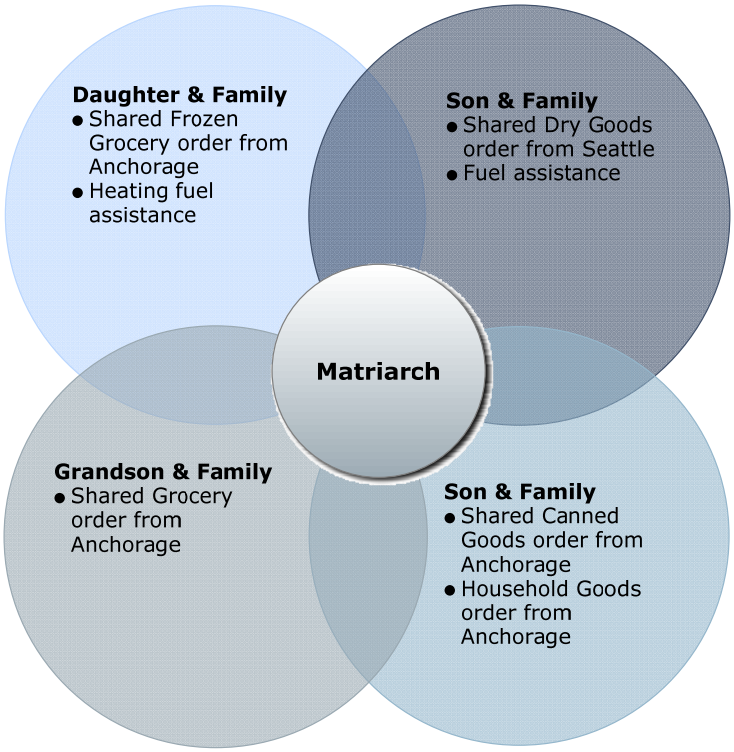

Figure 59. Shared grocery and other orders by four households with one matriarch.

Rent or Mortgage

Nine of the 22 surveyed households in Port Heiden pay a rent or a mortgage. These average $3,200 annually, or $267 per month, and are typically paid to the Bristol Bay Housing Authority.

Heating Fuel

Households in Port Heiden pay an average of $3,898 in heating fuel costs. Fuel prices for 2009 appear in Figure 60. Most households buy fuel oil, with a few heating by electricity from diesel powered generators.

Propane

Households pay approximately $544 in propane costs annually.

Electricity

An average of $3,375 per year is paid in electricity for each household. Port Heiden Utilities provides electricity from diesel powered electrical generators. The community building and several households have also added wind turbines to offset utility costs.

Water-Sewer-Garbage

These services are fairly inexpensive relative to other expenses in Port Heiden, with households paying an average of $230 annually. Garbage collection occurs three days a week and the city manages a landfill several miles from the village.

Telephone
Telephone service cost households an average of $913 annually during the survey year. Since then, many people have converted to cell phones and discontinued their land lines.

Television
Every home had at least one television, costing an average of $1,528 annually.

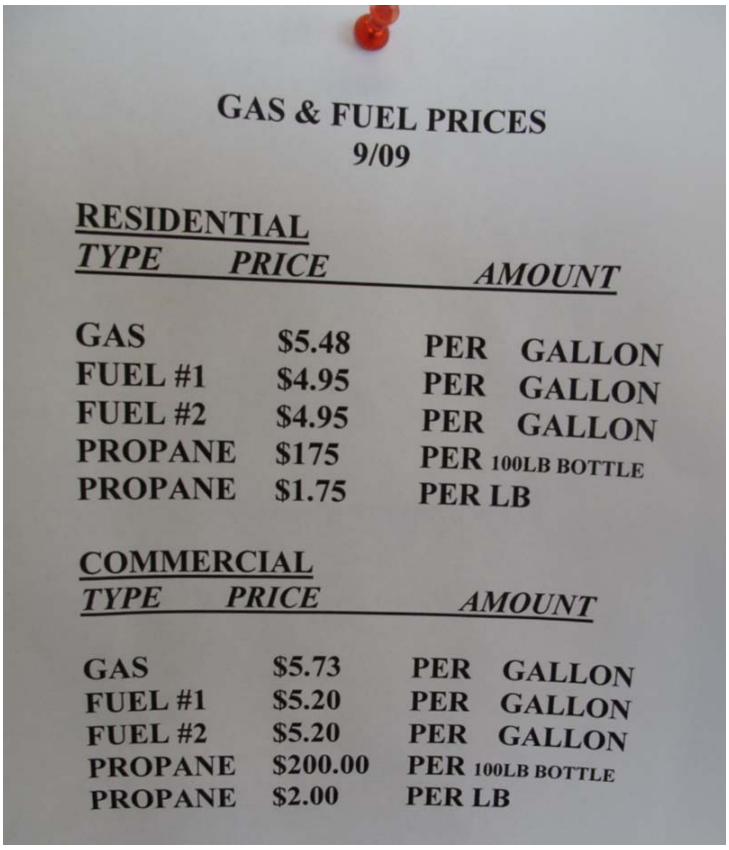

Figure 60. Gas & Fuel Prices posted in Ray's Place, the community center of Port Heiden. Photo by K. Reedy-Maschner, March 2010. Gasoline in Anchorage in March 2010 was $3.20 per gallon, and the national average was $2.81.

Subsistence Expenses

Gasoline
Estimating only gasoline costs for subsistence harvesting trips, households averaged $1,025 annually.

Ammunition
$262 was spent annually on ammunition for subsistence. This also included ammunition for killing wolves near the village, which is a part of protecting subsistence resources.

Supplies
An estimated $342 in subsistence supplies above ammunition and gasoline was spent in the survey year for each household.

Subsistence Equipment Owned, Shared, Purchased

Subsistence nets placed off the beach in Meshik Bay are generally shared with anyone who needs or wants some fish. Other equipment that allows subsistence activities owned by the 22 households surveyed is listed below (Table 18).

Table 18. Equipment used in subsistence harvesting reported by Port Heiden in 2009.

Equipment Type	Total	Households (of 22)	Average per Household with Equipment Type	Average per Household in Village
Skiffs	8	5	1.6	0.4
Outboard Motor	8	4	2	0.4
Commercial > 30' Boat	7	7	1	0.3
Snow Mobiles	8	4	2	0.4
ATVs; 4-Wheelers	17	13	1.3	0.8
Cars(s) or Truck(s)	39	19	2.1	1.8

POSITIVE INFLUENCE ON COMMUNITY LIFE

Twenty individuals and entities were named as having a positive influence on community life, including the tribal council and elders generally. Three women were named between five and seven times, one of whom is now deceased. They were praised for strong leadership, ethics, and community support.

SUMMARY

- Port Heiden appears to harvest a greater variety (54 different species) of wild foods, and a greater quantity of sea mammals, fish, and land species than the other study communities from local lands and waters.
- Port Heiden fishermen fish Bristol Bay Area T commercial fisheries as a primary economic base and employ family as crew. Commercial salmon fishery openings are starting earlier and earlier, which can interfere with subsistence and, thus, sharing.
- The city, tribal council and village pursue economic development options that involve land reclamation and soil remediation to keep their village and resources healthy.
- 30 percent of the households account for 81 percent of the total community's harvests, whereas 30 percent of households account for 70 percent of the community's total salmon harvests.
- Of the 29,784 total pounds of wild foods entering all Port Heiden households, 8,492 (28.5 percent) were received through sharing and are the result of social relationships other than the household's own harvests through cooperative hunting and fishing.
- The primary subsistence food is all species of salmon with 562.6 edible pounds per household (a 137 percent increase from 1987) and 16,315.4 edible pounds harvested for the community (an 86.1 percent increase from 1987).
- Gas rationing is a concern, and forces people to delay or combine hunts/fishing expeditions.

- Closure of caribou hunting has increased grocery costs, altered people's hunting behavior to target moose and bear, and is threatening a generation with cultural and skills losses.
- There was a 96.4 percent drop in per capita edible pounds harvested of caribou between 1987 and 2009. Moose and brown bear have gained importance, yet households reported 68.5 percent less land mammals harvested since 1987.
- Households reported harvesting 32 percent more non-salmon fish and 244 percent more marine mammals between 1987 and 2009.
- Households reported harvesting 92.3 percent less shellfish, 16.5% fewer birds and eggs, and 77 percent fewer wild plants between 1987 and 2009.
- Port Heiden is the only study village to seek and gain permits for ceremonial and educational caribou hunts.
- Sport hunting and fishing operations were identified by local people as negatively affecting Port Heiden's subsistence access.
- Community fishing nets support many people who have no other means to fish.
- Sharing networks are widespread, frequent, and diverse, occurring between Pacific communities (e.g. Perryville, the Chigniks) and into Bristol Bay.
- The population experienced a 14 percent decline between the 2000 and 2010 censuses.
- Economic opportunities in soil remediation and environmental cleanup currently support the majority of the community, and are attracting population growth.
- Controversy over the Pebble Mine has shaped attitudes towards all natural resource exploration and development. Leaders see opportunities for jobs and revenue sharing, while the community support is mixed.

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CHAPTER 6. FALSE PASS

INTRODUCTION

False Pass is an Aleut village located on the eastern end of Unimak Island facing Isanotski Strait (Figure 61). *Isanax* means "the pass" in Aleut, and was renamed False Pass because of the difficulties in navigating the channel. Established in 1917 from dwindling nearby villages, the community has been a small commercial fishing port for the past century. Today, the community struggles to stay viable; False Pass has a population of 35 (66 percent Aleut) (Census 2010). There are two homesteads across the pass. Six fishermen held seven commercial salmon fishing permits in 2008, with additional permit holdings in halibut, herring, sablefish, and other groundfish fisheries.

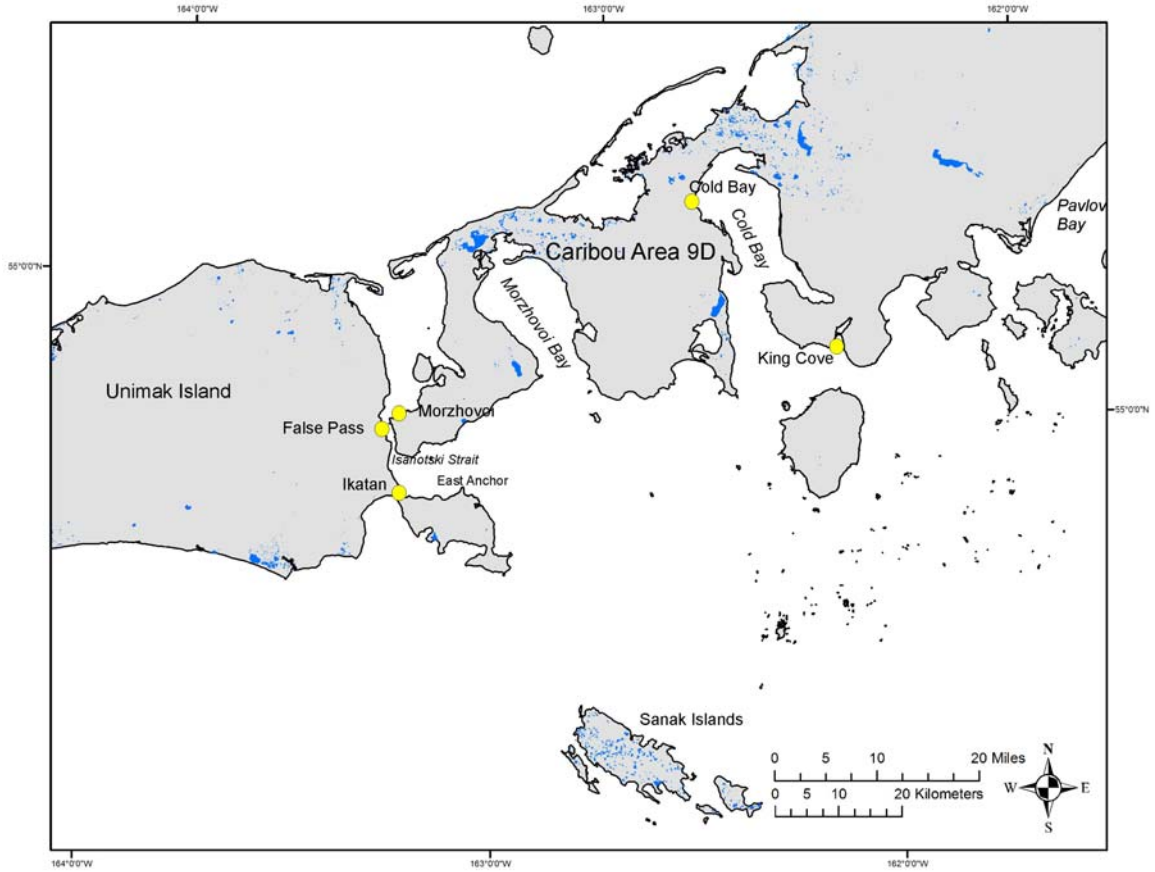

Figure 61. Regional map for the False Pass area. Map drawn by B. Benson and H. Maschner

VILLAGE HISTORY

False Pass was established around a P.E. Harris cannery beginning in 1917 with people from the now vacant villages of Morzhovoi, Ikatan and Sanak Island. Having been purchased by Peter Pan Seafoods, the cannery operated until it burned in 1981, but the facility continued to be a supply

base. In 2003, Peter Pan Seafoods announced closure of its facility altogether, but continues as a fueling station for the fishing fleet (Figure 62).

Figure 62. Old Peter Pan Seafoods, Inc. sign lying in the tundra, False Pass, Alaska, August 2009. Photo by K. Reedy-Maschner.

A school was built in False Pass in 1929, but did not operate every year as the number of children in the community fluctuated, especially since the school in Ikatan operated until 1956 and there was a lot of movement between communities. The school in False Pass was in the cannery hospital building. The next school was built in 1966 also on cannery property due to the efforts of the late Borge Larsen, the former cannery manager who was a legendary figure in the whole region. He followed his uncle Chris Larsen there from Denmark to take care of the P.E. Harris cannery. The AEB built the most recent school in the 1990s. It has struggled to stay open since the number of children is small.

The cannery was the focal point of False Pass, and owned fish traps near Ikatan, East Anchor and Pavlof Bay (Figure 61). The P.E. Harris facility was sold to Pacific American Fisheries and later to Peter Pan Seafoods. It processed salmon, crab and other Bering Sea and Pacific Ocean fish, but was always a smaller operation than its facility in King Cove. Food and supply orders came to the cannery store on the M/V *Dolphin* boat from Seattle, a small barge that came once a month. When Peter Pan burned in 1981, the False Pass economy struggled. Commercial fishing remained the focus of the economy, but fishermen delivered to tenders for the King Cove plant. Some people moved to King Cove and Sand Point.

The old Peter Pan Seafoods dock is now a fueling station with one man operating it, living in the "ghost town." Another family rents a house there from Peter Pan every summer, fishing nearby

and delivering to the Peter Pan tender that comes over from King Cove. The buildings appear as if people just closed the doors and left, leaving the store and houses as is.

There is an old boardwalk through the old part of town, but the village is now a series of roads, and the old boardwalk is in a terrible state, no longer used. Everyone uses "bikes" and cars now, driving the need for gasoline. Beach access is somewhat obscured because of the emphasis on roads. The F/V *Western Dawn* that caught fire at sea in 2006 sits as burned up wreckage on the beach, a reminder of fishing dangers.

Figure 63 shows a demographic profile of the community of False Pass. Table 19 breaks this down by household data. Both these sets of data show the very small number of children in the community, further emphasis that these communities are vulnerable.

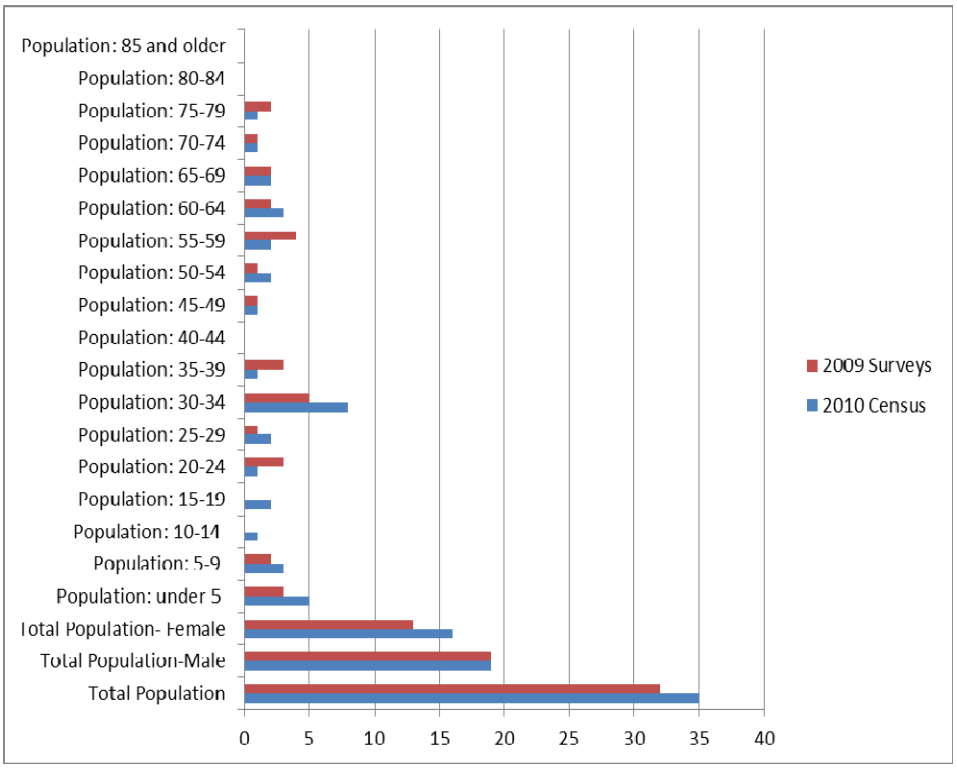

Figure 63. False Pass surveyed population and U.S. Census population.

Table 19. U.S. Census and Survey Population, False Pass.

	2010 Census	2010 Surveys
Households:	15	15
Family Households:	9	9
with own children under 18	4	3
Husband-Wife Family:	4	7
with own children under 18	2	3
Male Householder	2	1
with own children under 18	0	0
Female Householder	3	1
with own children under 18	2	0
Non-family Households	6	6
Householder alone	5	6
Male	2	5
65 or over	1	2
Female	3	1
65 or over	1	1
Households w/ individs under 18	4	3
Households w/ individs 65 & over	3	2
Average Household size	2.3	2.13
Average Family size	2.8	3.44

FISHERIES AND ECONOMIC DEVELOPMENT

In 2000, Bering Pacific Seafoods opened as a local cooperative cannery, which closed after two years. It reopened for the 2008-2012 salmon seasons and hires "outsiders" and a few local people. There used to be a "dipper," a floating processor/barge at the end of the dock in the late 1990s, and this facility is considered a major improvement.

Peter Pan Seafoods in King Cove sends tenders over to the False Pass area to collect fish off the boats. A tender, a type of vessel that moves fish from boats to canneries, that is operated by the seafood processor SnoPac comes down from Bristol Bay. Bering Pacific Seafoods, or BP, is primarily a "slime line", which is a fish gutting and cleaning assembly line to ready fish for market. They hire workers at $9/hour and provide housing, food, and transportation.

Commercial fishing issues weigh heavily on False Pass as a community and as a fishery. In the late 1990s and early 2000s, the "False Pass" fishery became hotly contested by people of the Arctic-Yukon-Kuskokwim and Bristol Bay regions as unfairly intercepting salmon bound for those streams. "False Pass was a convenient target," one local man said, and the controversy, and subsequent fluctuations in fishing regulations for the Area M fishery, added stress to an already fragile community.

Fishermen complained that they used to fish only in the summer to make a living but now must fish all year long. There are only four boats holding slips year round. There is a concern over fishing opportunities lost to local communities. "Handliners" refers to the cod fishermen of the late 19th and early 20th centuries who fished commercially for cod from dories using handlines. These men married locally and are ancestors to many in the region. Cod fishery traditions were lost to the future generations through North Pacific Fisheries Management Council management allocations. "Our fathers and grandfathers were handliners. It's in my heritage but where's my portion?" False Pass also participates in the CDQ program APICDA, which is funded based upon a portion of the Bering Sea pollock quota.

Crab fishing was described as a "huge tragedy," referring to the rationalization of crab. In 2005, the crab fisheries were restructured by the NPFMC to give quotas to both vessels and processors based upon historical participation, effectively reducing the crab fleet by approximately 75 percent. In 2008, there were perhaps 85 boats fishing in what used to be a 350 boat fishery. False Pass collected fishery tax on a PPSF floating processor that was put across the bay in season. False Pass also sold fuel and hanging bait to crab fishermen, and offered pot storage. A local man also moved pots for the boats as an employee of Isanotski Pot Storage. He also worked making alterations on the pots for the different fisheries/species. There were industries within the industry that have dwindled or no longer exist. Before rationalization, there were 5,000 pots stored in False Pass. Now there are 2,200 crab pots for 46 boats stored there.

One elder described how the pass used to be full of king crab. Locals would shine lights on the water to attract king crab which would come towards the people, who caught them with their hands. He said there were so many that the residents were feeding them to their dogs, "but not one codfish" was to be found. "Now you throw a halibut line off the Municipal Dock and get two codfish before it hits the bottom." People in False Pass will sometimes get crab from non-local Bering Sea crab fishermen passing through.

POLITICAL AND ECONOMIC LANDSCAPE OF FALSE PASS

False Pass faces serious housing shortages due to deterioration of the houses standing. There was an out-migration in early to mid-2009, and the population was down to 45 people in August 2009. By March 2010, only 35 permanent residents called False Pass home. Out-migration was due to failed relationships and partners leaving (with children too), people choosing to attend school in Anchorage, and people leaving for work. Several recent deaths also contribute to the decline (Figure 64).

Figure 64. The cemetery, fire truck, and house in the mountain shadows, False Pass 2009. Photo by K. Reedy-Maschner.

Despite this drop in population, the city has still secured numerous improvement monies. There is a planned airport expansion that was approved in the state budget. There is newly remodeled warehousing at the airstrip, and there is a new weather system set up there so Cold Bay pilots can get reliable information before flying. There is a new harbor completed in July 2009 (with rocks barged in because they cannot quarry rock here) and new crab pot storage space created by the waste from the harbor dredge. False Pass boats used to anchor in the pass using huge 750 lb. anchors during the fishing season, and pulled their boats up onto the beach in the off season. This was very hard on all the vessels due to the harsh weather.

There is a new liquor store owned by the Isanotski Corporation, the local village corporation, open for a couple hours each week day. There is a new landfill recently completed. Aleutian Housing Authority (AHA)[10] workers were building a duplex in the summer of 2009 for a Village Public Safety Officer (VPSO) hired in 2011. This is a local law enforcement and first responder

[10] Aleutian Housing Authority (AHA) was organized in 1977 to provide affordable housing and related housing services to low-to-moderate-income families throughout the Aleutian and Pribilof Islands region. With the passage of the federal Native American Housing and Self-Determination Act (NAHASDA) in 1998, AHA became the "Tribally Designated Housing Entity" (TDHE) for the region.

program that provides rural Alaska communities with public safety assistance, when hired. A business need mentioned repeatedly is that of a hardware store.

Profit-sharing forms a significant portion of the local revenue. APICDA and Bering Pacific Seafoods engage in profit sharing. There is also revenue from wharfage charges, mooring fees, sales tax, bed taxes, and a raw fish tax.

Although the community has a Library and Recreation Center, neither was open regularly for youths in 2009. The Recreation Center is rented out by the City to travelers and researchers as hotel space, and it is where the author of this report stayed and conducted interviews. There were stacks of tissue boxes everywhere, left over from a number of recent funerals. The clinic is located near the cemetery, and one man joked that once someone dies they "open a shoot and send them over to their grave." Although every community faces difficulties related to alcohol and untimely deaths, several recent "younger deaths" that were alcohol related in False Pass made it a current topic for discussion during interviews. As one woman stated, "You're looking at a few square miles with nothing but a liquor store."

There was a discussion of a greenhouse being built for home grown vegetables. The cancer rate is high and diet was blamed by several people; it was hoped that this plan would change diets. No one is purely subsistence anymore given greater access to western foods, and people are worried over the health consequences of a western diet, such as obesity, diabetes, and heart disease. Potluck foods are very starchy: potatoes, cheese, and bread. Soda and alcohol are also consumed frequently. Some families order groceries from Seattle once or twice a year, but freight prices make this very expensive. Some also shop for groceries at the local store, which is extremely expensive.

There was also mention of capturing tidal energy and increasing the number of wind turbines (currently the city office owns one but it is not operational). Geothermal was also mentioned. Fuel costs concern everyone. Two 50-gallon drums of oil cost $1000.00 and last only a few months. The village is now so spread out along the shore that a vehicle is necessary. But, as one man said, "people complain about the price of fuel and groceries, but for the price of booze and cigarettes, they're not complaining," which are also approximately twice the costs as in Anchorage.

Tourism in the form of hunting lodges has been discussed, but there is concern that these would interfere with subsistence. This is especially worrisome with the closure of caribou hunting. One man stated that he harvested caribou more than any other species and missed it terribly. He was frustrated with the recent management history after a trophy hunt was paired with a subsistence hunt, and then closed the following year. One man felt that the Unimak herd could sustain a small hunt, but if it was opened up to King Cove, Sand Point, and False Pass, the quota would be unrealistic. One man distinguished a "False Pass culture" that includes a greater dependency on caribou than the other Borough villages, although his characterization of others as "sport hunters" would not likely be well received.

SUBSISTENCE PRACTICES AND CONCERNS

Salmon is the main subsistence food (Table 20, Figure 65). Subsistence fishing with rod and reel is done off the dock. Halibut fishing is done there as well, tying the line to the dock. *Ukela*, or half-dried salmon, is prized.

False Pass gets an abundance of berries. Salmonberries, wild strawberries, moss berries, blueberries, and cranberries are picked right in town, on the hillsides, by the old houses in Morzhovoi Village and Ikatan Village, and by the dump. Strawberries are found near Ikatan and on Sanak Island. People use hand-held, tined berry pickers for the smaller berries. Berries are eaten with milk and sugar, made into pies and jelly, eaten fresh or frozen for later. People also make salmonberry wine.

Caribou hunting is closed. The caribou population on Unimak Island and the Alaska Peninsula is viewed as having been reduced by wolves. One man used to get between two and three caribou every year and shared them with family and elders in False Pass, but not anymore. "No more caribou. No more elders either," he said. A few local men will go to Sanak Island to take a domestic cow, which are left over from the cod fishing days of the 1880s to 1920s when fishermen imported cattle to the island for meat and milk. Beef is not seen as an alternative to caribou; it is simply another subsistence animal on the landscape.

Locals go *bidarki* (chiton) picking all year, gather sea (urchin) eggs, catch octopus, and collect *pushki* (cow parsnip) and *petrushki* (wild parsley). They make octo-burgers out of beach octopus. They also collect rhubarb stalks for food and beach grasses for basket weaving. Other prize foods are seal oil and *ulla* (whale meat that is scavenged from beached whales, not hunted), which are usually traded in from other communities such as King Cove.

A woman in town has been teaching about the health uses of plants. Low *pushki* roots are split and used to dress wounds; *Iris setosa,* or blue flag iris, is a natural laxative, *Geum Calthifolium* (commonly called calthaleaf avens) roots are boiled and made into tonic that is drunk for sore throats and colds. The leaves put on open wounds. Narcissus flowered anemone juices are used to treat hemorrhage. They also drink the juices after the root was boiled for internal ailments. It appears that these are not current or widespread practices, but there is an effort to retain the knowledge.

Table 20. Subsistence Data for False Pass.

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
Birds/Eggs	Tern Eggs	2	0.60	0.60	0.00	1.20	0.60	0.00	0.60	0.60	0.00	0.08	0.04	1.28
	Wigeon Duck	1	7.00	7.00	0.00	7.00	7.00		7.00	7.00		0.47	0.22	7.47
	Gadwall Duck	2	1.60	6.40	4.80	8.00	4.00	2.40	-26.49	34.49	3.39	0.53	0.25	8.53
	Goldeneye Duck	1	8.20	8.20	0.00	8.20	8.20		8.20	8.20		0.55	0.26	8.75
	Pintail Duck	4	1.60	8.00	6.40	20.80	5.20	1.65	-0.05	10.45	3.30	1.39	0.65	22.19
	Unknown Duck	1	22.50	22.50	0.00	22.50	22.50		22.50	22.50		1.50	0.70	24.00
	Teal Duck	6	3.00	12.00	9.00	33.60	5.60	1.40	2.00	9.20	3.43	2.24	1.05	35.84
	Mallard Duck	4	5.00	20.00	15.00	45.00	11.25	3.15	1.24	21.26	6.29	3.00	1.41	48.00
	Brant	3	6.00	36.00	30.00	54.00	18.00	9.17	-21.43	57.43	15.87	3.60	1.69	57.60
	Geese	2	5.00	50.00	45.00	55.00	27.50	22.50	-258.39	313.39	31.82	3.67	1.72	58.67
	Gull Eggs	5	3.60	60.00	56.40	136.20	27.24	13.41	-9.99	64.47	29.99	9.08	4.26	145.28
	Ptarmigan	5	14.00	56.00	42.00	147.00	29.40	7.79	7.76	51.04	17.43	9.80	4.59	156.80
	Canadian Geese	5	12.60	63.00	50.40	157.50	31.50	9.44	5.30	57.70	21.10	10.50	4.92	168.00
	Total					**696.00**						**46.40**	**21.75**	**742.40**
Land Mammals	Bear	1	1360.00	1360.00	0.00	1360.00	1360.00		1360.00	1360.00		90.67	42.50	1450.67
	Feral Cattle	4	700.00	1750.00	1050.00	4550.00	1137.50	262.50	302.11	1972.89	525.00	303.33	142.19	4853.33
	Total					**5910.00**						**394.00**	**184.69**	**6304.00**
Non-Salmon Fish	Dolly Varden	1	4.00	4.00	0.00	4.00	4.00		4.00	4.00		0.27	0.13	4.27
	Yelloweye	1	48.00	48.00	0.00	48.00	48.00		48.00	48.00		3.20	1.50	51.20
	Red Rockfish	1	50.00	50.00	0.00	50.00	50.00		50.00	50.00		3.33	1.56	53.33
	Cod	8	6.40	384.00	377.60	749.60	93.70	43.15	-8.33	195.73	122.05	49.97	23.43	799.57
	Halibut	10	19.20	1843.20	1824.00	2922.40	292.24	174.07	-101.53	686.01	550.45	194.83	91.33	3117.23
	Total					**3774.00**						**251.60**	**117.94**	**4025.60**
Plants	Wild Rice	1	1.00	1.00	0.00	1.00	1.00		1.00	1.00		0.07	0.03	1.07
	Fiddlehead Ferns	2	0.50	0.60	0.10	1.10	0.55	0.05	-0.09	1.19	0.07	0.07	0.03	1.17
	Wild Rhubarb	2	0.08	1.40	1.32	1.48	0.74	0.66	-7.65	9.13	0.93	0.10	0.05	1.58
	Beach Greens	1	8.00	8.00	0.00	8.00	8.00		8.00	8.00		0.53	0.25	8.53
	Cranberries	2	0.08	8.00	7.92	8.08	4.04	3.96	-46.28	54.36	5.60	0.54	0.25	8.62
	Fireweed	1	20.00	20.00	0.00	20.00	20.00		20.00	20.00		1.33	0.63	21.33
	Petrushki	8	0.16	8.00	7.84	27.40	3.43	0.99	1.08	5.77	2.81	1.83	0.86	29.23

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
	Strawberries	4	0.03	16.00	15.97	34.20	8.51	3.30	-1.99	19.00	6.60	2.28	1.07	36.48
	Pushki	10	0.08	20.00	19.92	46.92	4.69	2.24	-0.37	9.75	7.07	3.13	1.47	50.05
	Blueberries	6	2.00	16.00	14.00	50.00	8.33	1.82	3.66	13.01	4.46	3.33	1.56	53.33
	Mossberries	7	0.75	60.00	59.25	140.75	20.11	8.27	-0.14	40.35	21.89	9.38	4.40	150.13
	Salmonberries	12	0.16	188.00	187.84	484.16	40.35	14.56	8.29	72.40	50.45	32.28	15.13	516.44
	Total					**823.09**						**54.87**	**25.72**	**877.96**
Salmon	Pink Salmon	6	15.00	125.00	110.00	315.00	52.50	16.82	9.26	95.74	41.20	21.00	9.84	336.00
	Chinook Salmon	8	33.26	415.75	382.49	1480.07	185.01	46.24	75.68	294.34	130.77	98.67	46.25	1578.74
	Coho Salmon	5	69.36	1156.00	1086.64	1976.76	395.35	198.76	-156.51	947.21	444.45	131.78	61.77	2108.54
	Chum Salmon	5	32.52	1084.00	1051.48	2254.72	450.94	202.53	-111.36	1013.24	452.86	150.31	70.46	2405.03
	Sockeye Salmon	10	46.62	1554.00	1507.38	3085.32	308.53	145.28	-20.12	637.19	459.43	205.69	96.42	3291.01
	Total					**9111.87**						**607.46**	**284.75**	**9719.33**
Sea Mammals	Harbor Seal	2	30.00	56.00	26.00	86.00	43.00	13.00	-122.18	208.18	18.38	5.73	2.69	91.73
	Total					**86.00**						**5.73**	**2.69**	**91.73**
Shellfish/Intertidal	Razor Clams	1	15.00	15.00	0.00	15.00	15.00		15.00	15.00		1.00	0.47	16.00
	Sea Urchins	6	1.60	8.00	6.40	18.60	3.10	1.00	0.54	5.66	2.44	1.24	0.58	19.84
	Clams	1	24.00	24.00	0.00	24.00	24.00		24.00	24.00		1.60	0.75	25.60
	Dungeness Crab	2	5.60	60.00	54.40	65.60	32.80	27.20	-312.81	378.41	38.47	4.37	2.05	69.97
	Tanner Crab	2	44.00	100.00	56.00	144.00	72.00	28.00	-283.77	427.77	39.60	9.60	4.50	153.60
	Bidarkis	9	0.60	108.00	107.40	324.10	36.01	12.10	8.11	63.92	36.30	21.61	10.13	345.71
	Butter Clams	2	30.00	300.00	270.00	330.00	165.00	135.00	-1550.34	1880.34	190.92	22.00	10.31	352.00
	Octopus	9	20.00	240.00	220.00	732.00	81.33	27.56	17.78	144.89	82.68	48.80	22.88	780.80
	Total					**1653.30**						**110.22**	**51.67**	**1763.52**
All Resources	**Total**					**22054.26**						**1470.28**	**689.20**	**23524.54**

There is a great deal of waterfowl hunting on Unimak Island, but locals are not always licensed. Men go out in hunting parties. Bird shortages were mentioned for Canadian geese and ducks, which they "had to bum from other hunters [in the community] when they got scarce."

Relevant to plant harvesting, there is only one *banya* in town that is currently in use and they will let everyone know if they fire it up. While there is no beach grass used for the banya to splash water on their backs, people will use rags instead, and occasionally fireweed.

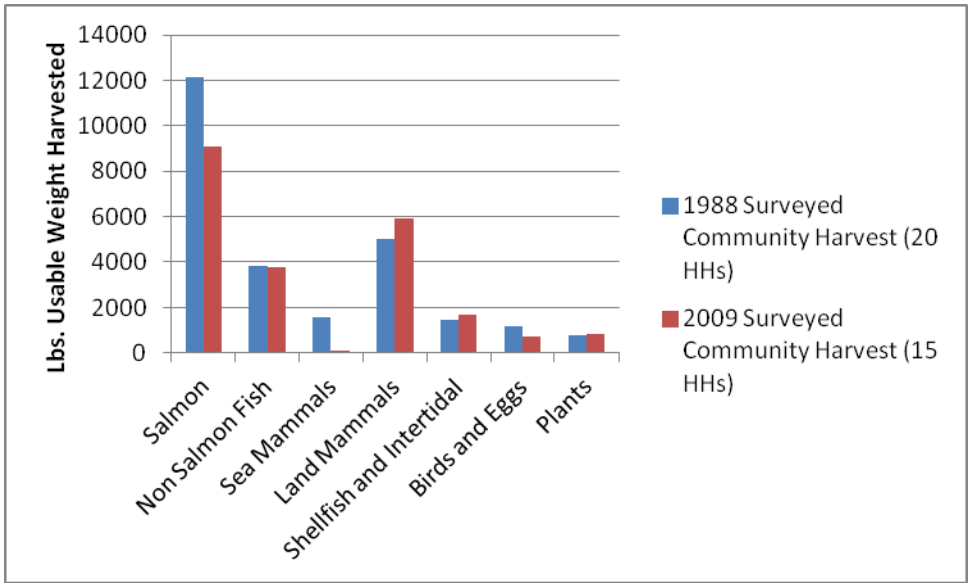

Figure 65. False Pass harvests by pounds usable weight between the 1988 Subsistence Division survey (20 of 22 HHs) and this project (15 of 16 HHs).

Figures 66 and 67 provide comparisons between the 1988 Subsistence Division survey and the 2009 data. Unlike the other communities in this survey, the 1988 and 2009 data are remakably similar in all areas except sea mammals, which played little role in the 2009 harvest. When converted to pounds usable weight of harvest, and their percentages, there is a reduction in salmon, sea mammals, and birds and eggs, and an increase in land mammals, which is a product of increasing use of Sanak Island cattle (Figures 68 and 69). The household data (Figure 70 and 71) show similar trends in the community data, except there has been no reduction in the household harvest of salmon even though in Figure 68 there is a community-wide reduction in the use of salmon, as a product of fewer households in the community.

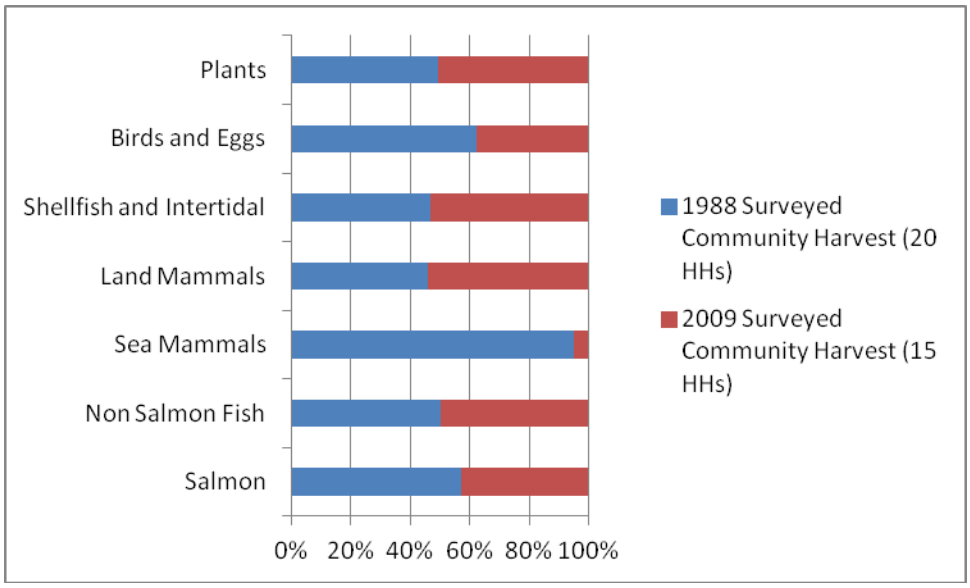

Figure 66. Percentage of harvest by species category between the 1998 Subsistence Division survey (20 of 22 HHs) and the 2009 survey (15 of 16 HHs), False Pass.

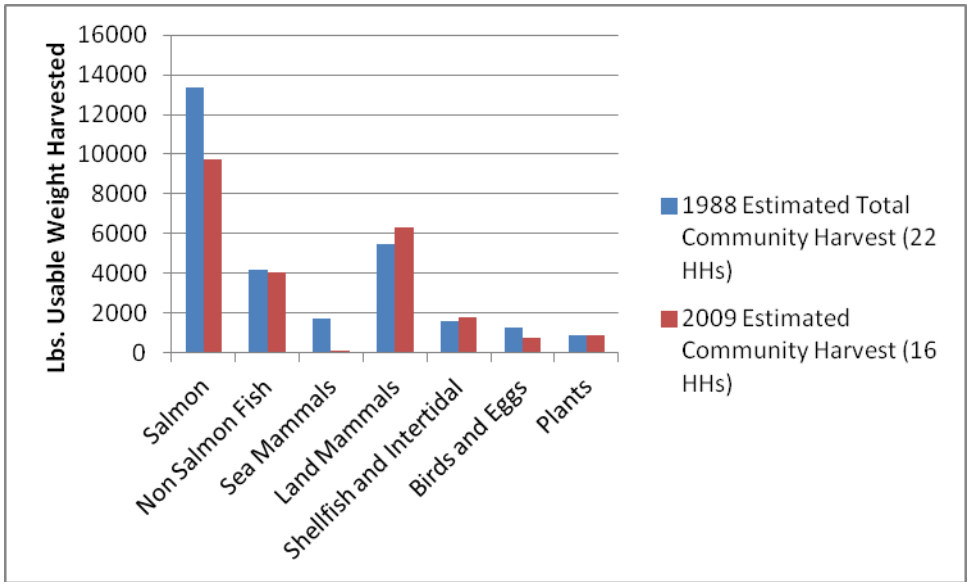

Figure 67. Estimated total community harvest by species category between 1988 and 2009, False Pass.

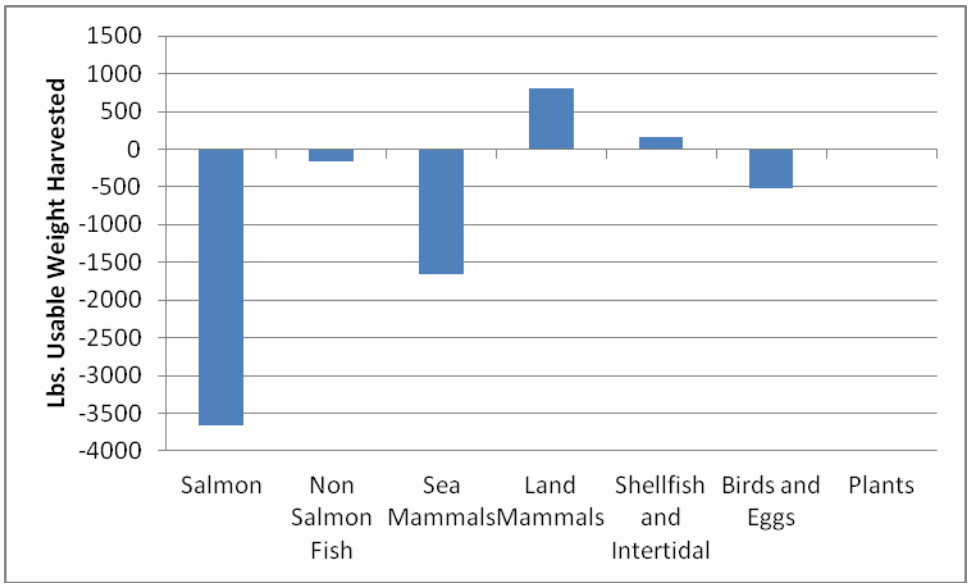

Figure 68. Change in estimated total pounds usable weight harvested by species category between 1988 and 2009, False Pass.

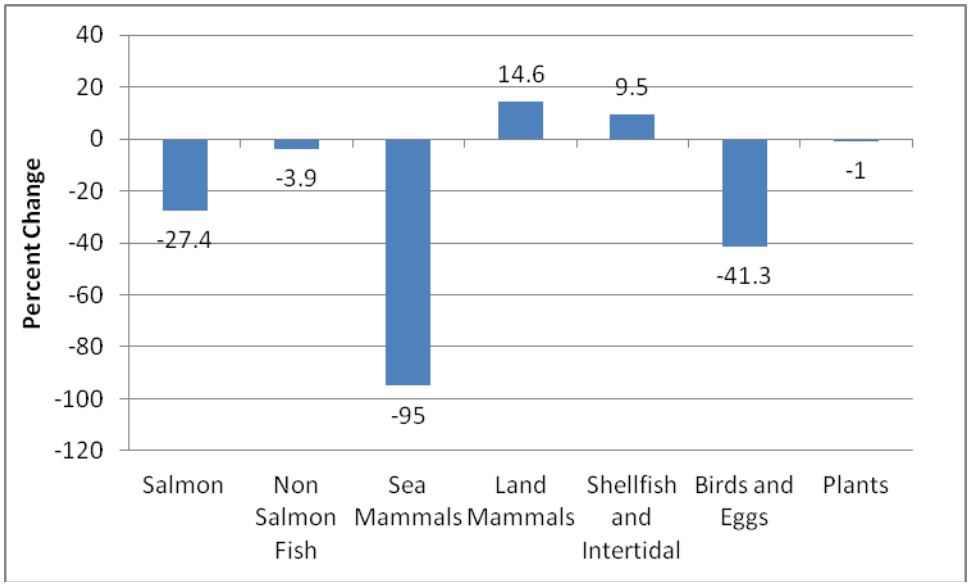

Figure 69. Percent change of estimated total pounds usable weight harvested by species category between 1988 and 2009, False Pass.

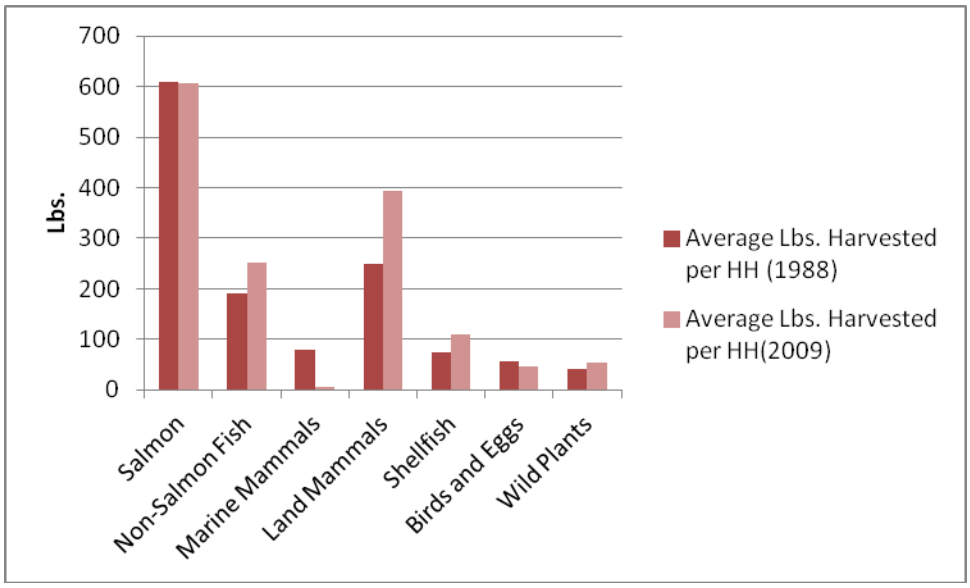

Figure 70. Average pounds harvested per household between 1988 and 2009, False Pass.

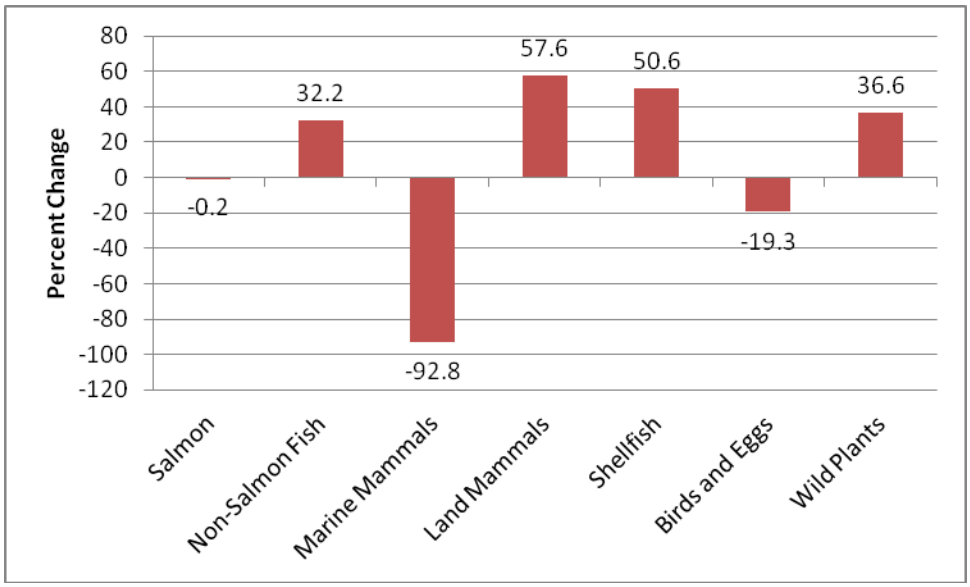

Figure 71. Percent change in Lbs. Harvested per household between 1988 and 2009, False Pass.

In 2009, several people were "waiting on the APIA food box," which is an annual benefit distributed to all elders in the Aleutian and Pribilof Islands villages. APIA receives state assistance money for this program to offset the food burdens on elders. There were also complaints about the food box; it used to have potatoes, milk, canned beans, for example, but now has brown rice, low fat milk and canned fruit. One elder stated that most of her food comes from the Isanotski Store (owned by the village corporation) at outrageous prices (for example $66 for a package of processed barbeque ribs for a family of four). There is no credit extended at the store unless one is working on a boat.

Subsistence Security

There was a discussion of foods they used to get in large quantities: salt salmon, salt ducks, salt geese, limpets or "china hats" (these are good fried with onions and rice), dried fish, seal meat, ptarmigan. There was concern that the sea otters ate all the clams and now people in King Cove send them over to share.

Brown bear management was highly criticized by several people. According to local residents, the Alaska Peninsula and Unimak bears belong to the same population and they swim across the pass all the time, but are managed as two separate populations. There are many "problem bears" in False Pass that end up shot. The alder bushes in the village used to be short, but are taller than people now. Bear fears are heightened because they are difficult to see in the alders. (Alders were also blamed for taking over good mossberry patches.) Rumors were that the U.S. Fish and Wildlife Service or USFWS counted 1,000 bears on Unimak Island so they could open a sport hunt.

When the comparing the top 10 species harvested in 1988 and 2009, cattle have completely replaced caribou and the primary terrestrial mammal and the top harvest. We also see that octopus has moved into the top 10 and harbor seal has moved out of the top 10 (Figures 72 and 73). When we look at both the changes in pounds usable weight per capita in the 1988 top 10 species, and changes in the percent harvest for those same top 10 species, the reduction in access to caribou and the increase in both sockeye salmon and halibut use is clear (Figures 74 and 75). In responding to "Did you get enough for your needs?" the majority of False Pass residents indicated that they did indeed get enough for their needs, except in relation to land mammals (Figure 76). In responding to whether or not they used less, the same, or more in 2009 for species, False Pass residents indicated they used more wild cattle and more dolly varden in 2009 and, as is shown in all the other data, less caribou (Figure 77).

Almost all wild foods in False Pass are harvested. Unlike the other communities, very few wild foods are purchased. False Pass residents purchase almost no wild foods, in this case a single 40 pound box of king crab and another 40 pound box of salmon fillets, both from Peter Pan Seafoods in King Cove (Figure 78). This was for convenience, not because of lack of availability in the region.

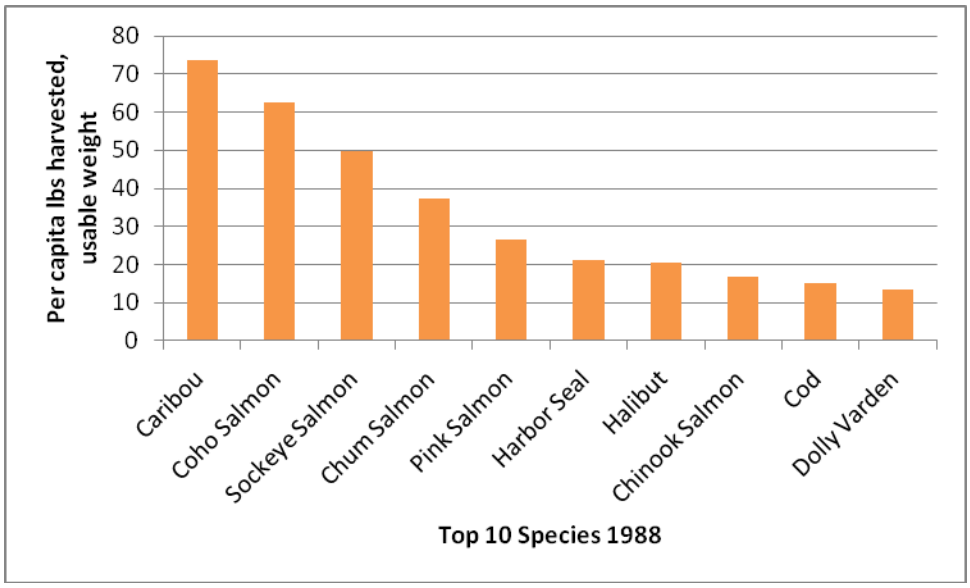

Figure 72. Top ten species harvested in False Pass, 1988.

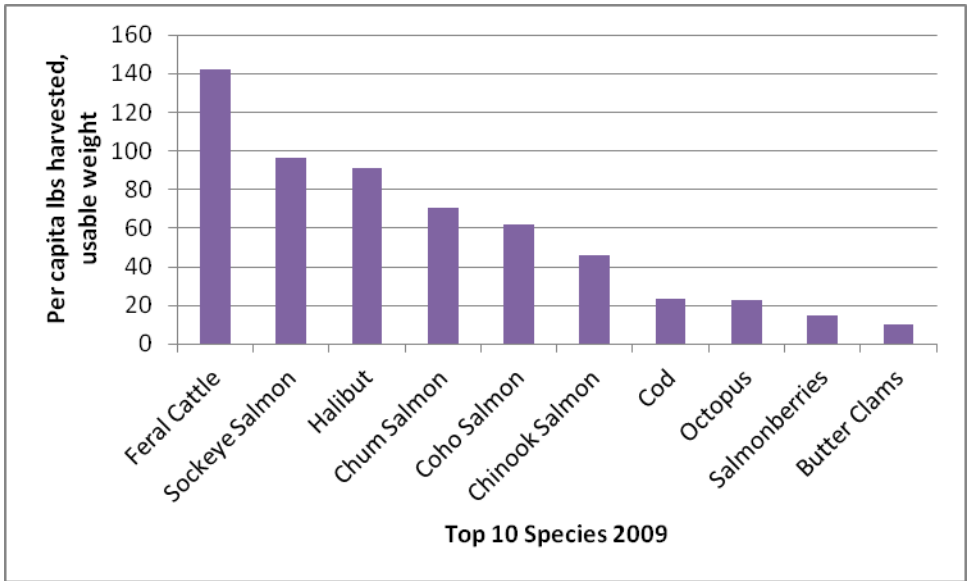

Figure 73. Top ten species harvested in False Pass, 2009.

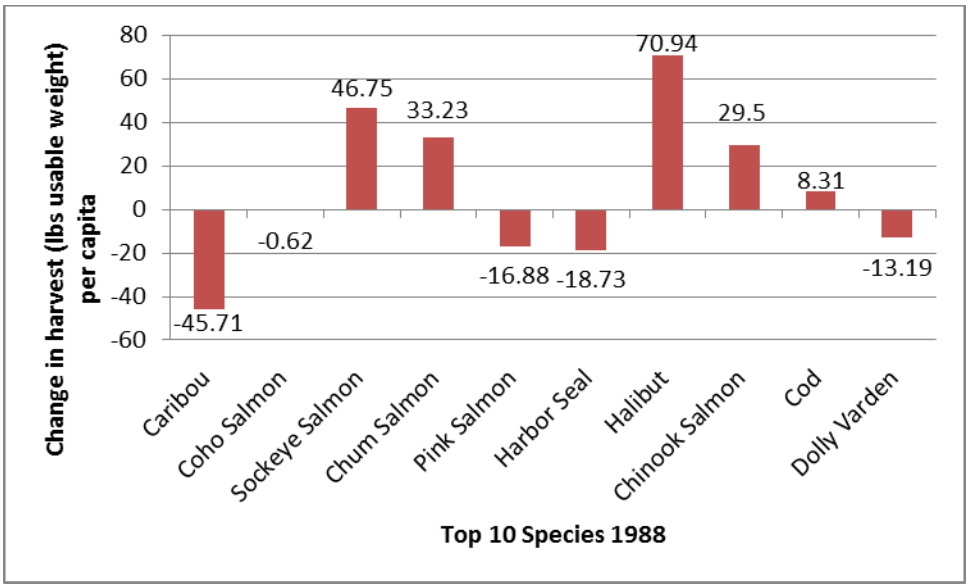

Figure 74. Change in harvest in pounds usable weight per capita in 2009 for the top ten species harvested in 1988, False Pass.

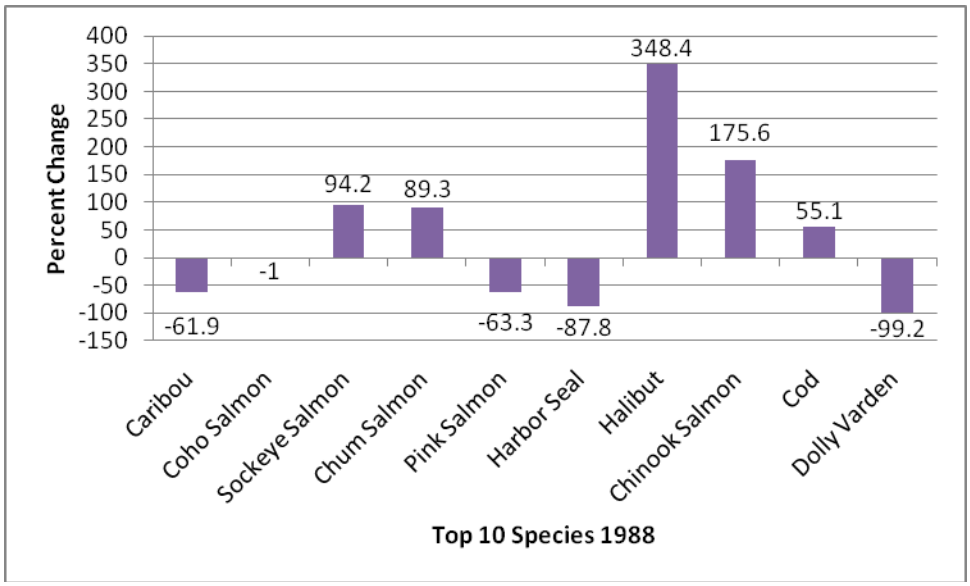

Figure 75. Percent change in harvest in pounds usable weight per capita in 2009 for the top ten species harvested in 1988, False Pass.

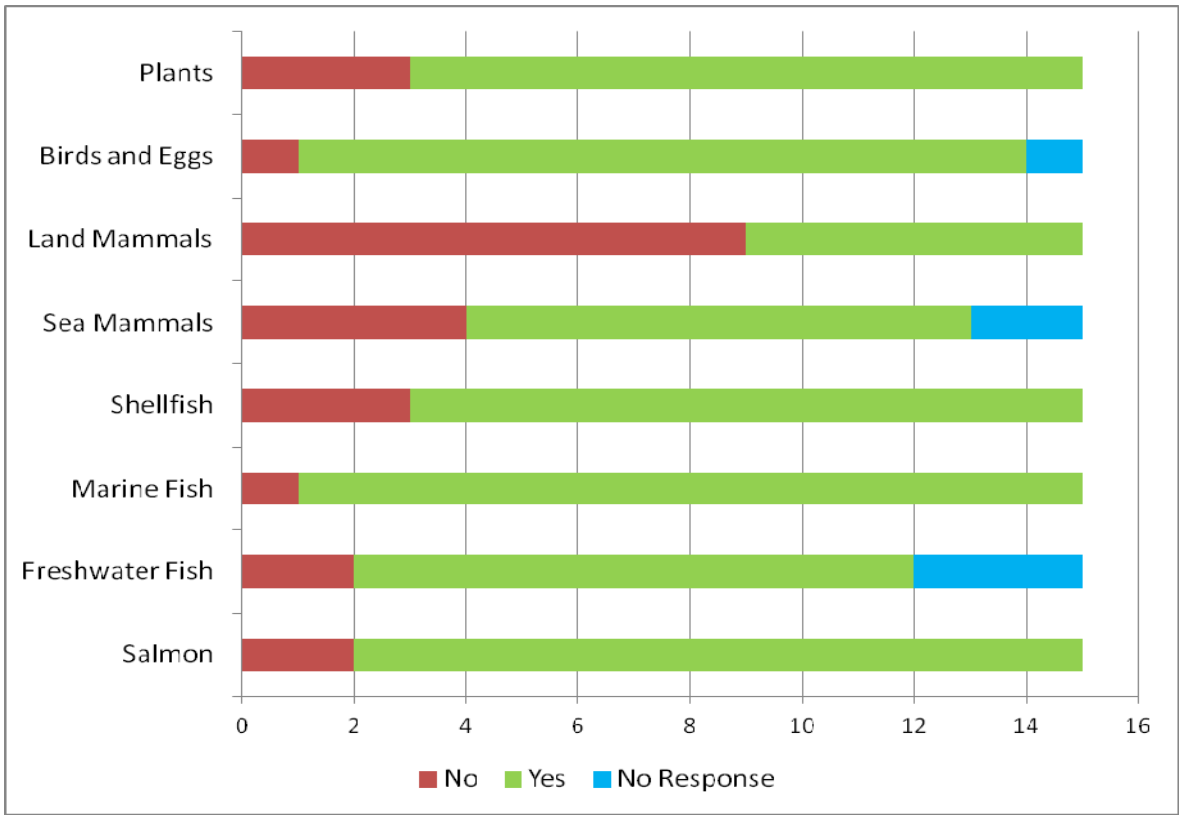

Figure 76. Responses to the question, "Did you get enough (resource) for your needs last year?", in percentages of False Pass households (N=15), 2009.

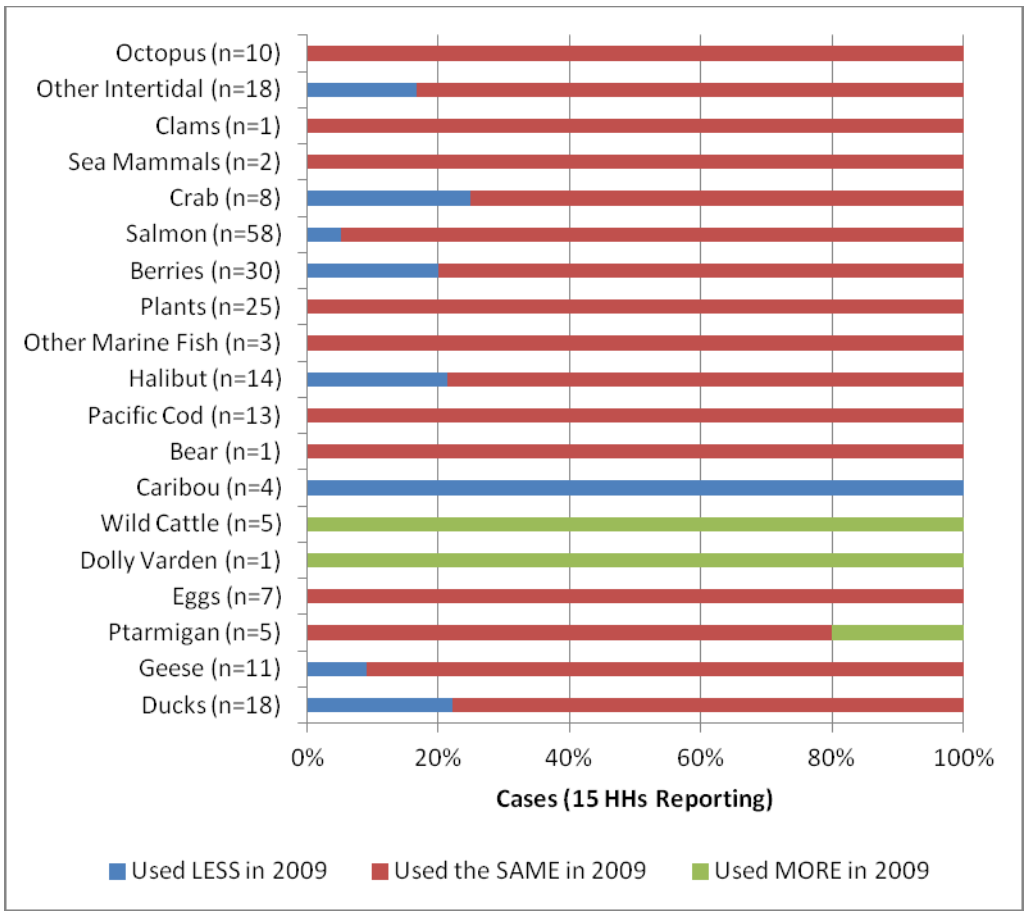

Figure 77. False Pass's responses to whether people used less, same, or more of resources in 2009 than in the past.

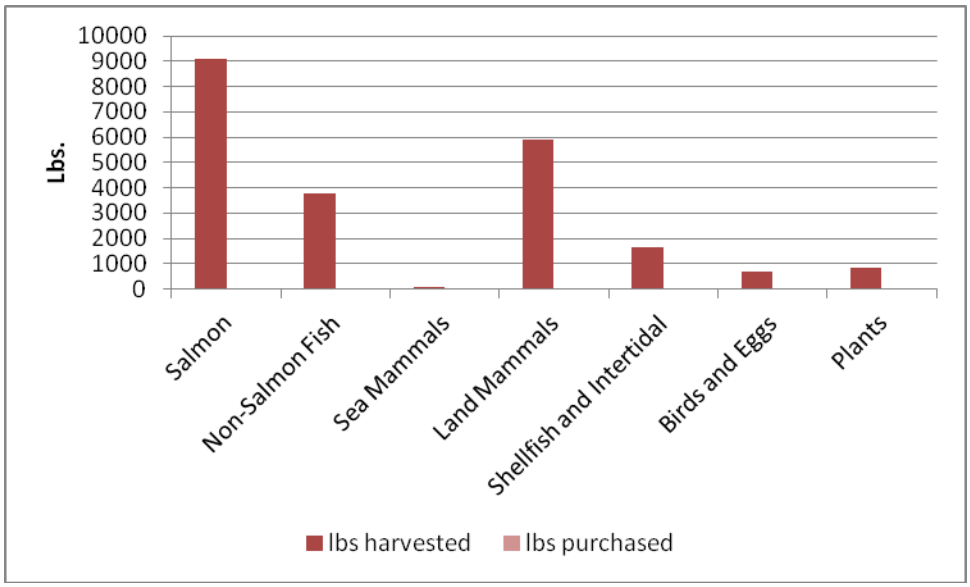

Figure 78. False Pass Lbs. of Wild Foods Harvested and Purchased, 2009.

The "30/70 rule" identified by the Subsistence Division, where 30 percent of a community's households harvest approximately 70 percent of that community's subsistence (in pounds usable weight), was tested for False Pass using a Pareto chart (Figure 79). For the households surveyed in False Pass, approximately 30 percent of households account for 70 percent of the community's total harvests, confirming this "30/70 rule." For salmon harvests, 30 percent of the households are responsible for 82 percent of the total salmon harvests, which could be a reflection of commercial salmon vessel ownership, and thus access (Figure 80).

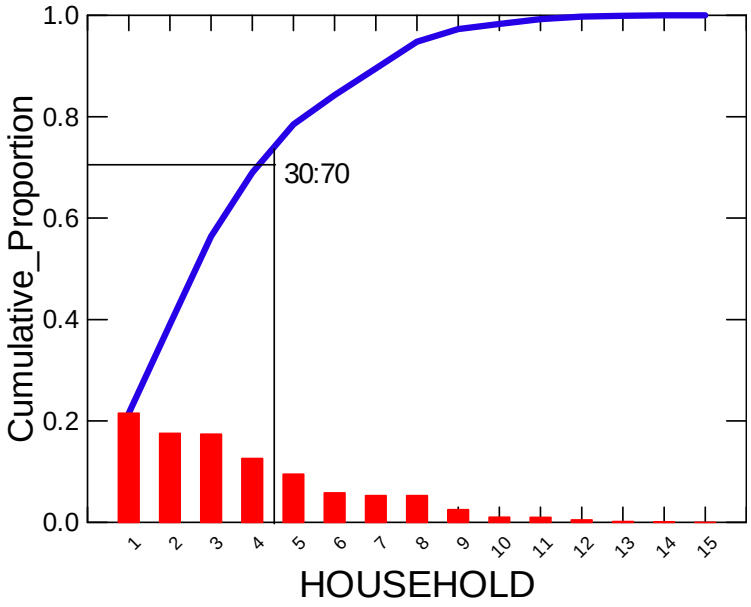

Figure 79. Pareto chart showing False Pass's household harvests where approximately 30 percent of households are responsible for 70 percent of the harvests for the community.

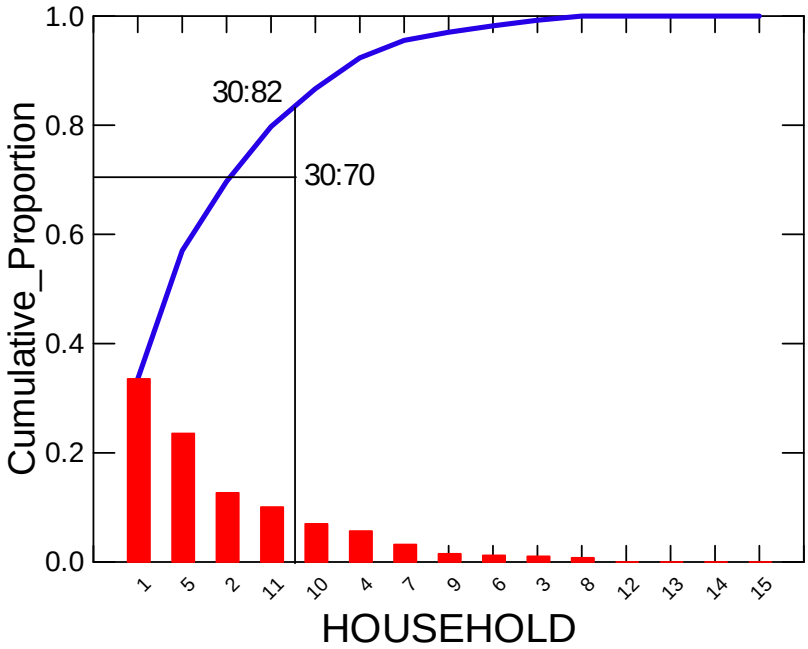

Figure 80. Pareto chart showing that 30 percent of False Pass households are responsible for 82 percent of the total salmon harvests for the community.

Figure 81 shows the total pounds of wild foods harvested for the 15 surveyed households in False Pass versus the total pounds received by household. One household did not harvest at all, but every household received at least some subsistence foods from others. Of the 25,464 total pounds of wild foods entering False Pass households, 3,870 (15 percent) was received through sharing and is the product of social relationships.

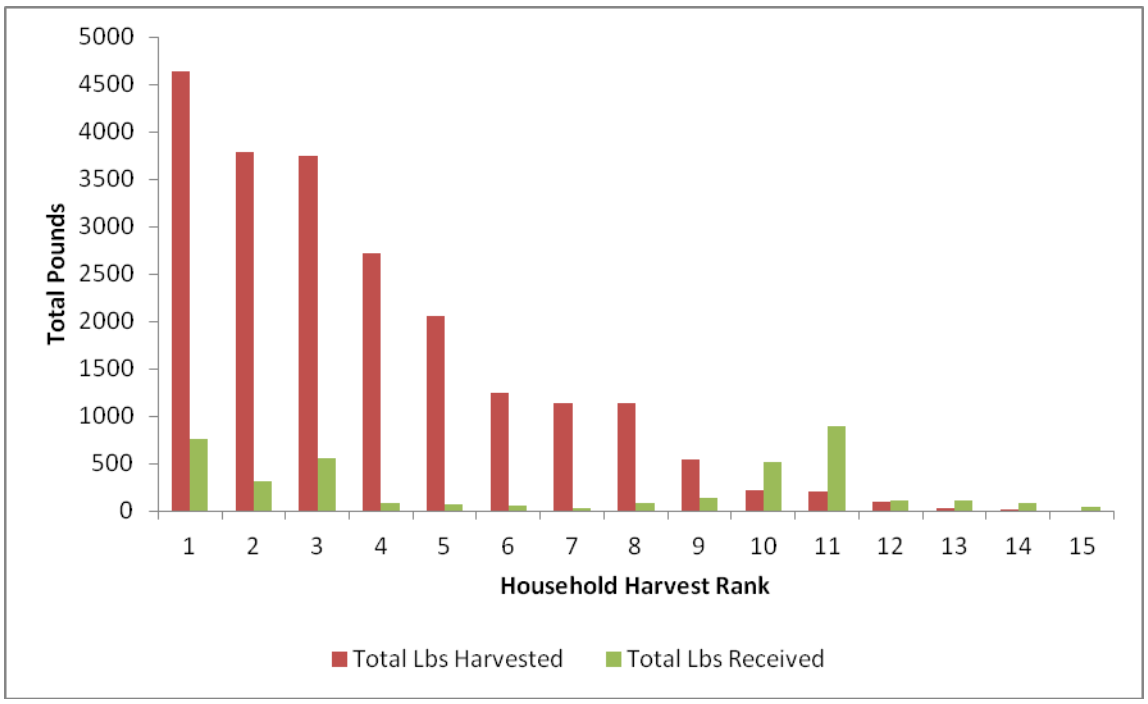

Figure 81. Total pounds of wild foods harvested versus total pounds received by household, False Pass.

SHARING NETWORKS

Sharing was described as "kind of random," by one young man. Others spoke of it as somewhat more structured in which at least half of others' harvests are given away. As one man said, "It is a responsibility of mine. I have the ability and the opportunity."

Subsistence was also described as "not a yearly thing," meaning different species are harvested in different quantities in different years. Access depends upon relationships with the harvesters. Trade networks have extended as far away as St. Lawrence Island in the recent past. Networks for the survey year are analyzed in Appendix 2.

SPATIAL DATA

Located on the pass, the village has easier access to fisheries and other resources of both the Bering Sea and North Pacific. See Appendix 1 for spatial analysis for False Pass.

COMMUNITY ECONOMICS

Participation in the fisheries relative to the total fleets in the same fisheries is small, but significant from a village economic perspective (Figure 82).

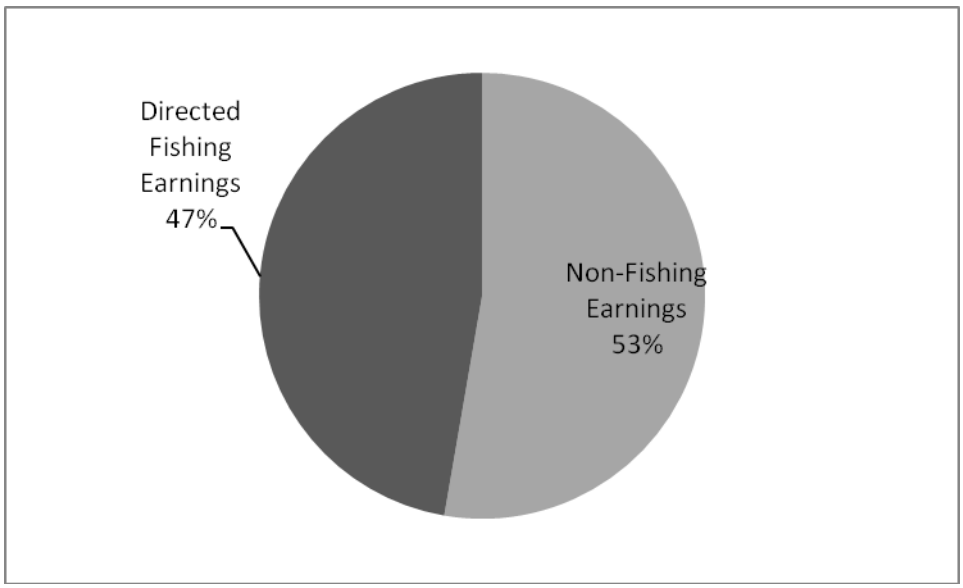

Figure 82. Percentage of fishing and non-fishing earnings, False Pass 2009. This does not include returns to the village from CDQs.

False Pass is most dependent on directed fishing income relative to the other communities. Of those households surveyed, seven derive income directly from fishing. Three of these are as captains and four are as crew. The crewmen in this village all work for local captains, so essentially three vessels/fishing operations are supporting 47 percent of the households. These represent the total fishing operations in the village, since none of those that were not surveyed are fishermen.

Twenty adults in False Pass listed 32 separate job titles, or 1.6 jobs per person (Table 21). The majority of False Pass earned income is through fisheries, followed distantly by local government and education (Table 22). 87 percent of income in False Pass is earned income (Figure 83).

Table 21. Job titles identified by False Pass adults.

Fisherman/Crewman	9	City Clerk	1
Maintenance/Laborer	4	Community Health Aide	1
Store Manager	2	Cook	1
Teacher	2	Fence Construction	1
Pot Storage	2	Peninsula Airways Agent	1
Tribal Council/Corporation Administrator	2	Secretary	1
Babysitter	1	Fuel Operator (Delivery)	1
Board Member	1	Tribal Children Service Worker	1
		Mayor	1

Table 22. Earned and other incomes, False Pass 2009.

	Households Reporting	Total Income	Average per HH
Earned Income			
Local Government	7	186080	26583
Fisheries	7	507009	72430
Retail	1	5010	5010
Services	7	71020	10146
Education	1	132000	132000
Other	1	1500	1500
Total Earned Income		**$902619**	
Other Income			
Alaska Permanent Fund Dividend	14	36540	2610
Native Corporation Dividend	10	12608	1261
Unemployment	3	12592	4197
WIC	1	1284	1284
Social Security	5	41560	8312
Pension	1	23500	23500
Total Other Income		**$128084**	
FALSE PASS TOTAL		**$1030703**	

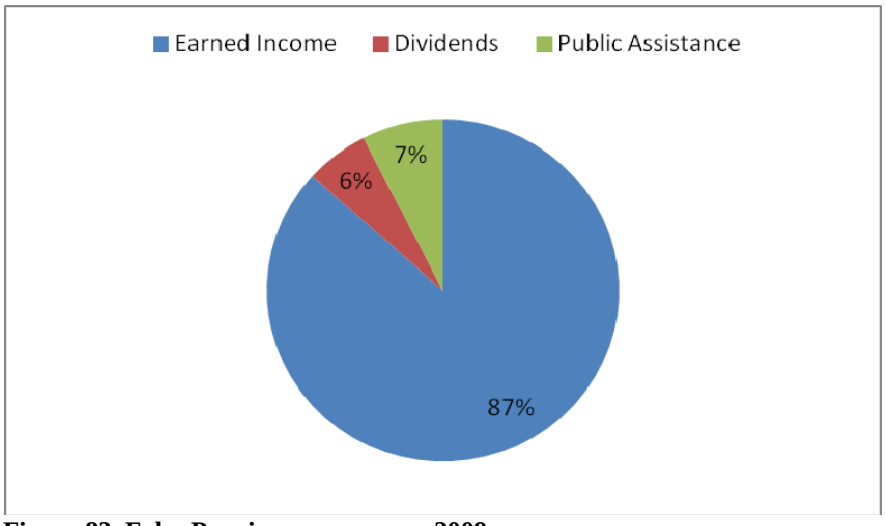

Figure 83. False Pass income sources, 2009.

EXPENSES AND EXPENSE NETWORKS

Household Expenses

Groceries

False Pass households spent an average of $9,647 on groceries (Figure 84), and make up the bulk of household expenses. There is regular barge service in False Pass where most grocery orders are made from outside. There is a small store operated by the Isanotski Corporation, and orders are also made through the Bearfoot Store in Cold Bay. False Pass has a separate liquor store operated by the Isanotski Corporation and is popular with fishermen stopping through the pass.

Rent or Mortgage

Eight of 15 households surveyed in False Pass pay a rent or a mortgage. These households pay $4,686 annually, or $390 per month.

Heating Fuel

Households paid an average of $2,703 in heating fuel oil annually. It is sold by Peter Pan Seafoods.

Propane

Propane cost the surveyed households an average of $972 annually.

Electricity

Diesel power generation provides electricity for the city. Households pay an average of $1,426 annually. Bering Pacific Seafoods has separate generators for its electricity demands.

Water-Sewer-Garbage

Water is piped from a spring and reservoir to the village. Individual septic tanks are used for sewage. The city manages a dump site. Bering Pacific Seafoods uses an outfall line to dispose of wastewater from seafood processing.

Telephone

Telephone costs each household an average of $1,186 each year. Many people were transitioning to cell phones at the time of the survey, and giving of landlines.

Television

Every home had at least one television costing an average of $1,144 per household.

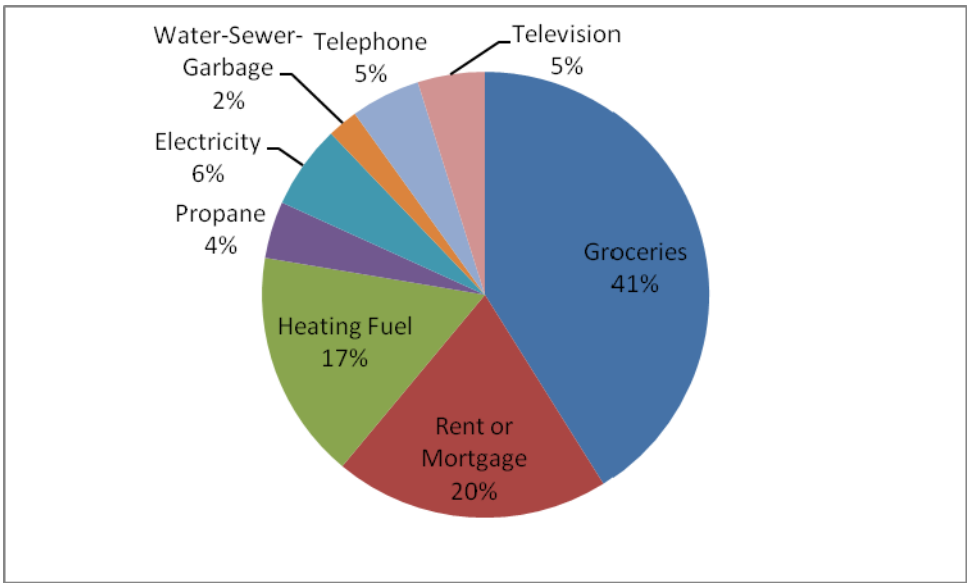

Figure 84. Relative percentages of Household Expenses, False Pass.

Subsistence Expenses

Gasoline

Gasoline costs $552 each year per household for subsistence use only. A great deal of subsistence is conducted on commercial boats, however, so these costs are underestimated because it is difficult to separate out fuel burned for subsistence harvesting only. Two households without boats reported paying two men with boats in fuel in order to be able to accompany them on subsistence trips.

Ammunition

Hunters spent an average of $182 annually on ammunition for hunting for food and for protection against bears and wolves.

Supplies

Other subsistence supplies cost households an average of $320 annually. This included rain gear, boots, rifles, and other items.

Subsistence Equipment Owned, Shared, Purchased

False Pass residents own a large number of vessels and vehicles to support subsistence harvesting (Table 23). These are shared with those who do not own what they need.

Table 23. Equipment used in subsistence harvesting reported by False Pass in 2009.

Equipment Type	Total	Households (of 15)	Average per Household with Equipment Type	Average per Household in Village
Skiffs	13	6	2.2	0.9
Outboard Motor	14	5	2.8	0.9
Commercial > 30' Boat	5	5	1.0	0.3
Snow Mobiles	2	2	1.0	0.1
ATVs; 4-Wheelers	12	9	1.3	0.8
Cars(s) or Truck(s)	17	10	1.7	1.1

POSITIVE INFLUENCE ON COMMUNITY LIFE

Nine adults were named as having positive influences on life in False Pass. These included all adult members of a large extended family, two elders, and two other elders no longer living in the village. These individuals were praised for bringing infrastructure improvements and being tenacious leaders for many decades.

SUMMARY

- False Pass is a small commercial fishing community highly dependent upon salmon, cod, tanner crab, and other fisheries.
- 30 percent of the households account for 70 percent of the total community's harvests, but 30 percent of households account for 82 percent of the total salmon harvests.
- Of the 25,464 total pounds of wild foods entering False Pass households, 3,870 (15 percent) was received through sharing and are the result of social relationships other than the household's own harvests through cooperative hunting and fishing.
- Households reported harvesting just 0.2 percent fewer salmon and 19.3 percent fewer birds and eggs between 1988 and 2009, but 92.8 percent fewer marine mammals.
- Households reported a 50.6 percent increase in shellfish harvesting and a 36.6 percent increase in wild plant harvesting between 1988 and 2009.
- False Pass lost a significant portion of its population in 2009 and 2010 due to family reasons, deaths, and the lack of economic opportunities. The village experienced a 54 percent drop in population between the 2000 and 2010 censuses. Several new families moved into the village in 2011 to work for the city and village corporation.
- The city, village, and corporation continue to pursue improvement and expansion projects despite a dwindling population, offering a new harbor, for example. False Pass is actively pursuing alternative energy development in wind and tidal energy.
- APICDA is investing millions of dollars to expand the local shore plant to support the fisheries and the village.
- Sharing is widespread within the village and beyond, consisting mostly of fish products and berries.

- False Pass has tremendous access to a large variety of subsistence and commercial species, and harvest 46 different species.
- False Pass residents harvested 348 percent more halibut in 2009 than they did in 1988. Households harvested 32.2 percent more non-salmon fish in 2009.
- People lament the closure of the caribou harvest, which played a key role is sharing and seasonal activities. This also contributed to people leaving the village.
- Predator control is a primary concern for caribou health and people's safety.
- The City of False Pass was optimistic about its role as staging grounds for the North Aleutian Basin oil and gas exploration and development, but community support for the overall project is mixed.

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CHAPTER 7. AKUTAN

INTRODUCTION

The modern village of Akutan sits perched on the eastern end of Akutan Island on the north shore of a bay and is accessible only by boat and, until 2012, seaplane (Figure 85). Akutan is a tightly spaced village with all homes and businesses connected by boardwalks. While there are a few ATVs owned in the village, there is no need (or space) for cars. The Akutan Corporation manages a hotel and store. Offices of the Akutan Tribal Council and a new City office building sit next to one another along the boardwalk. There is also a new school with a married couple as teachers. Akutan also has a library/museum building containing displays of Akutan's whaling history, Aleut history, and archaeological discoveries. At the center of Akutan is the Bayside Café run by a couple from Unalaska whose parents run the Dutch Harbor airport café.

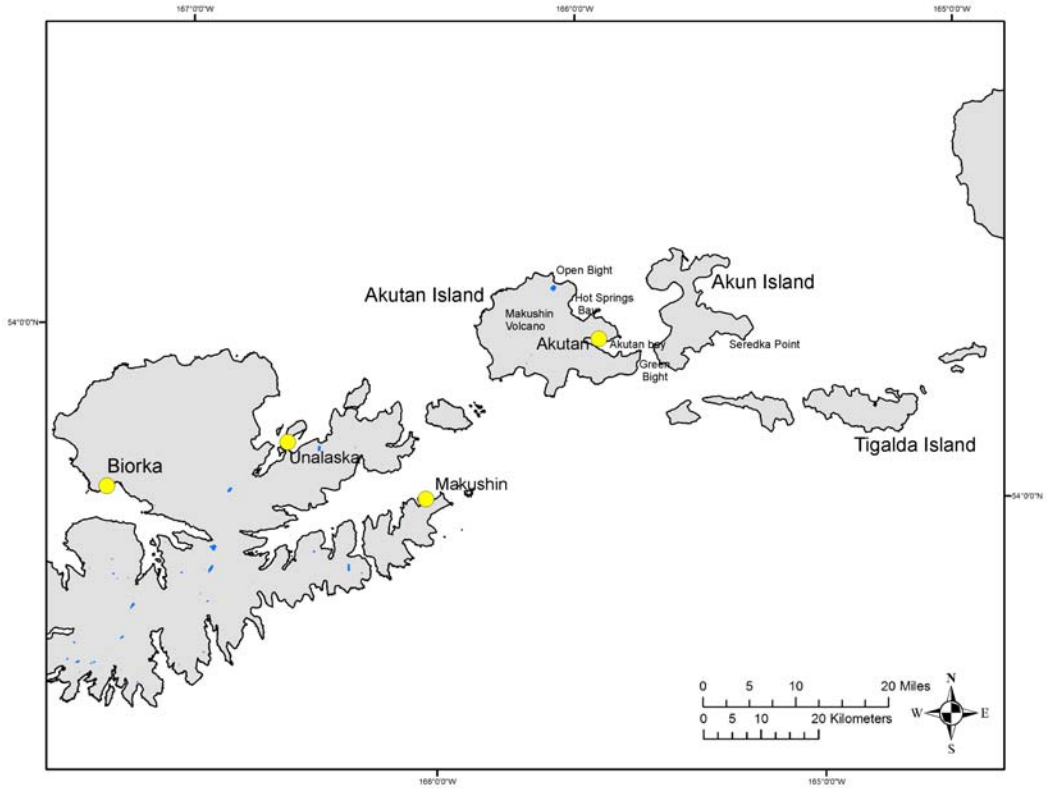

Figure 85. Regional map for Akutan village. Map drawn by B. Benson and H. Maschner

The village and Trident Seafoods are approximately ¼ mile apart along the north shore of Akutan Bay (Figure 86). Trident sits on an old homestead from a non-local resident and on former whaling station lands. Trident Seafoods is a massive processing plant that employs up to 1200 people for year round processing. The majority of workers in the plant are migrant laborers from nations in North Africa, the Philippines, and Mexico, but they also recruit from across the

United States.[11] On the stretch between the village and plant is a large Christian church built by Chuck Bundrant, owner of Trident Seafoods. A new pastor arrived during this research and was moving his wife and three children there from Minnesota later in the spring. The current pastor and his wife were moving on. During follow up research, this pastor left after only a few months. In the interim, a missionary and his wife living in Unalaska flew over every other Sunday to run the Akutan church services. The church is primarily used by Trident employees instead of the Akutan villagers, who are mostly Russian Orthodox.

Figure 86. Trident Seafoods and Akutan village on Akutan Island, 2009.

RECENT HISTORY

Akutan was founded in 1878 after the Western Fur and Trading Company chose the location as the site for a trading post. Soon a Russian Orthodox Church and a school were constructed, attracting Aleuts from the region but especially from Tigalda, Akun and nearby islands. The old village on the island was called Akutanax, and had been influenced and decimated by Russian occupation, disease and outmigration. Aleut residents gave the new village a similar name. In 1878, the Western Fur and Trading Company opened a sea otter pelt trading facility there (McGowan 1999), and the company expanded into commercial cod fishing and processing. A Russian Orthodox Church was constructed at the site in the same year. The Alaska Commercial Company took over the trading facility in 1879 and was managed by Hugh McGlashan, a Scotsman who is ancestor to many Akutan and Unalaska families today.

[11] These laborers typically work 11 months of the year. All travel and accommodations are included in their work contracts.

Sea otter hunting was banned in 1911, and in 1912, the Pacific Whaling Company built a whale processing station across the bay from Akutan, which operated until 1939 and provided an economic base (Birkeland 1926). Fox farming and sulfur mining were pursued on nearby islands (McGowan 1999:48). The Aleutian Islands were made a bird preserve by a 1913 Presidential Executive Order, negatively affecting fox farming and subsistence bird hunting and egg collecting. The cod fishery also started in Akutan, attracting people from Unalaska, Makushin, Kashega, the Pribilofs. A dock and processing facility were constructed to serve the fishery. Village people worked on trawler boats for cod and crab.

Population declines due to the smallpox and influenza epidemics were devastating to the village (Robert-Lamblin 1982). Nevertheless, a school was opened in 1921 (McGowan 1999:50). The whaling station closed in 1939 due to market forces, but the cod fishery continued. The community was again devastated by evacuation in 1942 during World War II after the Japanese attacked Unalaska, and the military occupied the village in everyone's absence, ruining homes, the processing facilities, and the church. Those who survived internment camps in Southeast Alaska (described above) returned home along with people from neighboring Biorka, Kashega, and Makushin villages who had been discouraged by the federal government from resettling their homes.

The village was re-established in 1944 with a much smaller population. In the late 1940s, fish processing industries flourished, and floating processors anchored in the bay, employing local people. Akutan harbor supported thirteen processors, and became a lucrative port. The crab fishery declined in the 1980s, and many processors left. Trident Seafoods built a shore plant in the early 1980s, and continues to process cod, crab, pollock, and other fish. They provide a critical tax base to the village and the Aleutians East Borough.

The City was incorporated in 1979, and the island has supported a Trident processing plant since the 1980s. Akutan is also a member of the Community Development Quota (CDQ) program of the Aleutian Pribilof Islands Community Development Association (APICDA). The Census Bureau reported 767 residents in 2006, of which approximately seven-eighths are cannery employees. Only seven residents hold commercial fishing permits. The City of Akutan is actively pursuing expansion of their harbor, docks, and other local capacities to increase Akutan's importance as a Bering Sea port.

SURVEYED POPULATION

The following graphs show the portion of the population surveyed relative to data from the 2010 U.S. Census (Figure 87). Akutan is obscured here because the census includes Trident Seafoods. The total Akutan village population is estimated at 80 at the time of the survey, but we do not have the age breakdown. There are 40 households, of which 30 were surveyed (Table 24).

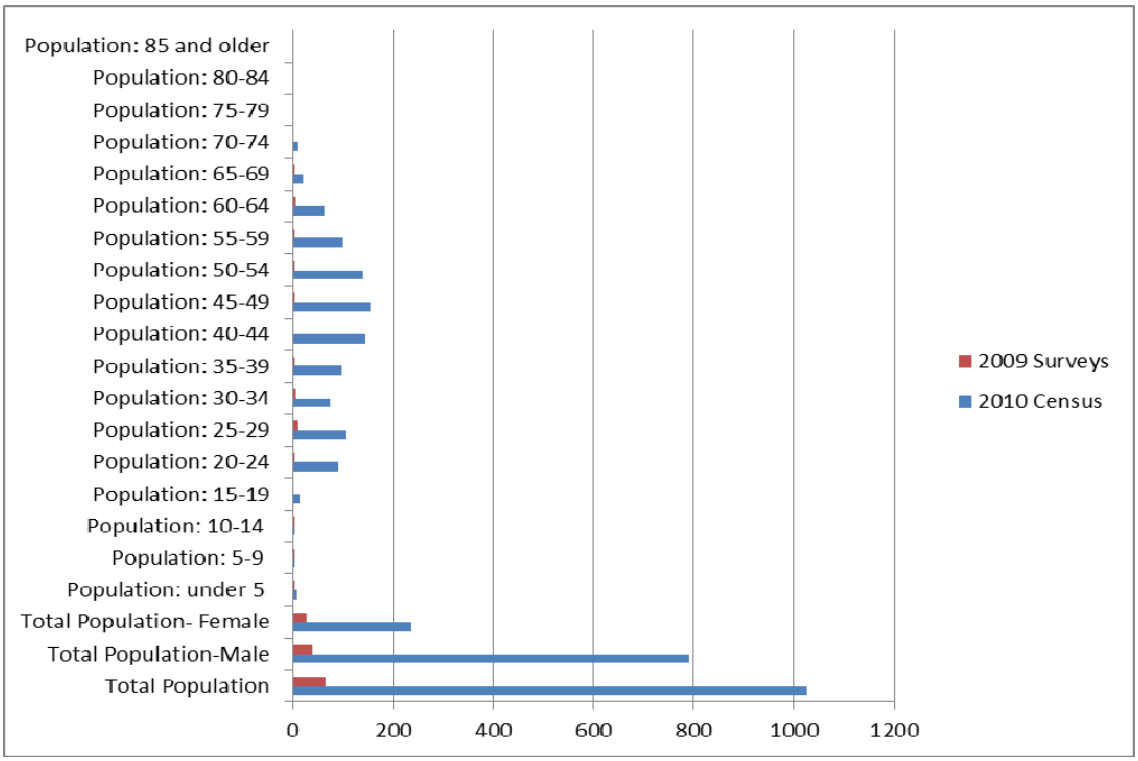

Figure 87. Akutan census with Trident obscuring the village in 2010.

Table 24. U.S. Census and Survey Population, Akutan 2010.

	2010 Census	2010 Surveys
Households:	40	30
Family Households:	23	22
with own children under 18	10	6
Husband-Wife Family:	14	19
with own children under 18	7	5
Male Householder	5	3
with own children under 18	2	2
Female Householder	4	1
with own children under 18	1	0
Non-family Households	17	8
Householder alone	12	8
Male	11	7
65 or over	3	2
Female	1	1
65 or over	0	0
Households w/ individs under 18	11	7
Households w/ individs 65 & over	8	5
Average Household size	2.3	2.2
Average Family size	2.8	2.4

FISHERIES AND ECONOMIC DEVELOPMENT

The Trident Seafoods plant processes mostly frozen fillets and blocks of pollock for frozen fish sticks marketed throughout the United States. All value-added processing is done in the corporation's other plants, especially the Anacortes, Washington, plant. They ship to Asia, Europe and across the U.S. More commercial fishing money flows through Dutch Harbor in the "bottom industry," but the Akutan Trident plant gets more poundage. When Dutch Harbor plants run out of bait, the highliner boats come into Akutan to restock.

The village and the plant have a strong, reportedly positive relationship. Akutan's Trident plant has been an APICDA partner since 1992, meaning they work together to enhance economic development opportunities for the community. This involves joint ownership in vessels and harvestable quota. The Trident Seafoods plant manager is on the Akutan city council, which is very different from its neighboring villages with processors, except Unalaska, where this phenomenon is seen to have contributed to marginalizing local people in their own town. Another Trident employee sits on the Aleutians East Borough Assembly. Because Trident operates throughout the year, several U.S. resident employees have lived there long enough to have gained voting rights and can out-vote the city, which can create difficulties for Akutan leaders. Trident employees live at the plant eleven months of the year, which is very different from other plants around the area. The city wants to build more housing to expand the village, accommodate year-round employees of Trident, and remain viable. Local people tend not to work in the Trident plant in the actual processing sector, but may drive equipment or hold other jobs there. Other jobs include working at the post office, store, the Roadhouse bar, diving, halibut IFQ holders, cod/miscellaneous finfish permit holders, and boat piloting.

While local jobs are relatively limited, many commercial opportunities were discussed. "Akutan Harbor would be ideal to raise mussel and abalone. They get huge." It was also pointed out that the waters are probably too cold to do it commercially. One fisherman who delivers to Trident discussed trying an oyster farm in the bay, but was concerned over sea otter predation. The cattle business still looms as a possibility. Akun Island has approximately 1,000 head of cattle, and people have been making improvements to the island. It now has a house and steam bath (*banya*), setting the stage for longer occupation and thus more involved business activities. There are two fences with the goal of rotating the animals over pasture to manage the herd. The Akutan Corporation, which owns the land, wants to do a seeding project on the island for feed as well.

With the assistance of federal stimulus funds, the Aleutians East Borough is funding the construction of a boat harbor at the head of the bay. The Army Corps of Engineers was awarded the construction contract in March 2010. The harbor will accommodate 58 vessels ranging up to 180-feet in length. Road construction from the village to the harbor site is also planned.

Tourism prospects have also been considered. In addition to birding, whale watching, and other wildlife viewing, the leaders want to include Aleut culture in tourism. "We need to educate ourselves and other people…Aleuts are a dying breed," according to one leader.

There are few commercial fishermen based in Akutan. Some young men work on boats as crew, but this is not consistent. One man fishes out of Sand Point to be able to participate in the salmon fishery, but Akutan does not support a commercial salmon fishery. Individual Fishing Quotas for

halibut (IFQs) are owned by approximately seven local people. These are quota shares that are owned by individuals and allow participation in halibut fisheries based upon the shares owned and the expected harvest for the species in a region. One man called it a "rich man's game" because of the capital required to enter the fishery. Creating a salmon fishery near Akutan has been considered. In 2007, a local man proposed the testing of the creation of an Akutan salmon fishery before the Board of Fisheries, the regulatory board that sets fisheries policy for the state of Alaska, since they too are part of Area M. The Board declined their request in part because of the low abundance of salmon in those waters. There was also fear that King Cove and Sand Point fishermen might come down there to fish it out. Herring move down from Togiak and mill between Akutan and Dutch Harbor. Trident is the primary buyer for herring, which is fished in July. Whales, halibut and cod follow the herring. Herring is so abundant that "we need to get serious about [fishing] it." Atka mackerel are so thick on the south side of the island that they are difficult to avoid when halibut fishing and, thus, developing a market for them was also mentioned.

Akutan is part of the Aleutian Pribilof Island Community Development Association (APICDA) but gets no direct Commercial Development Quota (CDQ); instead APICDA offers financial development and support for infrastructure projects. The local APICDA board member from Akutan described some of their current projects, including Puffin Seafoods, a processing venture they are trying to start in St. George, one of the Pribilof Islands.

The lack of fishermen in Akutan does not mean that people do not understand the business of fishing. One man described the crab fisheries in such detail, stating, "You memorize the Bering Sea after awhile." In order to expand crab fishing and build up a crab subsistence fishery, crabbers will sometimes try to seed the bay with crabs, and they claim to have some limited success. They save them up while fishing and then dump them into the bay when they are coming in, thereby directly shaping the local ecosystem.

POLITICAL AND ECONOMIC LANDSCAPE OF AKUTAN

Akutan Island is locally referred to as "the Rock" and occasionally as "Akutraz." Accessible only by boat and seaplane, it has the feeling of isolation in the Aleutian crossroads. Difficulties of travel to and from Akutan weigh on everyone because it can only be accessed from the sea. The City of Akutan was awarded state funding for an airport runway in February 2010 on nearby Akun Island so different planes can land there and thus not be as restricted by the seas and the weather.

Akutan has two votes in the Aleutians East Borough (AEB) but provides a disproportionate amount of revenue to the Borough because of the fish tax and the Trident Plant. Local leaders estimated that 45 percent of the Borough's budget comes from Akutan. Some tension with the Borough over this was reported, and local people formed an organization called the Concerned Citizens of Akutan to pursue more equitable returns from the Borough. "People think we're rich out here because of Trident, but the corporation doesn't own the land that Trident sits on." Trident leases some of its land from the City of Akutan.

The City of Akutan is working on several projects. As mentioned above, they are working towards constructing an airport on Akun Island, since PenAir (the only commercial carrier in the region) now has a $500,000 subsidy from the federal government to fly the amphibious Grumman Goose and Widgeon aircraft to Akutan Bay. They would like a 4,500 foot paved airstrip with a Hovercraft on the contiguous shore moving passengers between islands (a Hovercraft is desirable because it is not a hulled vessel and no dock construction would be necessary). This plan would be a key facet in the Akutan Corporation's future goals of marketing cattle. They are also working towards constructing a new boat harbor at the head of the bay closer to Trident Seafoods. Right now there is little more than a skiff moorage with four small local fishing vessels there (42' is the largest local boat). Trident Seafoods owns 40 to 50 vessels and is the second busiest port in the United States country, and the City of Akutan would like to tap into the boat storage market. They are also interested in developing geothermal energy. The Akutan Traditional Council hired a consulting group from Anchorage to do a feasibility study on what is estimated as being a $45 million project. The State of Alaska views nearby Makushin Volcano as one of two of the most promising for geothermal energy in Alaska. There is also a potential for hydrogen development but The Aleut Corporation (TAC), which, under ANCSA, owns the subsurface rights, does not support it at this time.

Akutan receives a fuel delivery twice year and they are locked in to the price at the time of ordering. In 2009, it was $3.75 per gallon. The city buys it and sells it at cost. APICDA gave every household 100 gallons of fuel in 2008 because of the free fuel from Venezuelan president Hugo Chavez to all Alaska Native villages, the Aleutian Pribilof Islands Association's (APIA) rejection of the gift, and APICDA's match.

CULTURAL THEMES OF AKUTAN

Akutan residents claim to be part of both the historical Qigiigun Tribe and the Qawalangin Tribe (which is Unalaska's main tribe). The Akutan Traditional Council both pursues and facilitates studies of Aleut culture and subsistence. They also support children attending culture camps in Unalaska.

Russian Orthodox holidays are observed and conform to the Julian calendar, For example, in Akutan close to Easter time, it was learned that the Friday before Easter is Good Friday and one should wear dark colored clothing to church. Then on Easter morning, church goers should wear colored light clothing. The Russian Orthodox also observe 40 days of Lent before Easter, which used to be rather strict, such as no listening to music, no dancing, no gum chewing, no playing, and avoiding eating meat and butter. On Easter, people make *kulich*, a Russian sweet bread which is iced and decorated with dried fruits and candies, and pass it out to friends and family around the community. At Russian Christmas, starring, which is the practice of twirling large decorated stars that mimic the star the Wise Men followed in the early Christian era, is a major activity in the community. They will spin one or several stars, and other members of the church will follow the leaders, visiting homes around the community and singing carols. The Orthodox emphasis does not restrict subsistence activities. Instead, there is a greater focus on subsistence activities around holidays as families stock up for community feasts and family events.

SUBSISTENCE

Subsistence foods regularly harvested in Akutan include salmon, halibut, black bass, yellow and bullhead sculpin, pogie roe, grey cod, clams, rock ducks, greenwing teal, coots, and multiple types of berries (Table 25).

Sea mammal hunting has declined in recent years. Fur seals are harvested infrequently. Several reported that they like to eat year old seals and fur seal pups ("*alakuduk*"). During Russian Orthodox Christmas starring, some of the fur seal pup is usually shared across the community with other church members by those few who harvest it. Some households prefer *chadu*, and make it out of the young seal (hair seal, fur seal, e.g.) for better flavor. They will dip dried fish and boiled cod in the *chadu.* Aleut chowder made out of sea lion blubber, sometimes locally called "stink soup" for the strong odor it produces during cooking, is also a favorite. Seal meat will also be divided up among the villagers, but "you got to be right there on the beach because it goes fast." Harbor seal are harvested when they are about two years old, and "small enough to handle." Also, as one man said, "I never bother them when they have the young ones."
Akutan harvests mass quantities of berries, mostly salmonberries and blueberries. With the blueberries they make *tagao*, which is a dish with mashed potatoes that have been ordered from Seattle or Anchorage, seal oil and blueberries, comparable to the Eskimo ice cream called *agutaq*. Blueberries are picked in late August through September. Salmonberries are picked in the middle of August to the end of the month. Mossberries come out in the middle of August for several weeks. All berries are found right in the village in between houses, and ladies laughed as they described opening their dining room windows and picking them right outside. *Petrushki,* which is wild parsley used to flavor fish chowders, and *pushki* are picked closer to the beach.

Drift wood is something of a prize possession on Akutan. It is gathered for *banyas* and smokehouses. When there is no cottonwood for smokehouses, which is the preferred wood for smoking salmon regionally, they burn wood chips or other materials on a hot plate and in coffee can and use a capped stove pipe that spreads the smoke out. Smokehouses are shared among family and friends, since there are only a few in the community.

Bidarkis (the local term for the Aleut kayak and for a shellfish, chitons, because of their shape) are harvested regularly and shared. Cockles and limpets are found near Akutan but rarely harvested because of preference for other foods. Only one man in town likes mussels, but the transient cannery workers, many of whom are Filipino, eat them frequently. When asked about red tide, one man said, "Well, there are no dead Filipinos." Shrimp used to be harvested around Makushin village, but they made people sick; algae were extremely thick near the village and shrimp were eating it. Shrimp were fished out in the 1980s but are back again. Nobody eats them because of the history of making people sick. One family had found no clams to harvest in three years and had only found a few sea urchins. Sea otters were to blame. Some get butter clams from people in King Cove and Sand Point and will share those.

Octopus is harvested in large quantities year round. One man kept 50 lbs. for himself but gave away 500-600 pounds. "It is really abundant out here. It gets on halibut for overnight sets. Gets stuck on them." Octopus is pickled. Sea cucumbers are harvested using j-hooks or circle hooks. "Sea eggs" (urchins) are collected by one man through diving. In 2008 he took 20 pounds. Sea otters tend to keep them cleaned out. Only one man in Akutan hunts sea otters.

Only four residents hunt birds. Some can only be hunted from a skiff, scaring them up off the water. But there are "not that many skiffs here." Puffin are eaten (*ookstin* = puffin breast). Willow ptarmigan, canvasbacks, teal (greenwing), mallards, buffleheads, harlequin, black scoter, rock ducks, white wing scoter, king eiders are harvested. A few elders like to eat murres and their eggs. The kittiwake is called "Pribilof goose" by Akutan locals. Horned auklets and Emperor geese are taken. Young men are not really interested in harvesting birds because of the price of gas ($340 for a 50-gallon drum). Also because there are only a few skiffs in the village, hunting is limited to those with access to them and funds for fuel.

Seagull eggs are hard to get because of inclement weather. They used to get them in May but now June or even the end of June. These are sent to friends and family in Unalaska since "they don't get stuff over there anymore like we do." Typically, people who get seagull eggs will announce on the radio, "We got seagull eggs. Come get them." But, one woman laughed, "we call on the *phone* if we get ducks." Eggs are harvested in June, but seagulls have started to move out because there are so many eagles.

Cash concerns affect harvesting. Residents increase their reliance on subsistence activities to lower their food bills, for example. For salmon harvesting, they will choose to stay closer to the village and only go as far as Entrance Point to burn less fuel.

Table 25. Subsistence Harvest Data for Akutan, 2009.

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
Birds/Eggs	Scaup	1	1.80	1.80	0.00	1.80	1.80		1.80	1.80		0.06	0.03	2.40
	Unknown Duck	1	7.50	7.50	0.00	7.50	7.50		7.50	7.50		0.25	0.11	10.00
	Goldeneye Duck	1	8.20	8.20	0.00	8.20	8.20		8.20	8.20		0.27	0.12	10.93
	Teal Duck	2	3.00	9.00	6.00	12.00	6.00	3.00	-32.12	44.12	4.24	0.40	0.18	16.00
	Ptarmigan	3	1.40	11.20	9.80	14.70	4.90	3.16	-8.68	18.48	5.47	0.49	0.22	19.60
	Black Duck	2	4.50	13.50	9.00	18.00	9.00	4.50	-48.18	66.18	6.36	0.60	0.27	24.00
	Black Scoter	1	22.50	22.50	0.00	22.50	22.50		22.50	22.50		0.75	0.34	30
	Geese	1	30.00	30.00	0.00	30.00	30.00		30.00	30.00		1.00	0.45	40.00
	Whitewing Scoter	1	30.50	30.50	0.00	30.50	30.50		30.50	30.50		1.02	0.46	40.67
	Harlequin Duck	3	4.00	15.00	11.00	34.00	11.33	3.67	-4.44	27.11	6.35	1.13	0.52	45.33
	Rock Ducks	4	5.00	30.00	25.00	67.00	16.75	5.38	-0.36	33.86	10.75	2.23	1.02	89.33
	Puffin	3	13.60	34.00	20.40	22.67	22.67	6.00	-3.14	48.47	10.39	0.76	0.34	30.23
	Gull Eggs	5	3.60	60.00	56.40	115.80	23.16	9.61	-3.53	49.85	21.50	3.86	1.75	154.40
	Total					**384.67**						**12.82**	**5.83**	**512.89**
Land Mammal	Feral Cattle	2	100.00	1600.00	1500.00	1700.00	850.00	750.00	-8679.65	10379.65	1060.66	56.67	25.76	2266.67
	Total					**1700.00**						**56.67**	**25.76**	**2266.67**
Non-Salmon Fish	Flatfish	1	1.00	1.00	0.00	1.00	1.00		1.00	1.00		0.03	0.02	1.33
	Greenling	2	3.00	6.00	3.00	9.00	4.50	1.50	-14.56	23.56	2.12	0.30	0.14	12.00
	Rainbow Trout	1	14.00	14.00	0.00	14.00	14.00		14.00	14.00		0.47	0.21	18.67
	Skate	1	18.00	18.00	0.00	18.00	18.00		18.00	18.00		0.60	0.27	24.00
	Rockfish	1	20.00	20.00	0.00	20.00	20.00		20.00	20.00		0.67	0.30	26.67
	Black Rockfish	1	30.00	30.00	0.00	30.00	30.00		30.00	30.00		1.00	0.45	40.00
	Black Bass	4	6.00	18.00	12.00	40.00	10.00	2.83	1.00	19.00	5.66	1.33	0.61	53.33
	Yelloweye	1	100.00	100.00	0.00	100.00	100.00		100.00	100.00		3.33	1.52	133.33
	Dolly Varden	7	2.80	70.00	67.20	246.80	35.26	10.06	10.64	59.87	26.62	8.23	3.74	329.07
	Cod	13	16.00	500.00	484.00	1278.40	98.34	38.71	14.01	182.67	139.56	42.61	19.37	1704.53
	Halibut	21	30.00	1920.00	1890.00	6937.80	330.37	102.69	116.16	544.58	470.59	231.26	105.12	9250.40
	Total					**8695.00**						**289.83**	**131.74**	**11593.33**
Plant	Cranberries	1	4.00	4.00	0.00	4.00	4.00		4.00	4.00		0.13	0.06	5.33
	Strawberries	4	0.08	4.00	3.92	4.57	1.14	0.95	-1.89	4.18	1.91	0.15	0.07	6.09
	Wild Rhubarb	1	12.00	12.00	0.00	12.00	12.00		12.00	12.00		0.40	0.18	16.00

	Species	N of Cases	Minimum	Maximum	Range	Sum (Total Lbs Reported Harvested)	Mean	Std Error of Mean	95% LCL mean	95% upper CL mean	Std. Dev.	Mean Lbs per Household	Mean Lbs per Person	Total Estimated Community Harvest (Lbs)
	Petrushki	6	1.00	8.00	7.00	19.00	3.17	1.08	0.40	5.94	2.64	0.63	0.29	25.33
	Pushki	13	1.00	20.00	19.00	47.90	3.68	1.40	0.63	6.74	5.06	1.60	0.73	63.87
	Mossberries	9	0.12	20.00	19.88	88.87	9.87	2.72	3.61	16.14	8.15	2.96	1.35	118.49
	Blueberries	12	0.40	60.00	59.60	170.40	14.20	4.61	4.06	24.34	15.96	5.68	2.58	227.20
	Salmonberries	19	0.16	60.00	59.84	247.40	13.02	3.46	5.75	20.29	15.08	8.25	3.75	329.87
	Total					**594.14**						**19.80**	**9.00**	**792.19**
Salmon	Chinook Salmon	2	8.18	12.27	4.09	20.45	10.23	2.05	-15.76	36.21	2.89	0.68	0.31	27.27
	Chum Salmon	3	10.68	80.10	69.42	144.18	48.06	20.22	-38.93	135.05	35.02	4.81	2.18	192.24
	Coho Salmon	9	15.81	137.02	121.21	558.62	62.07	10.86	37.03	87.10	32.57	18.62	8.46	744.83
	Sockeye Salmon	16	11.94	318.40	306.46	1814.88	113.43	24.74	60.70	166.16	98.95	60.50	27.50	2419.84
	Pink Salmon	15	25.00	625.00	600.00	2337.50	155.83	45.26	58.75	252.92	175.31	77.92	35.42	3116.67
	Total					**4875.63**						**162.52**	**73.87**	**6500.84**
Sea Mammals	Hair Seal	1	40.00	40.00	0.00	40.00	40.00		40.00	40.00		1.33	0.61	53.33
	Fur Seal	1	45.00	45.00	0.00	45.00	45.00		45.00	45.00		1.50	0.68	60.00
	Harbor Seal	4	56.00	112.00	56.00	392.00	98.00	14.00	53.45	142.55	28.00	13.07	5.94	522.67
	Sea Lion	5	200.00	200.00	0.00	1000.00	200.00	0.00	200.00	200.00	0.00	33.33	15.15	1333.33
	Total					**1477.00**						**49.23**	**22.38**	**1969.33**
Shellfish/Intertidal	Hair Crab	1	4.00	4.00	0.00	4.00	4.00		4.00	4.00		0.13	0.06	5.33
	King Crab	1	14.00	14.00	0.00	14.00	14.00		14.00	14.00		0.47	0.21	18.67
	Razor Clams	1	15.00	15.00	0.00	15.00	15.00		15.00	15.00		0.50	0.23	20.00
	Sea Urchins	6	1.28	10.00	8.72	23.48	3.91	1.36	0.41	7.42	3.34	0.78	0.36	31.31
	Bidarkis	8	1.00	20.00	19.00	56.50	7.06	2.11	2.08	12.04	5.95	1.88	0.86	75.33
	Octopus	4	20.00	200.00	180.00	392.00	98.00	39.88	-28.93	224.93	79.77	13.07	5.94	522.67
	Total					**504.98**						**16.83**	**7.65**	**673.31**
All Resources	**Total**					**18231.42**						**607.71**	**276.23**	**24308.56**

Figures 88 and 89 shows the difference in pounds usable weight harvested between 1990 and 2009. There has been a decline in every species category despite more houses reporting in 2009. Figures 90 to 92 reflect three years of survey data, 1990 and 2008 surveys by the Subsistence Division, and a 2009 survey from this project. Whether the comparison is made between the 1990 and 2009 surveys, or the 2008 and 2009 surveys, we see overall reduction in the use of salmon, shellfish, birds, eggs, and plants. Smaller reductions are also seen in sea mammals. The 2009 data show a marked increase in the use of non-salmon fish and land mammals (Akun Island beef). Figures 93 and 94 shows that the average pounds of harvested foods per household have declined for every category of harvested subsistence resource between 1990 and 2009 for the community of Akutan. Figure 95 shows a successful pink salmon harvest.

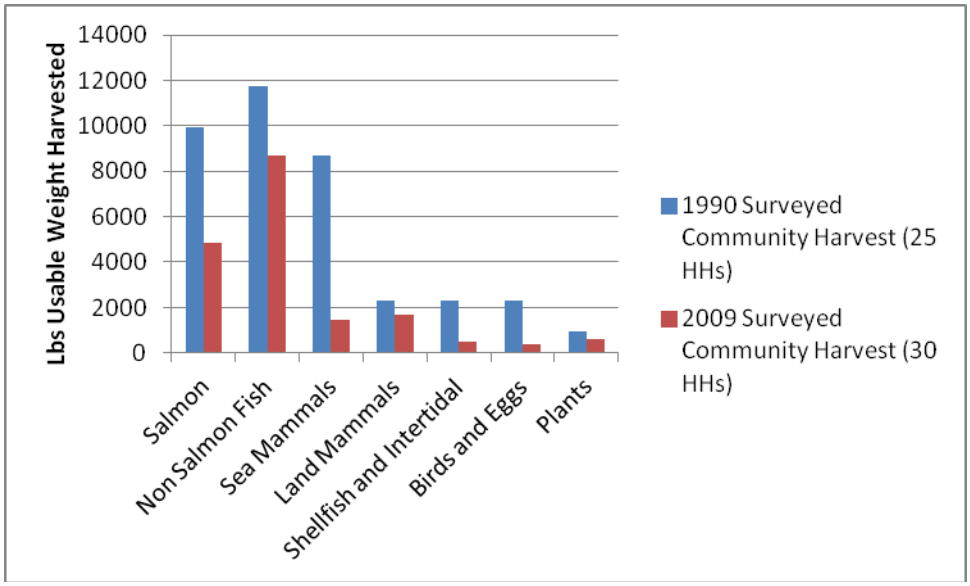

Figure 88. Akutan harvests reported by total pounds usable weight between the 1990 Subsistence Division survey (25 of 31 households) and this project (30 of 40 households).

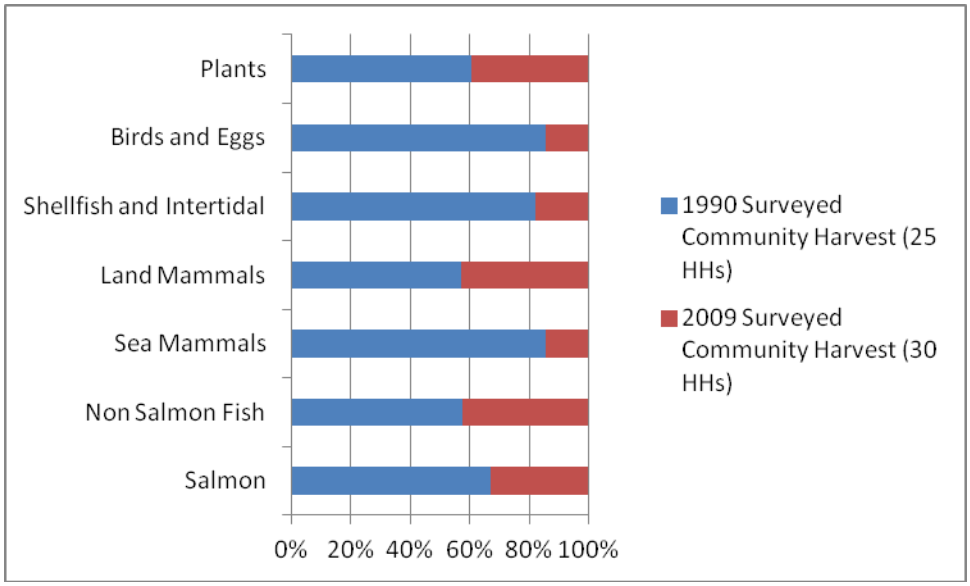

Figure 89. Percent of Akutan harvests reported by total pounds usable weight between the 1990 Subsistence Division survey (25 of 31 households) and this project (30 of 40 households).

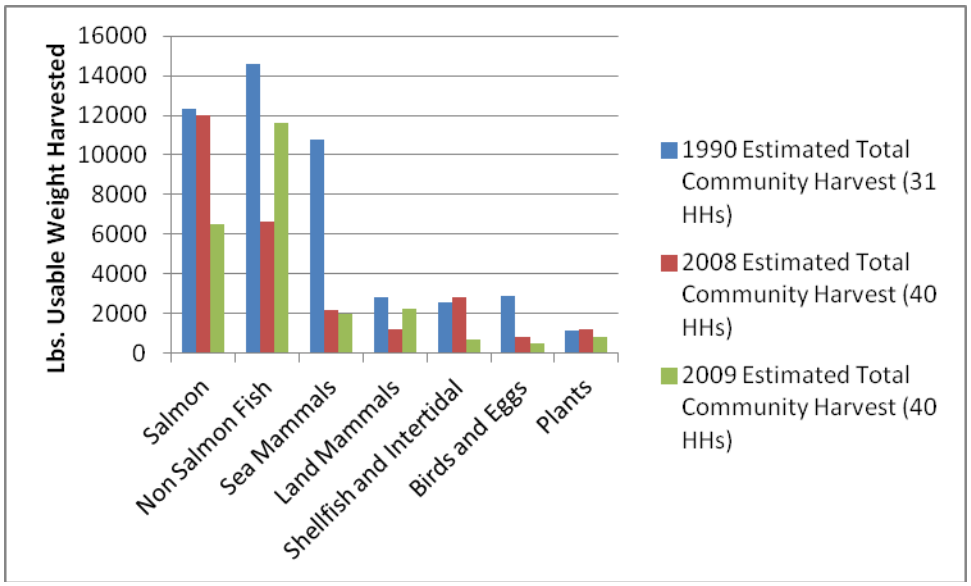

Figure 90. Estimated total community harvest for Akutan in pounds usable weight between the 1990 and 2008 Subsistence Division surveys and 2009 data from this project.

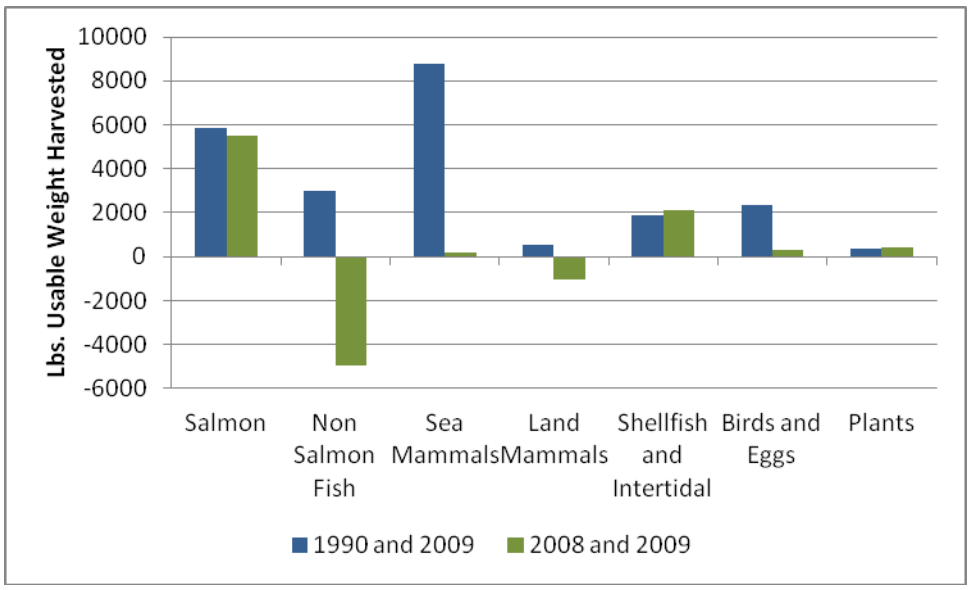

Figure 91. Change in estimated total pounds usable weight harvested by species category between 1990 (31 HHs), 2008 (40 HHs) and 2009 (40 HHs), Akutan.

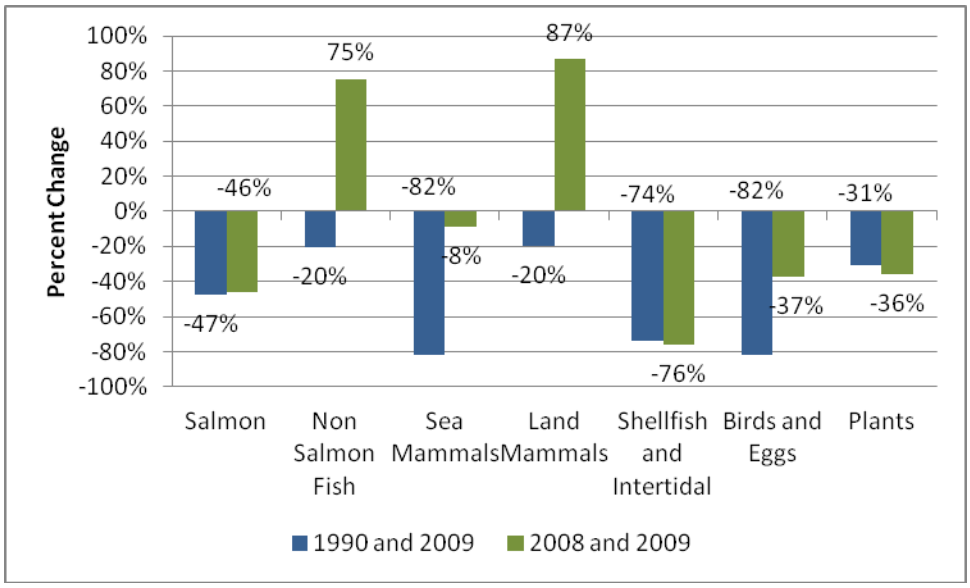

Figure 92. Percent change in estimated pounds usable weight harvested by species category between 1990 (31 HHs), 2008 (40 HHs) and 2009 (40 HHs), Akutan.

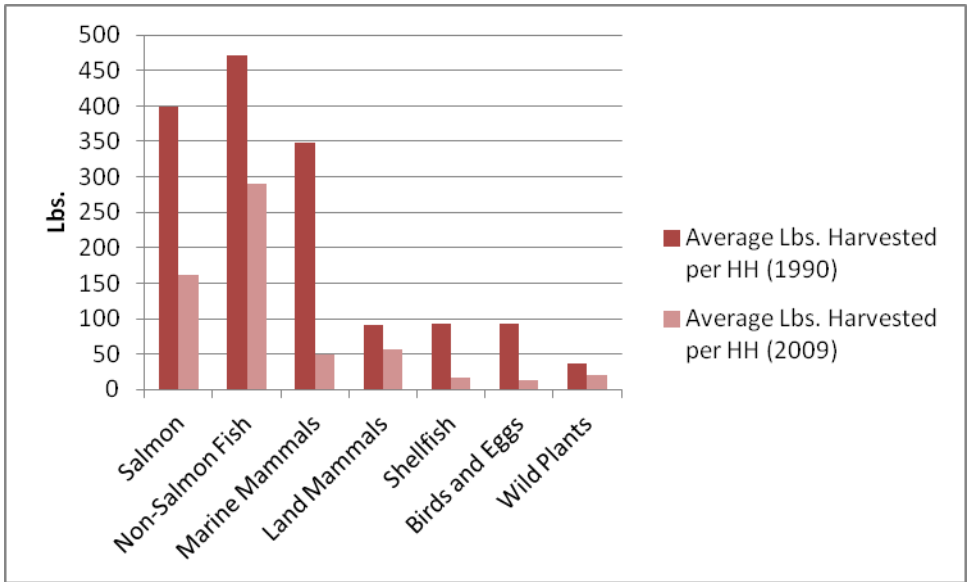

Figure 93. Average Lbs. Harvested per HH in 1990 and 2009, Akutan.

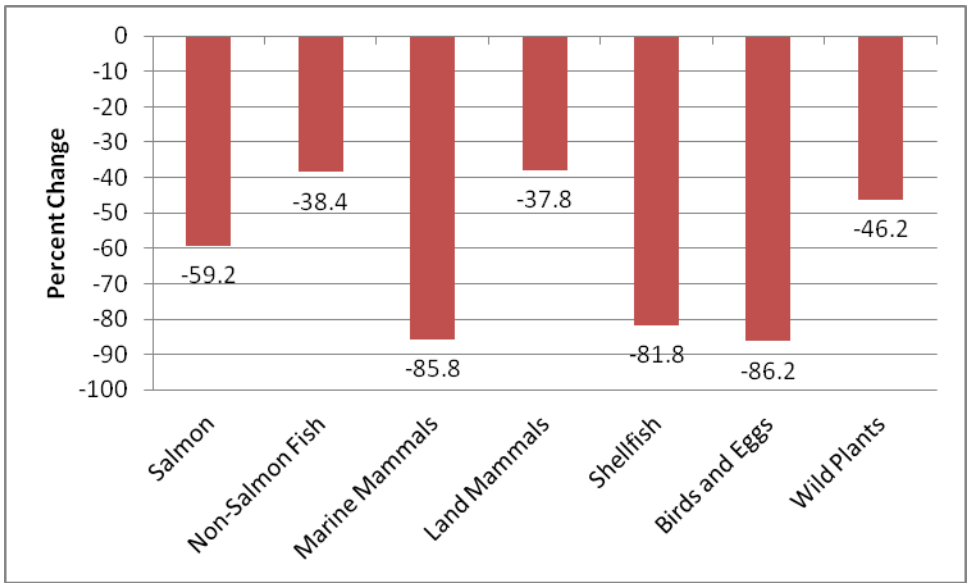

Figure 94. Percent change in Lbs. Harvested per household between 1990 and 2009, Akutan.

Figure 95. Akutan Dry Rack, Photo by April Pelkey, Summer 2011

Subsistence Security

The following is a list of specific subsistence and other species abundance issues described by informants that could indicate future shifts in subsistence activities.

- Sea otters are said to have cleaned out most of the urchins (sea eggs).

- Clams are seen as smaller in size and less abundant than in previous years due to predation by sea otters and other unknown factors.
- Climate change is also attributed to regime shifts. For example, shearwaters are dying off because waters have warmed and the fish that they eat are swimming deeper. Locals have found dead, starving birds and sent them in to the U.S. Fish and Wildlife Service.
- There has been an explosion of octopus and Atka mackerel in the waters around the islands, for unknown reasons.
- There was concern over "ghetto crab," which are crab that migrate through areas of known areas where the processor has disposed of fish processing byproducts and they turn black, both shells and meat. They are considered inedible. Local harvesters were setting pots in the area, then "sorting through the junk."

Changes in top 10 species between the 1990, 2008 and 2009 surveys show the increasing importance of feral cattle, octopus, and sockeye salmon, and the decreasing role of sea mammals (Figures 96-98). With only a year between the 2008 and 2009 data, there are dramatic differences in the top ten species harvested. These differences are especially marked in sockeye salmon and sea lion (Figure 99) demonstrating that a single year can make a substantial difference in how a subsistence economy is characterized in a given village. When comparing the 2009 harvest with the 1990 survey, only halibut and pink salmon have a higher harvest today than when they did in 1990. All other categories are between 33 and 94 percent less in 2009 than in 1990 (Figure 100). In responding to the question, "Did you get enough for your needs last year?" Akutan residents generally responded yes, except with regards to salmon (Figure 101). In response to whether people used less, the same, or more in 2009 than in the past, most respondents indicated they used about same in 2009 for most species, except for salmon (Figure 102).

Few people harvest subsistence crab in Akutan. Commercial fishermen sometimes give them opilios and tanners, they said. Instead of harvesting crab people buy it from Trident Seafoods in 25 lb. or 40 lb. boxes (Figure 103).

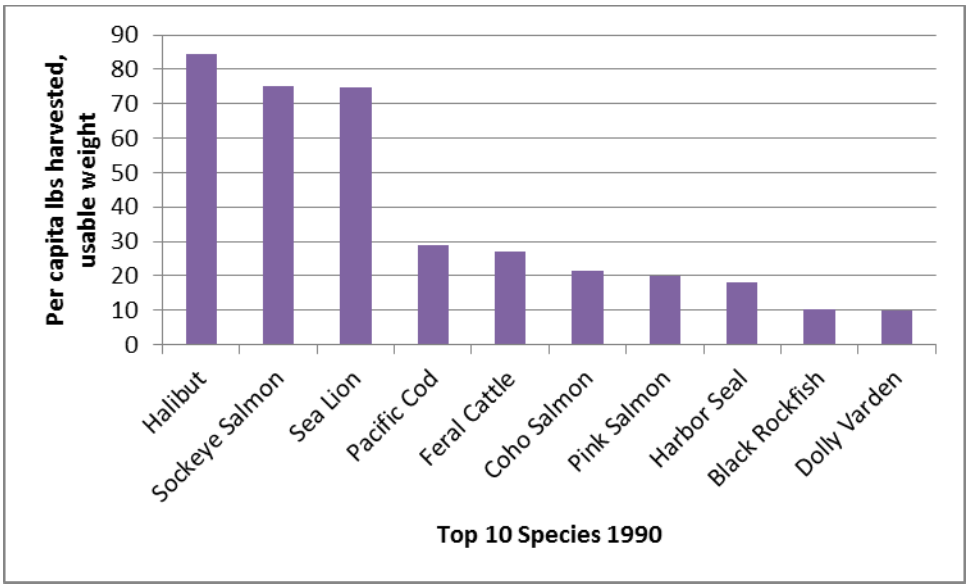

Figure 96. Top ten species harvested in Akutan, 1990.

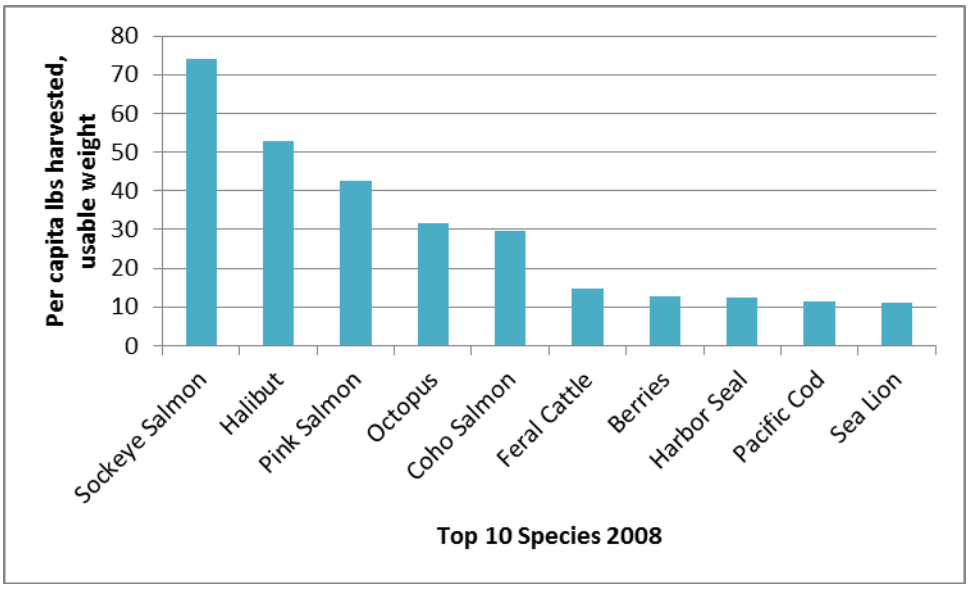

Figure 97. Top ten species harvested in Akutan, 2008.

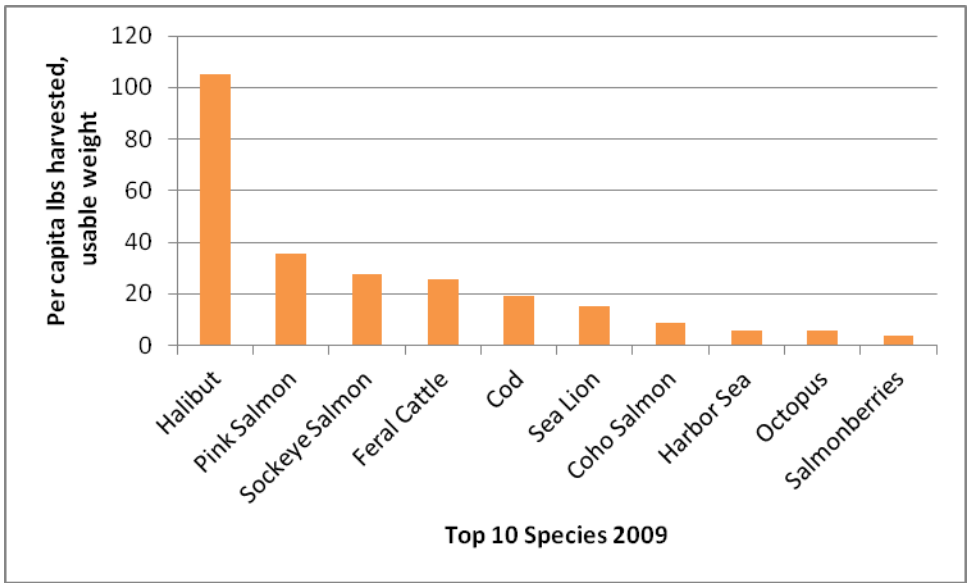

Figure 98. Top ten species harvested in Akutan, 2009.

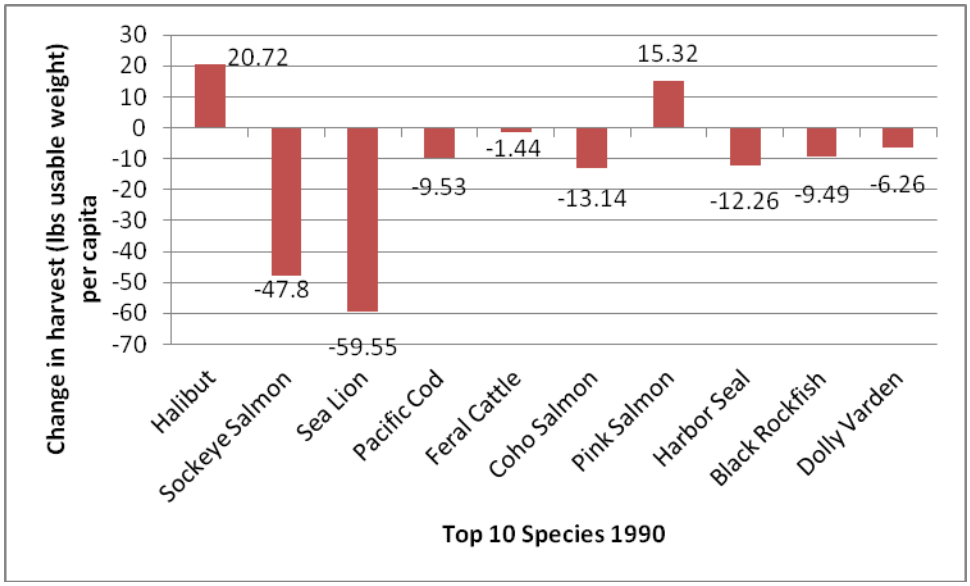

Figure 99. Change in pounds per capita harvested in 2009 for the top ten species harvested in 1990, Akutan.

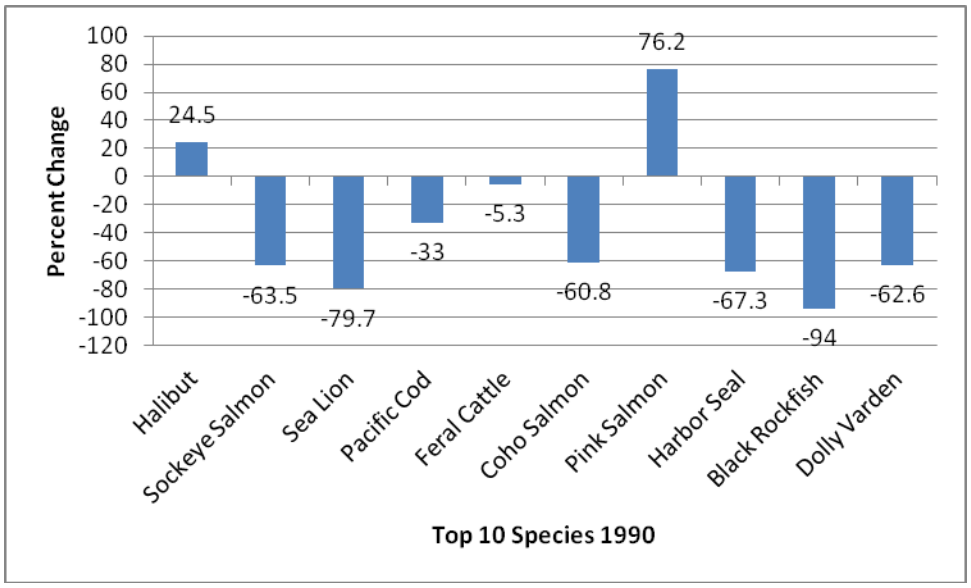

Figure 100. Percent change in pounds per capita harvested in 2009 for the top ten species harvested in 1990, Akutan.

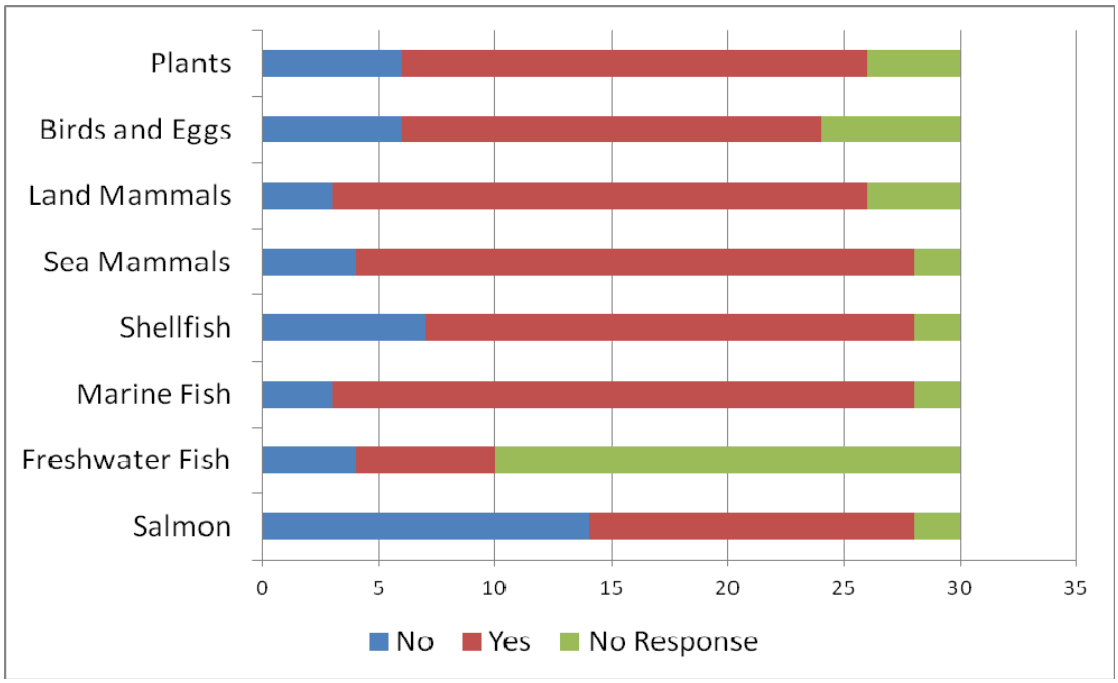

Figure 101. Responses to the question, "Did you get enough (resource) for your needs last year?", in percentages of Akutan households (N=30), 2009.

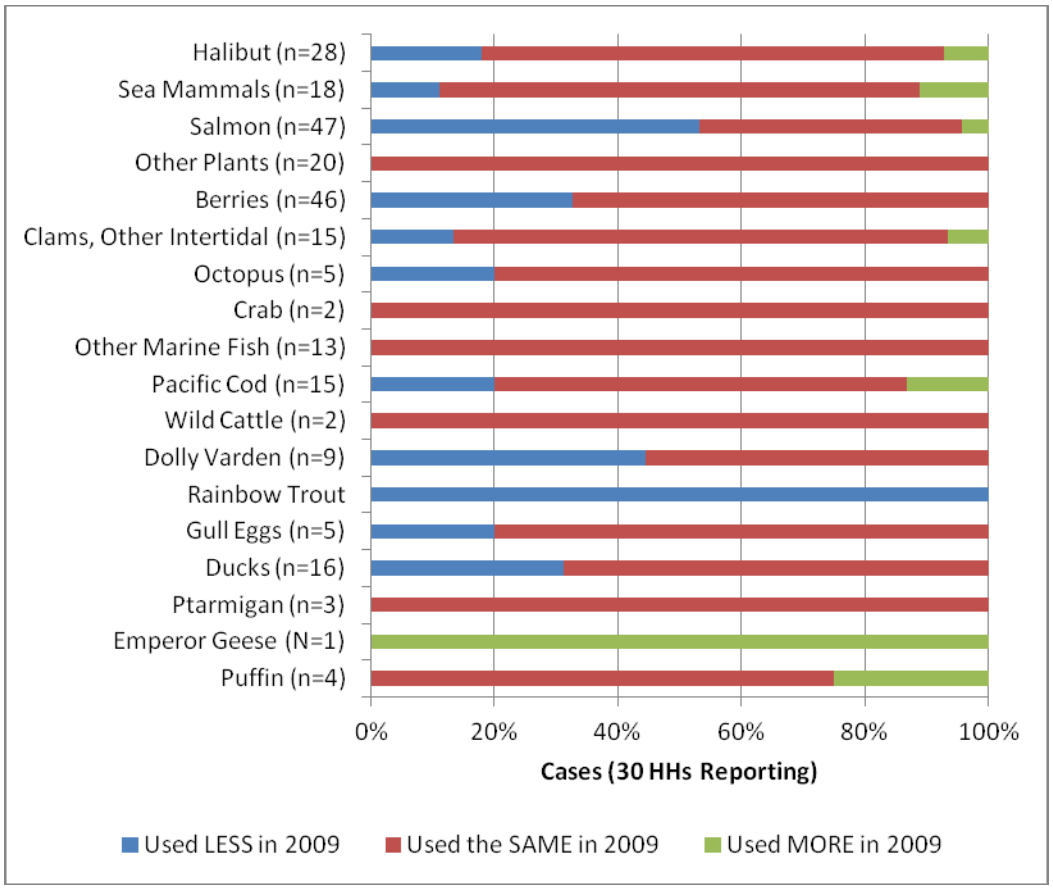

Figure 102. Akutan's responses to whether people used less, same, or more of resources in 2009 that in the past.

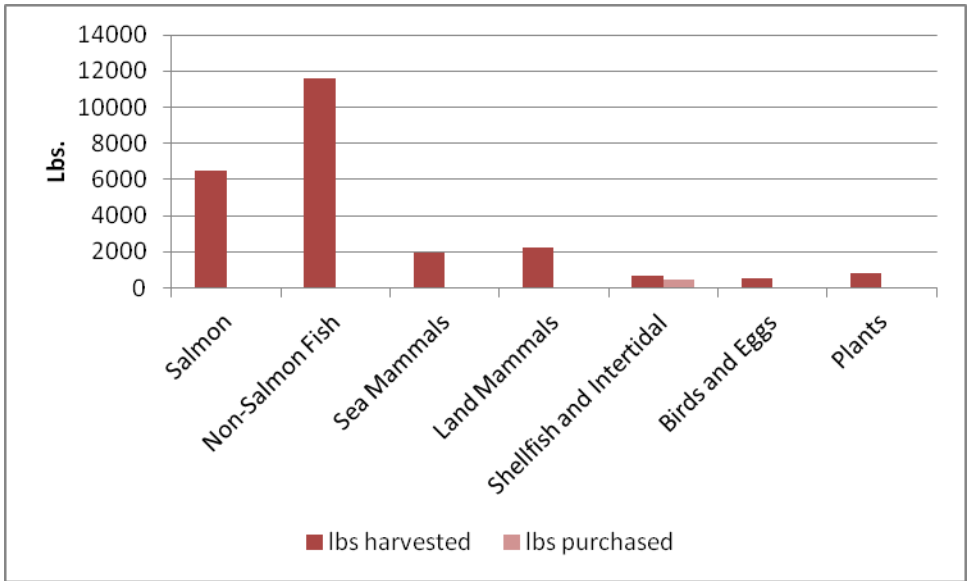

Figure 103. Akutan Lbs. of Wild Foods Harvested and Purchased, 2009

The "30/70 rule" identified by the Subsistence Division, where 30 percent of a community's households harvest approximately 70 percent of that community's subsistence (in pounds usable weight), was tested for Akutan using a Pareto chart (Figure 104). For the households surveyed in Akutan, approximately 30 percent of households account for 70 percent of the community's total harvests, confirming this "30/70 rule." This pattern is also true for salmon harvests (Figure 105).

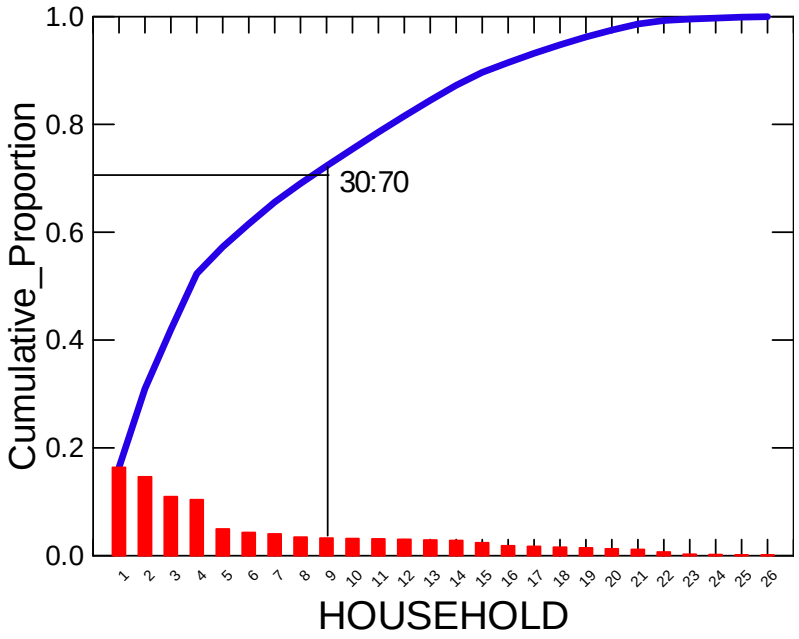

Figure 104. Pareto chart showing household harvests in Akutan closely fit the 30/70 rule where 30% of households are responsible for 70% of the total community's harvests.

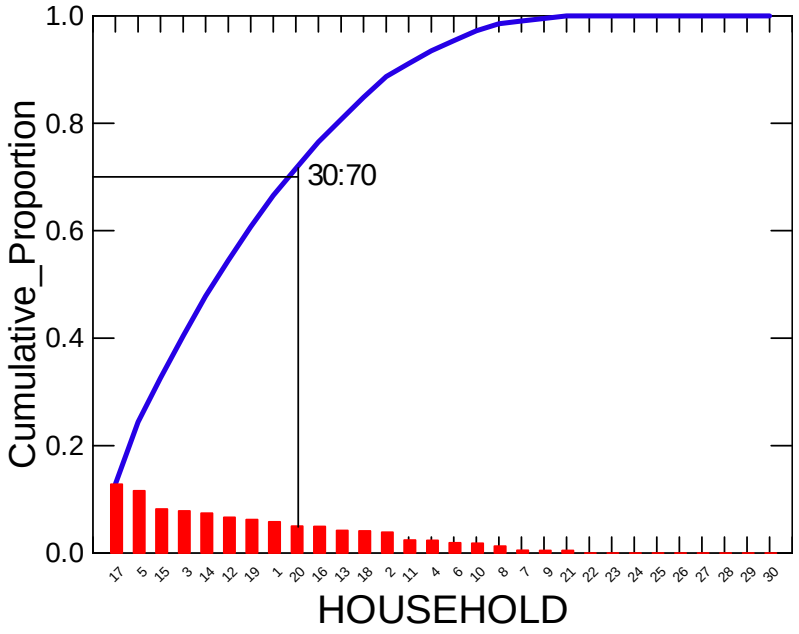

Figure 105. Pareto chart showing that 30% of Akutan households are responsible for 70% of the total community harvests.

Figure 106 shows the total pounds of wild foods harvested by Akutan households versus the total pounds received by the same households. Four of the 30 surveyed households did not harvest any wild foods but all received some subsistence foods from others. Of the 25,676 total pounds entering households, 7,955 (31 percent) pounds are foods received through sharing and social obligations.

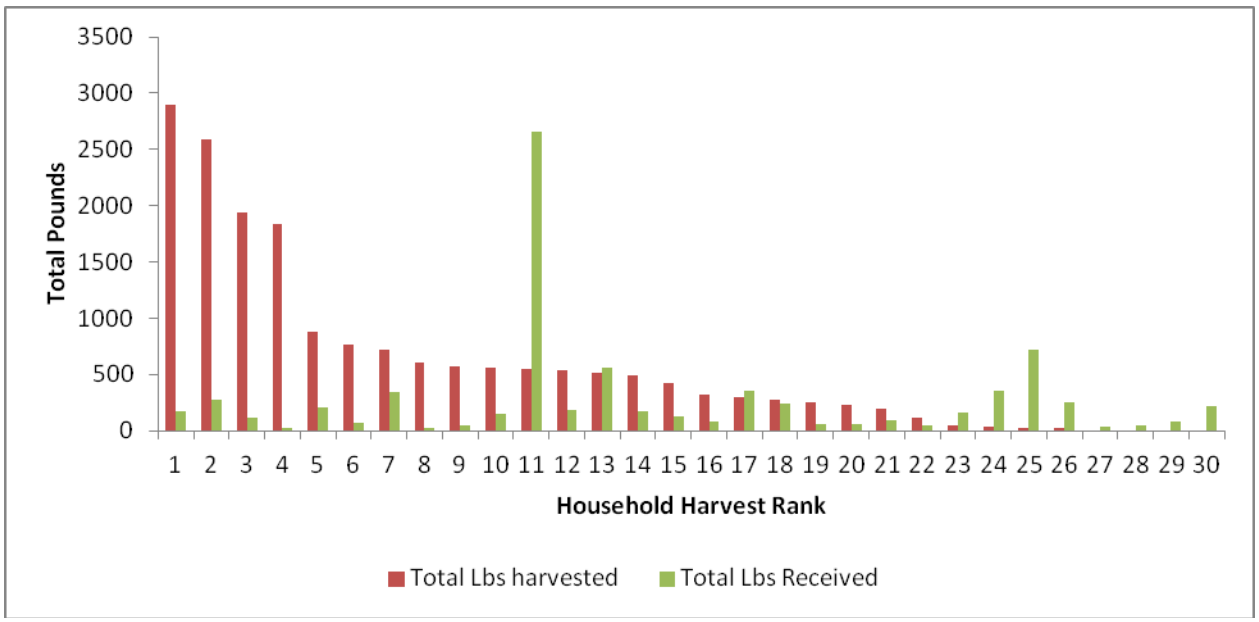

Figure 106. Total pounds of wild foods harvested for Akutan households versus the total pounds of wild foods received from others.

SPATIAL DATA

At the mouth of Hot Springs Bay, people will set nets and get halibut, pogey, flounder, bullhead, and salmon. In the Akutan Bay and Creek, people fish for pink salmon before they have spawned. Lake trout and dolly varden are harvested at Open Bight and Akun Island, both caught with rod and reel. Chum salmon, harvested in the creek, is eaten wrapped in *pushki* (wild cow parsnip) leaves or with *chadu* (seal oil), or boiled with mussels. Chum salmon eggs are drained using sheer curtains, cheese cloth or panty hose, and hung in smoke houses or drained raw, then onion and salt are added.

For subsistence salmon harvesting, people put nets outs (beach seines) and when they get their household needs met, they share with others in the village. 2008 was disappointing for subsistence salmon, catching maybe ten percent of what they normally harvest.

Commercial fishermen make sure they go beyond where community skiffs can go so that they do not interfere with subsistence. People jig for cod on the south of Akutan Island and north of Akun. Irish lord and sculpin are taken east of Akutan Island. Subsistence pogies are taken from "two-acre rock."

Several men hold halibut IFQs as described in the section above. One stated he had 747 lbs. Halibut must be at least 32 inches long to keep. They do not find large halibut anymore, but

stated that the flesh is still firm and healthy. Several stated that commercial boats overfish halibut. Most local harvesting is done between Green Bight and Seredka Point (Figure 85).

The Krenitzin Island Cattle Company on Akun Island is a subsidiary of the Akutan Corporation, and is managed by a non-Native man residing in Akutan. The cattle are descendants of a herd introduced by the Russians in the early 19th century. People from Akutan used to harvest cattle and bring them to the beach to share, but this has not been done for several years. Instead, the "cattle guys" brought in three animals to share in 2008 that equaled about 1,000 pounds of meat. There is rumored to be some dead loss due to severe weather or cattle falling off cliffs into the ocean. Erosion created by the cattle concerns some residents since Akun is Akutan Corporation-owned lands. People discussed culling the herd again and sharing the meat as a subsistence food.

All geographic data are presented in Appendix 1.

SHARING NETWORKS

The primary harvesters and distributors in Akutan have large quantities and varieties of wild foods flowing in and out of their homes (Figure 107). A person harvesting and distributing certain foods does not prevent those same foods from being shared with you by another harvester/distributor.

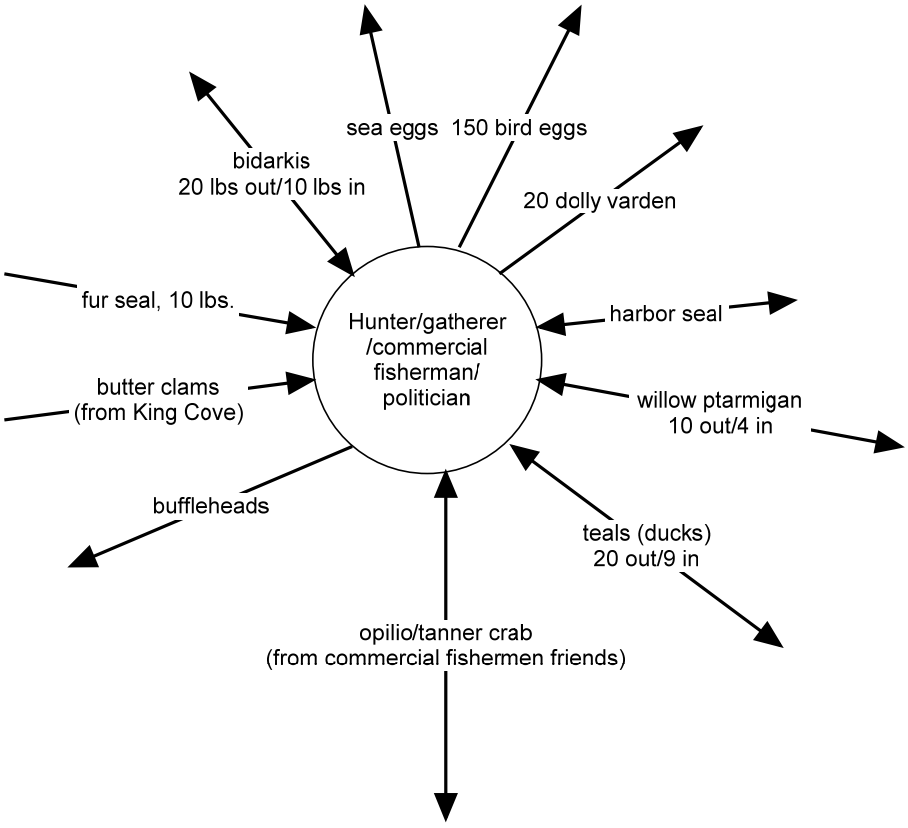

Figure 107. The flow of a portion of wild food in and out of the home of a primary hunter/gatherer/fisherman in Akutan, 2008.

In this case, this is the only man who gathers sea eggs (urchins, by diving for them) for the village, and his importance in providing variety, quantity, and quality cannot be overstated. The loss of this single hunter/gatherer/fisherman could have dramatic consequences for households beyond his own, and there are so few hunter/gatherer/fishermen in the community that the harvesting and sharing burdens to them would likely increase, rather than others stepping up to replace that person. Many of the elderly, infirmed or those otherwise unable to harvest on their own named this individual repeatedly as a key harvester for them (Figure 108).

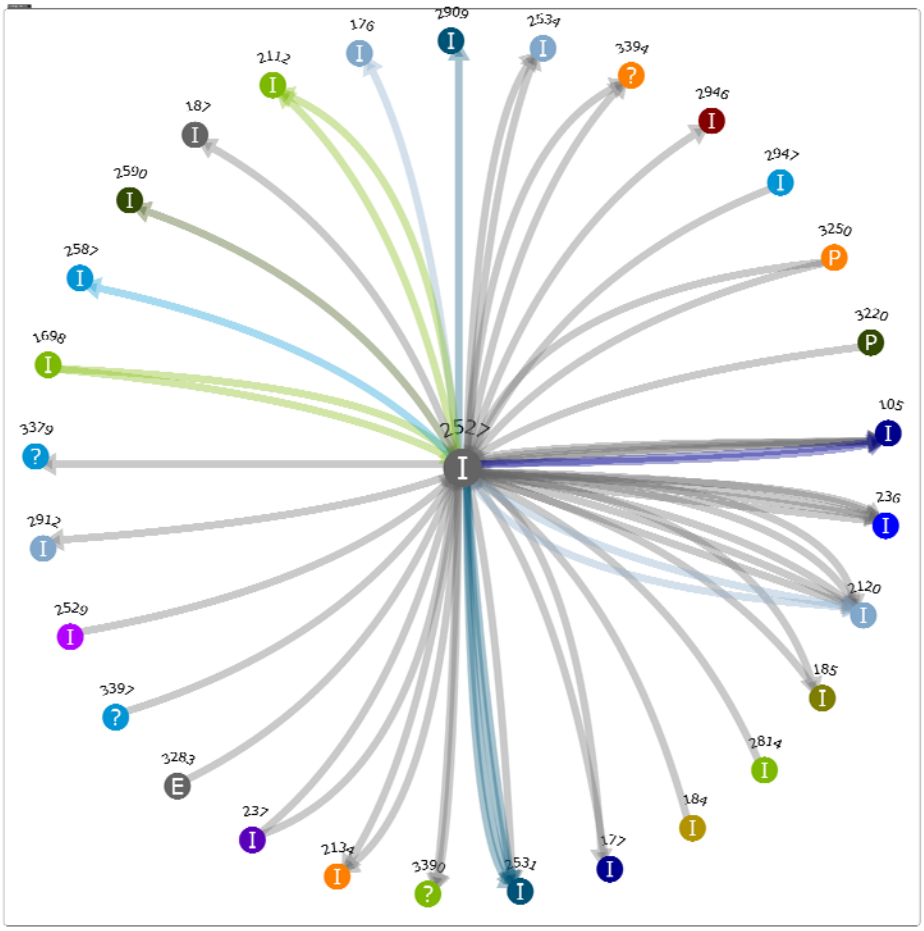

Figure 108. Network data for the same individual in Figure 107. I=Individual, P=Processor, E=Entity/Business, and ?=unknown/unidentified source. Numbers are codes distinguishing between identities.

Caribou has been traded in from family and friends in Chignik, King Cove and Sand Point, but not in recent years. It also comes from Atka a bit more regularly, since they have a population introduced by the U.S. Fish and Wildlife Service several decades ago. Relatives and friends in Seattle trade vegetables for fish. One woman has polar bear meat in her freezer; she traded fireweed jelly and tea for it in Anchorage a few years ago but now doesn't want to eat it because, "they eat humans."

There is a great deal of sharing with relatives in Unalaska. "They don't get stuff over there anymore like we do." One woman sends seagull eggs to a relative in Unalaska. One man sends

his sister in Unalaska ducks, berries and seafood, “otherwise she don’t get no [traditional] foods.” For sea mammal portions, one woman complained, “Everybody is so stingy with that stuff anymore, we hardly get it.”

Figure 109 shows some of the variety of foods flowing in and out of a woman’s home in Akutan. She is married but has no children, and most of the wild foods that enter her home do so from a network of friends and relatives. The foods she is able to gather on her own are plant foods found near the village, and she shares these in large quantities.

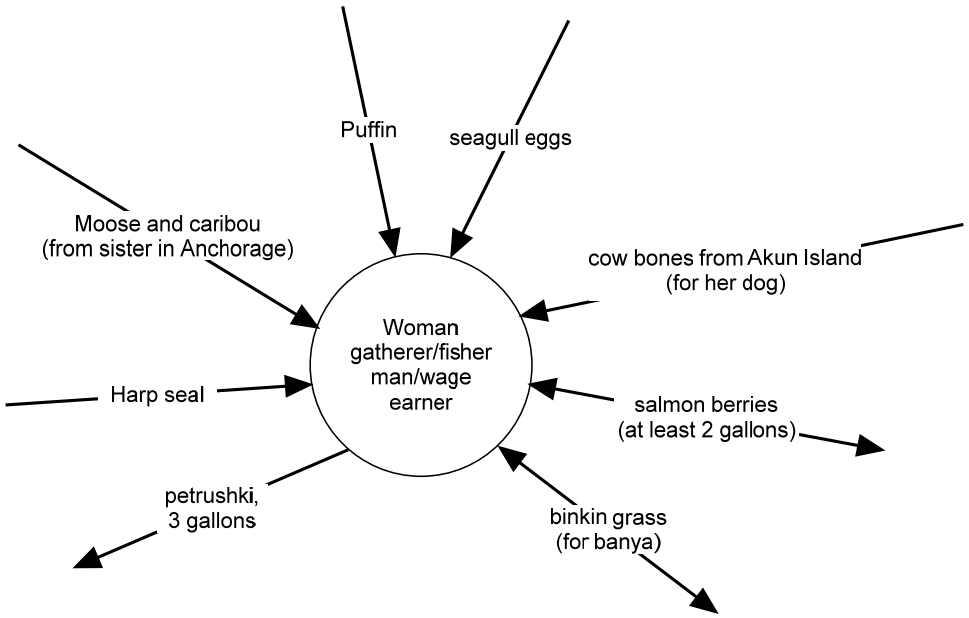

Figure 109. A portion of the flow of foods in and out of a woman’s home in Akutan, 2008.

Several households reported difficulties in getting sea mammal foods because the hunters are not targeting them often, and those that do get them tend to share mostly with their close network. Figure 110 shows the combined harvests in three of the four study communities that harvested sea mammals. 6 percent of all households are responsible for 70 percent of the total harvests for these three communities.

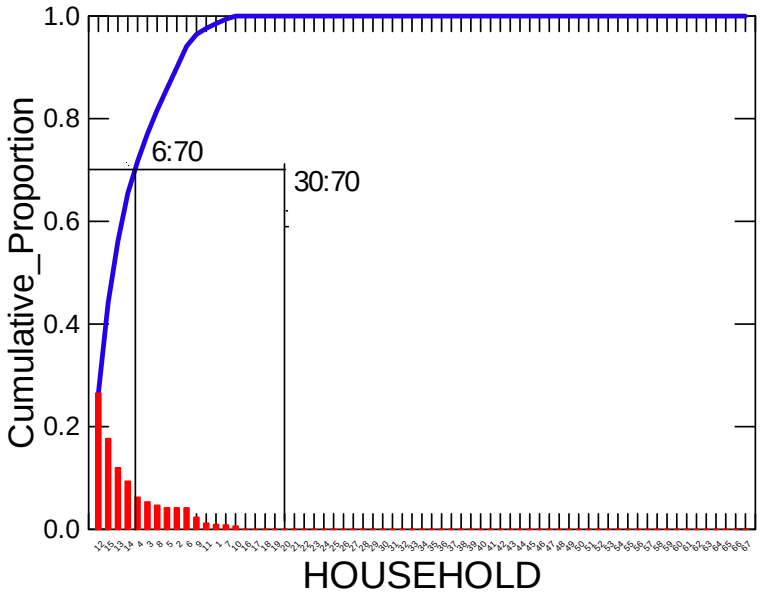

Figure 110. Pareto chart showing that 6% of all households in Port Heiden (n=4), False Pass (n=2), and Akutan (n=9) are responsible for 70% of the total sea mammal harvests in the study communities. Nelson Lagoon did not harvest sea mammals in 2009.

The community net system, in which fishing nets are set in front of the village and the food collected from them shared, appears to be a crucial feature of sharing in the community, and allows those unable to harvest to get at least a portion of what they need. There is communal sharing on the beach of other animals too, but "you have to get down there quick" or it is all gone. Although sporadic, this system is highly valued and is distinctive from the other study communities.

All network data for Akutan are presented in Appendix 2.

COMMUNITY ECONOMICS

Of the 30 surveyed households in Akutan, seven derive income directly from fishing (Figure 111). Three of these are as captain and four are as crew. Akutan fishermen are primarily engaged in longlining for halibut and jigging for cod. Crewmen work on local vessels with Akutan captains, or on a couple of large cod fishing vessels based outside the region. These crewmen are adult men with families of their own and need the fisheries income. Captains report bringing home subsistence foods from these commercial fishing trips, such as halibut and octopus. In the 30 surveyed households, 40 adults listed 67 separate job titles, or 1.7 jobs per adult (Table 26). Earned income in the community of Akutan is dominated by local government, followed by fisheries and services (Table 27). 88 percent of income in Akutan is earned income (Figure 112).

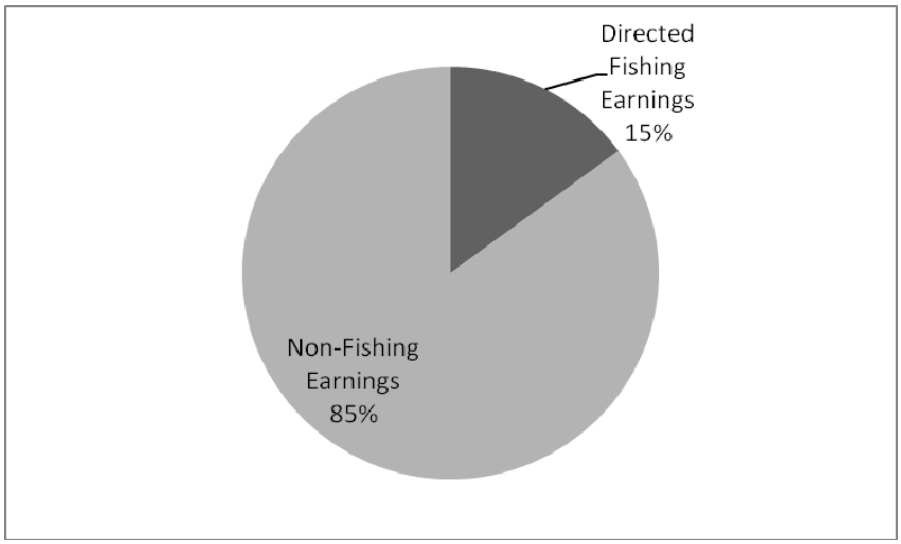

Figure 111. Percent of fishing and non-fishing earnings in Akutan, 2009. This does not include returns to the community from CDQs.

Table 26. Job titles identified by Akutan respondents.

Fisherman/Crewman	12	Cattleman	1
Handyman/Laborer	6	Diver	1
Fencer	4	Elder Case Worker	1
Administrative assistant/Front Desk	3	Harbormaster	1
Bartender/Waitress	3	Housekeeper	1
Secretary/Front Desk	3	Janitor	1
Waste Management	3	Librarian	1
Carpenter	2	Longshoreman	1
Clerk	2	Mayor	1
Corporation/Tribal Administrator	2	Native Artist	1
Fueler	2	Physician's Assistant	1
PenAir Agent	2	Preschool Teacher	1
Postmaster	2	Teacher's Aide	1
Storekeeper	2	VPSO	1
Teacher	2	Watchman	1
Business Owner/Service Manager	1	Water Treatment Operator	1

Table 27. Earned and other income, Akutan 2009.

	Households	Total Income	Average per HH
Earned Income			
Local Government	17	477917	28113
Federal Government	2	46000	23000
Fisheries	11	292500	26591
Retail	5	85640	17128
Services	9	227700	25300
Education	1	110000	110000
Transportation	1	4800	4800
Other	4	89000	22250
Total Earned Income		**$1333557**	
Other Income			
Alaska Permanent Fund Dividend	28	76995	2750
Native Corporation Dividend	22	52979	2408
Unemployment	4	14134	3534
Food Stamps	4	18008	4502
Social Security	2	13440	6720
Supplemental Security	1	3600	3600
Other	1	1700	1700
Total Other Income		**$180856**	
AKUTAN TOTAL		**$1514413**	

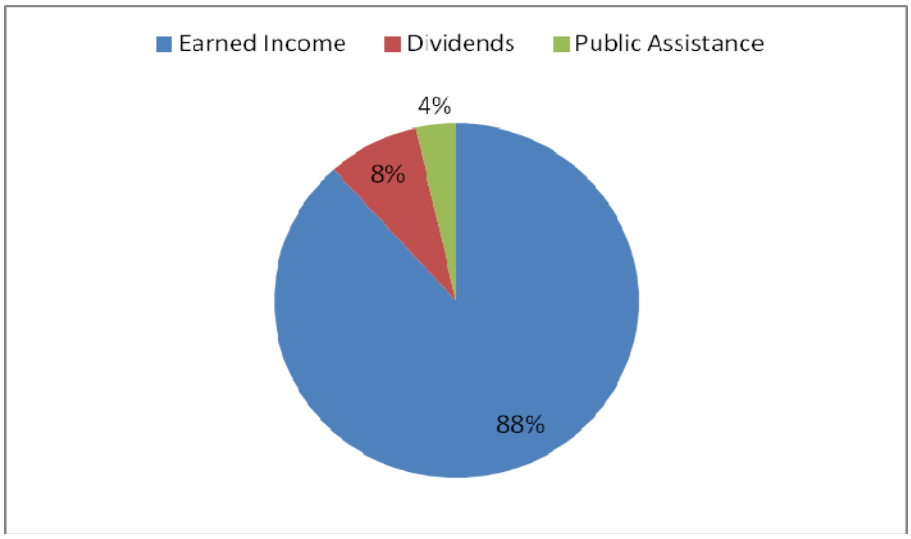

Figure 112. Akutan income sources, 2009.

EXPENSES AND EXPENSE NETOWRKS

Household Expenses

Groceries

The McGlashan Store in Akutan carries groceries and other goods, and many residents get a portion of their groceries there. Most food is ordered from outside arriving by barge. Residents also ride the ferry to Unalaska for shopping and bring groceries home. Grocery expenses reported ranged from between 5 percent to 41 percent of households' total incomes. They cost households an average of $8,217 annually (Figure 113).

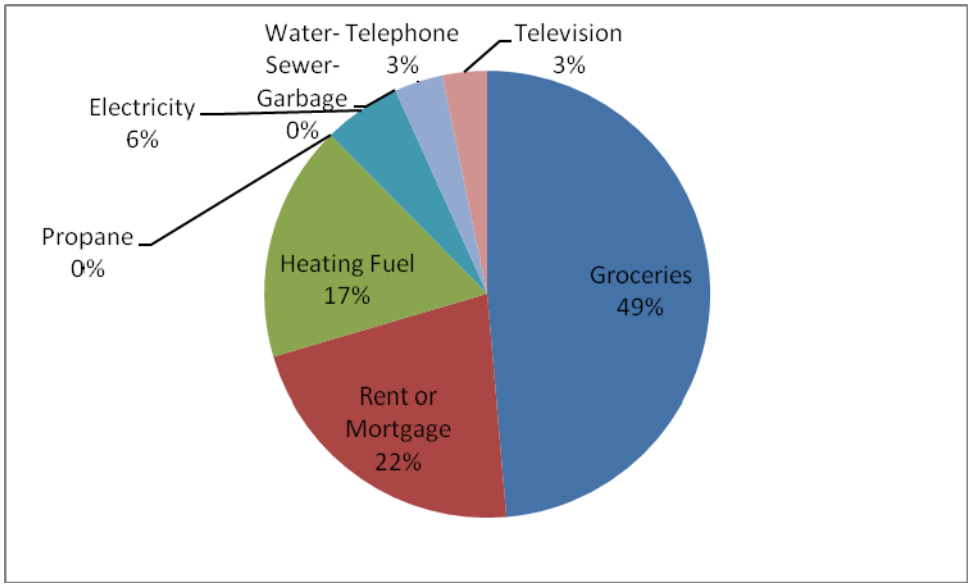

Figure 113. Relative Percentages of Household Expenses, Akutan.

Rent or Mortgage

Eighteen of 30 households surveyed pay a rent or mortgage, averaging $3,685 annually, or $307 monthly.

Heating Fuel

Heating fuel costs households an average of $2,902 each year. Propane is not used in Akutan.

Electricity

Households use $952 in electricity generated from a hydroelectric plant that is backed by diesel.

Water-Sewer-Garbage

There are no separate charges for these services.

Telephone

A combination of cell phones and landlines cost households an average of $594 annually.

Television
Every home had at least one television costing an average of $548 annually.

Subsistence Expenses

Gasoline
Cars and trucks owned by Akutan residents are actually in Anchorage. Trident Seafoods and the Safe Harbor Church own a few vehicles, but there are no roads through the village and no need for cars or trucks. The boardwalk though the village has been widened to accommodate the width of 4-wheelers; these are used to go between the village and cannery, airstrip and around the village. The use of gasoline, therefore, is much smaller than in other communities, averaging $390 per reporting household annually.

Ammunition
The average household uses $123 in ammunition.

Supplies
Other supplies such as berry pickers, buckets, freezer bags costs each household less than $100 annually.

Subsistence Equipment Owned, Shared, Purchased

The subsistence equipment for Akutan is minimal (Table 28). Few households have commercial sized boats and there are relatively few skiffs in use by the community. Cars and trucks reported that are owned by Akutan residents are actually in Anchorage. Once the harbor is completed and road access provided, this will likely change.

Table 28. Equipment used in subsistence harvesting reported by Akutan in 2009.

Equipment Type	Total	Households (of 30)	Average per Household with Equipment Type	Average per Household in Village
Skiffs	10	8	1.3	0.3
Outboard Motor	13	9	1.4	0.4
Commercial > 30' Boat	3	2	1.5	0.1
Snow Mobiles	0	0	0.0	0.0
ATVs; 4-Wheelers	10	10	1.0	0.3
Cars(s) or Truck(s)	4	4	1.0	0.1

POSITIVE INFLUENCE ON COMMUNITY LIFE

Thirteen individuals were named has having a positive influence on community life. Five individuals named themselves. Two men were cited the most (7 and 9 times) for their strong leadership and for taking care of many people beyond their immediate kin. These are also the strongest nodes in the food sharing networks.

SUMMARY

- Akutan is a small, progressive community that harvested 48 different species (in 2009) of subsistence foods from their immediate environment.
- 30 percent of the households account for 70 percent of the total community's harvests. 30 percent of households also account for 70 percent of the total community harvest of salmon.
- Of the 25,676 total pounds entering households, 7,955 (31 percent) pounds are foods received through sharing and are the result of social relationships other than the household's own harvests through cooperative hunting and fishing.
- The people of Akutan rely on a greater portion of sea mammals in their diet than the other communities surveyed for this study, but still experienced a 85.8 percent decline in household harvests.
- While some residents engage in commercial fishing, the dominant source of income is in local government.
- Commercial fishermen provide the greatest abundance and variety of wild foods for the whole community owing to their capacity and expanded range.
- Between 1990 and 2009, Akutan experienced declines in 8 of the top 10 species. Halibut and pink salmon have gained in importance significantly.
- Between 1990 and 2009, Akutan households reported harvest declines for every species category: 59.2 percent decline in salmon, 38.4 percent decline in non-salmon, 85.8% decline in marine mammals, 37.8 percent decline in land mammals, 81.8 percent decline in shellfish, 86.2 percent decline in birds and eggs, and a 46.2 percent decline in wild plants. These data could partly be the result of several hunters and fishermen who were unavailable during the survey.
- Communal sharing is a crucial feature of Akutan. Fishing nets are set in the bay and the fish are shared with everyone who comes down to the beach, announced on the VHF radio. Cattle, sea mammals, and birds are shared this way as well, but less frequently.
- Akutan has a positive relationship with Trident Seafoods even though few residents are employed in the processing plant.
- Akutan is constructing a harbor and airport to increase revenue and support the village.
- Geothermal prospects for Akutan Island could play a strong, positive role in community development.
- Support for the North Aleutian Basin project is mixed for the community, but the leadership supported the project.

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PART III

CHAPTER 8. COMPARATIVE ANALYSIS: DEMOGRAPHICS & ECONOMICS

CHARACTERISTICS OF SURVEYED HOUSEHOLDS

Household Information

The OMB approved survey collected basic demographic information and household composition. Respondents were asked to list the members of their household for the year 2009, whether they were male or female, Alaska Native or other ancestry (Scandinavian, Russian, Japanese, et cetera), what year each was born, how each in the household was related to the head of household, last grade of school completed, where they were born, and the number of years each had lived in the community. These data were used to generate demographics for the *surveyed portion* of the community. Data from the survey were also compared to the 2010 U.S. Census results. The average household size for each community is provided in Figure 114 and Table 29. Port Heiden has slightly more people per household than the other communities.

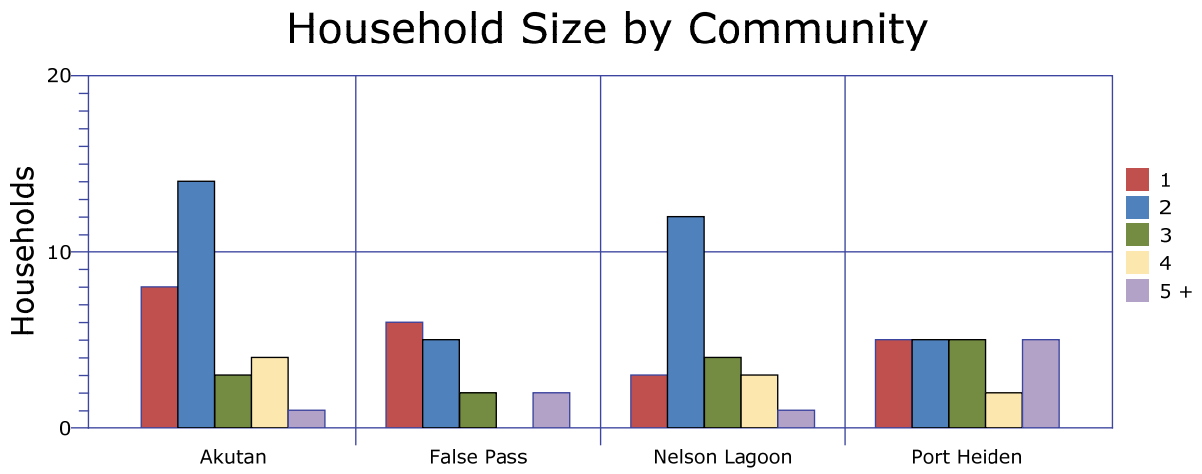

Figure 114. Sizes of Surveyed Households by Community, 2009.

Table 29. Average household size for each community.

	Average Household Size
Akutan	2.2
False Pass	2.1
Nelson Lagoon	2.5
Port Heiden	3.1

False Pass, Nelson Lagoon and Akutan are concerned about the dearth of school age children but there are some younger families in these communities still having children (Figure 115). The schools must have ten children in order to receive state funding and support teachers. The

inability to provide schooling could drive young families to leave the villages, which could signal the demise of entire communities. The Aleutians East Borough has contributed funds to maintain the schools in False Pass, Nelson Lagoon, and Akutan. These funds are from fisheries landing taxes within the Borough boundaries. In 2012, the Aleutians East Borough School District closed the Nelson Lagoon school. Port Heiden has a larger population of school age children, with new babies born often, and does not have the same pressure as the other communities. Figure 116 shows the years that respondents have lived in each community.

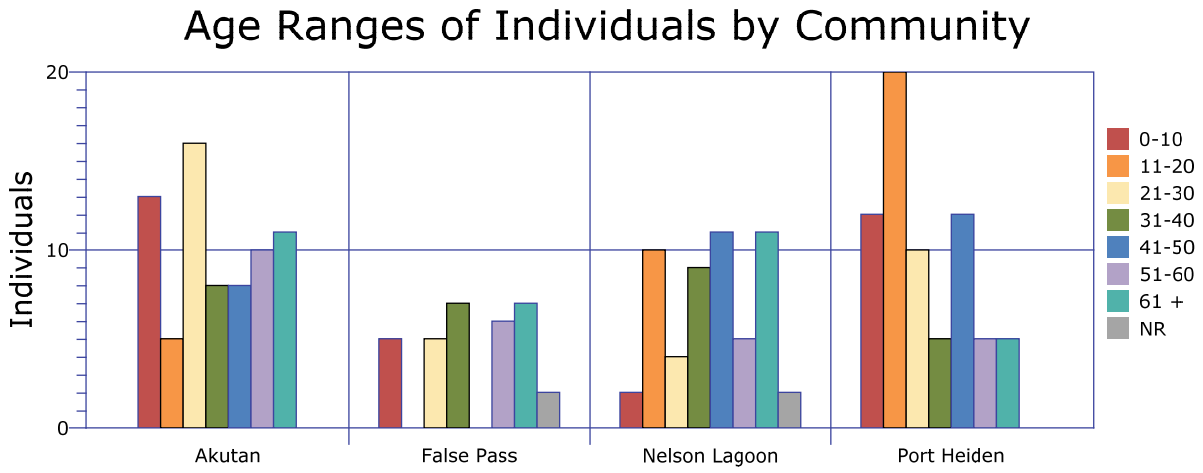

Figure 115. Age ranges of Surveyed Households by Community, 2009.

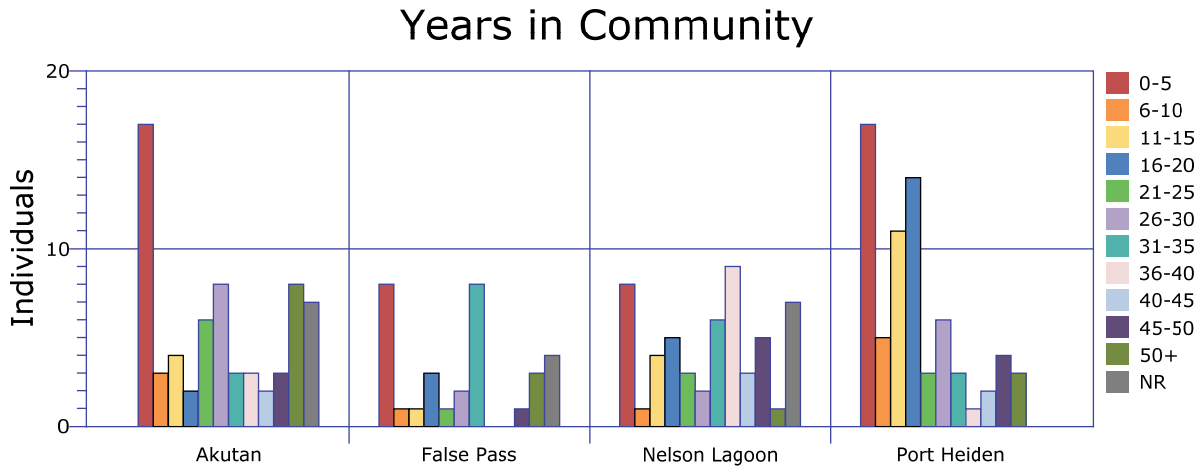

Figure 116. Years in the Community, Reported from Surveyed Households for 2009.

Most Alaska Native communities are male dominated (Hamilton, Seyfrit, and Bellinger 1997) and these villages are no exception (Figure 117).

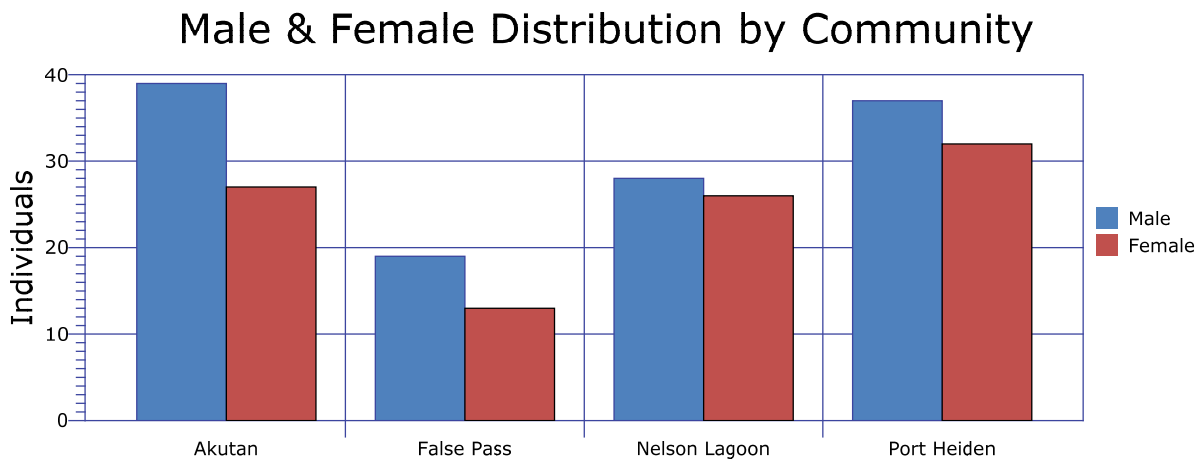

Figure 117. Sex Distribution within Surveyed Households by Community, 2009.

These villages are primarily Alaska Native Aleut/Unangan and Alutiiq/Sugpiaq/Yupik (Figure 118). Other ancestry reported was Russian, Danish, Swedish, Dutch, Norwegian, French, Finnish, Scottish, German, Hungarian, Filipino, Inupiaq, Irish, Cherokee, Apache, Quileute, and Athabascan.

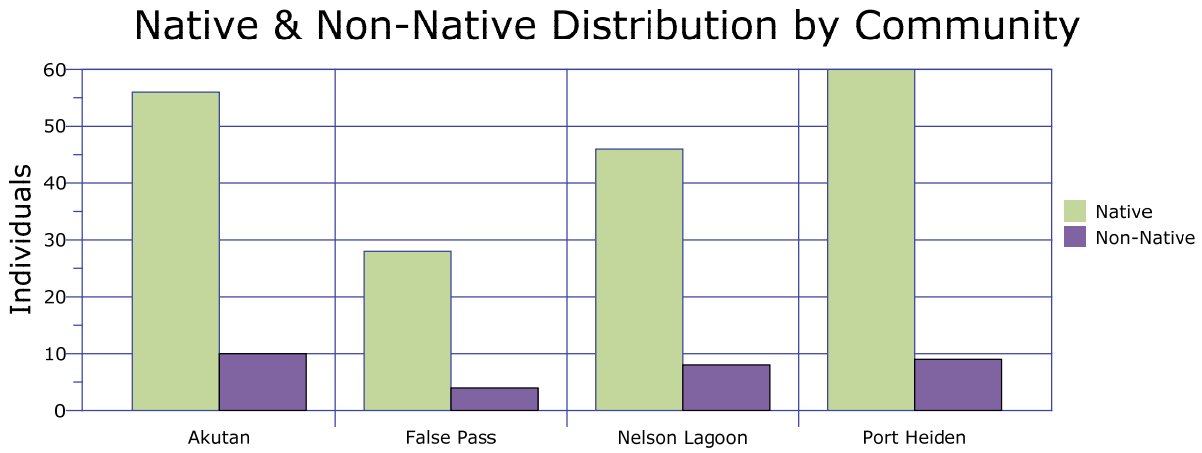

Figure 118. Alaska Native and non-Native distributions by community.

Most residents surveyed completed high school (Figure 119). A handful of people in each community achieved university degrees, with only one graduate degree reported in Akutan. Many residents attended high school outside of their village, for example, at Mt. Edgecombe, Kodiak, Anchorage, or Dillingham.

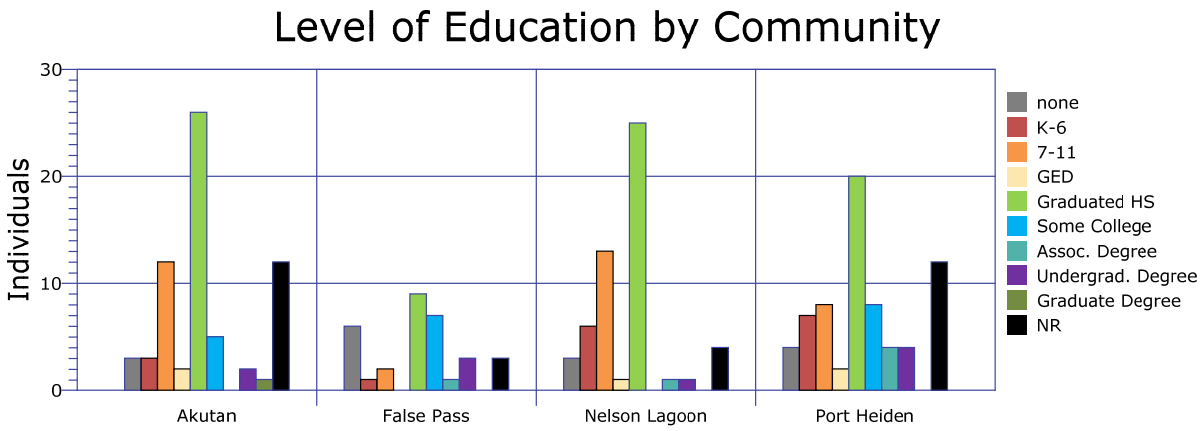

Figure 119. Level of education of surveyed population by community.

SUBSISTENCE HARVESTS AND DEPENDENCIES

Subsistence Harvester Information

The survey gathered basic information on household members' subsistence activities: who harvested during the study year, which months were they actively harvesting, and reasons for any inability to harvest (Figure 120). Nelson Lagoon and Port Heiden have the highest average number of subsistence harvesters per household of the surveyed communities (Figure 121).

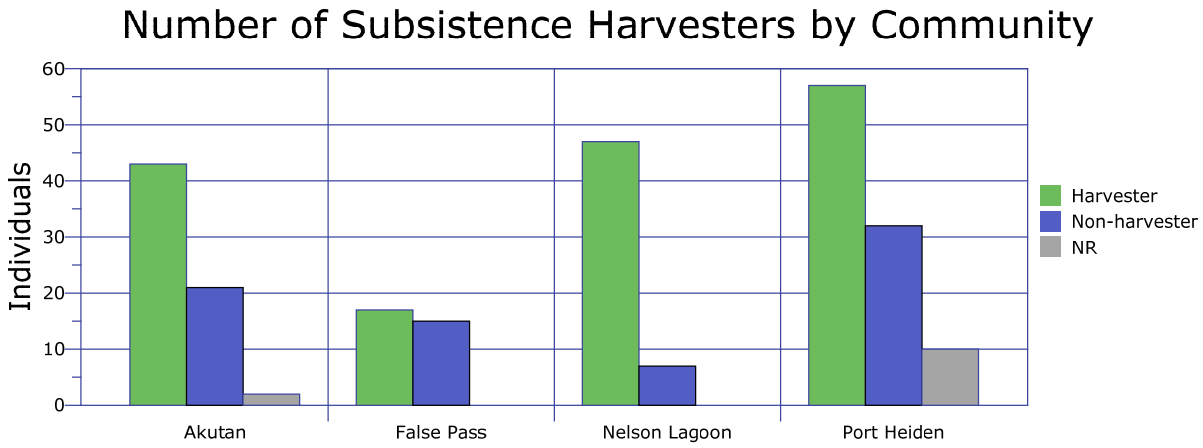

Figure 120. Number of subsistence harvesters by community.

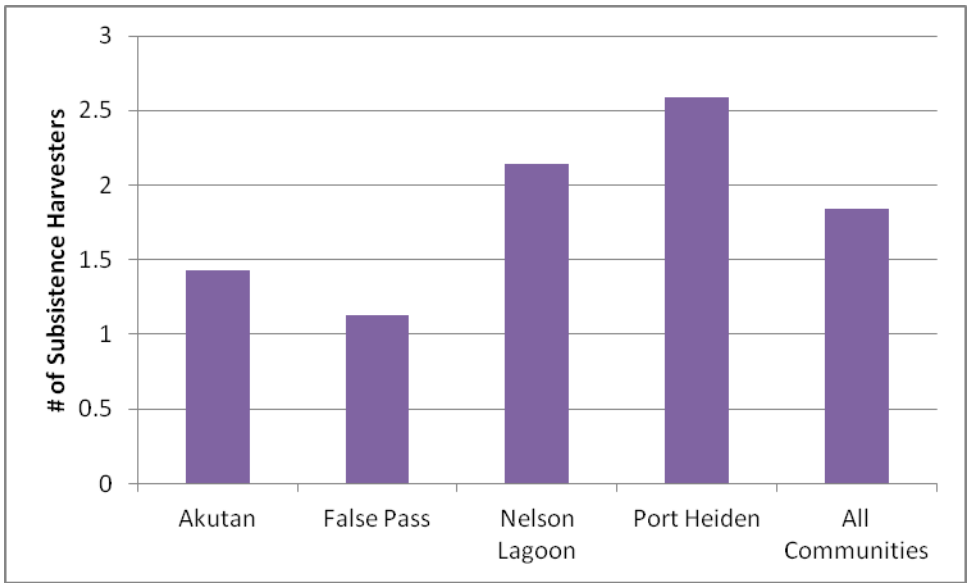

Figure 121. Average number of subsistence harvesters per household by community, 2009.

Comparative Harvest Data

More salmon are harvested for subsistence than any other wild foods in three of the four study communities (Figure 122-124). In pounds usuable weight, they dominate wild foods. Akutan is the exception because there are few salmon streams accessible from the village, and they have easier access to marine fish such as cod and halibut than they do the other foods. Land mammals available to Akutan are almost exclusively wild cattle from Akun Island. Nelson Lagoon is also eating relatively few land mammals, however, a member of the community experienced legal trouble for poaching caribou and members of the community were reluctant to share information for fear of more legal troubles for their hunters.

Per capita harvests of wild foods in pounds have changed for all villages. Akutan has seen a steady decline over three studies; False Pass has seen a significant increase; and Port Heiden and Nelson Lagoon have declined in pounds per capita. This is partly due to harvest closures (Figure 125). As described above, salmon are the most critical resource in most communities and, as shown in Figure 126, most salmon are taken with commercial gear. A variety of gear is used in harvesting. Figures 126 and 127 disaggregate activites out by context, whether subsistence harvesting was occuring during commercial fishing or if foods were removed from commercial fishing. These data show how intertwined all harvesting practices are.

A surprising finding of this study is the amount of wild foods formerly harvested that are now purchased or increasingly purchased (Figure 128). The bulk of purchased foods are king and tanner crab. False Pass consumes a great deal of crab, but because of local access does not need to purchase it the way that the other communities must. Nelson Lagoon is also purchasing frozen cod from Peter Pan Seafoods in King Cove and frozen salmon fillets from Peter Pan Seafoods in Port Moller.

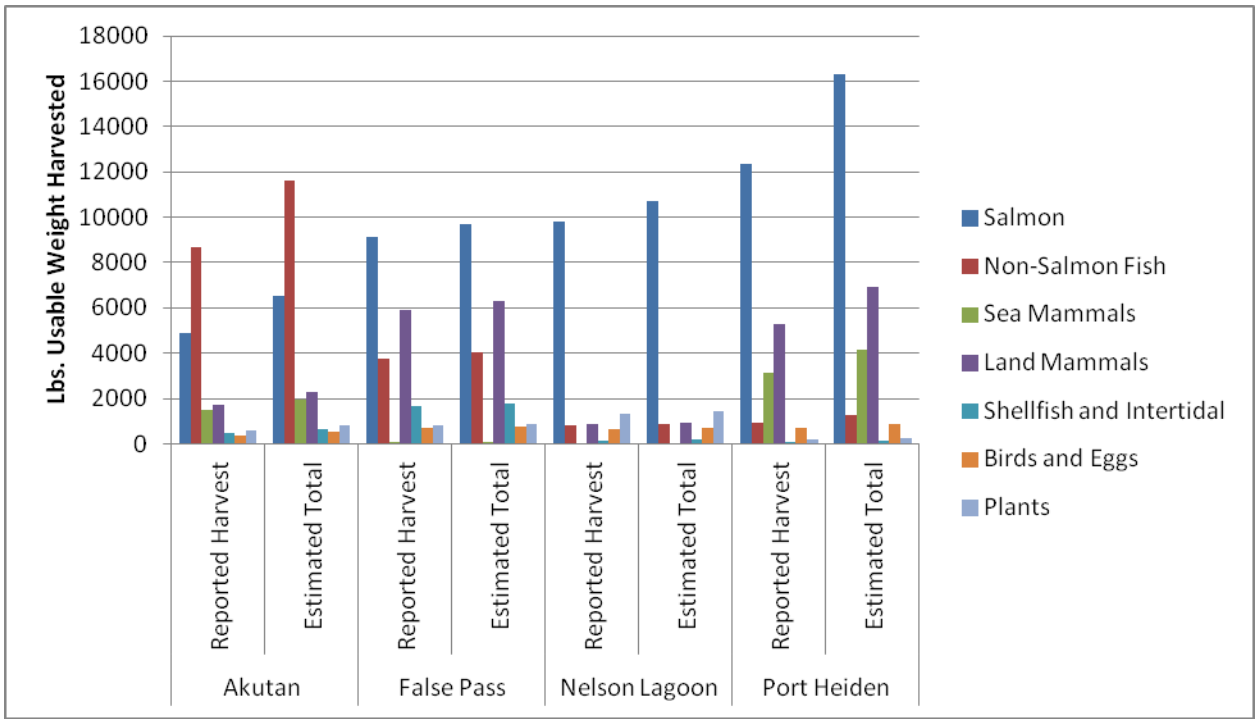

Figure 122. Reported and estimated total community harvests for the four study villages.

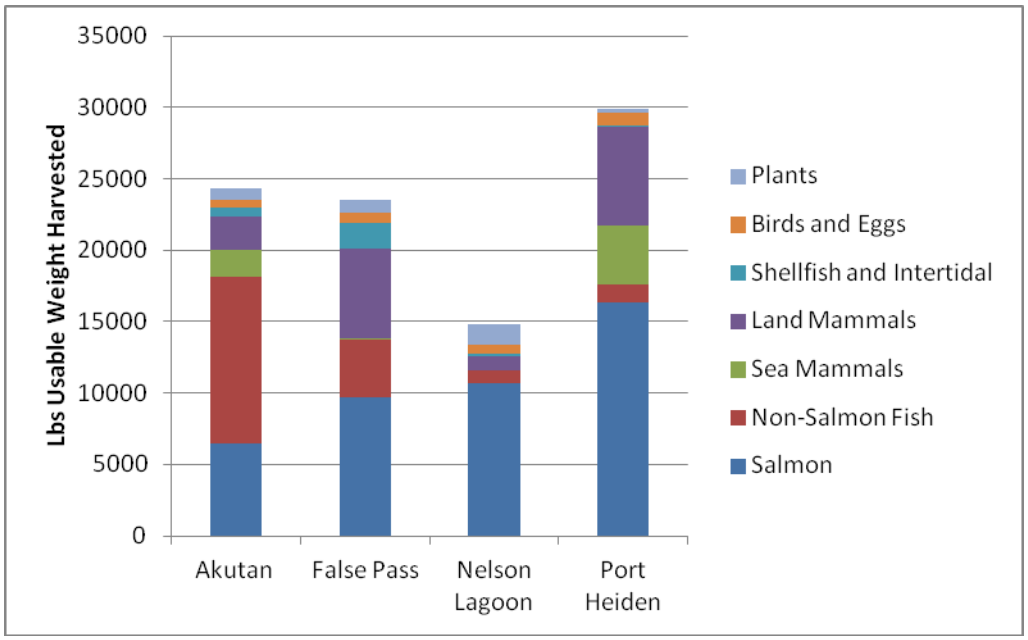

Figure 123. Cumulative pounds (in usable weight) estimated total harvested by community in 2009.

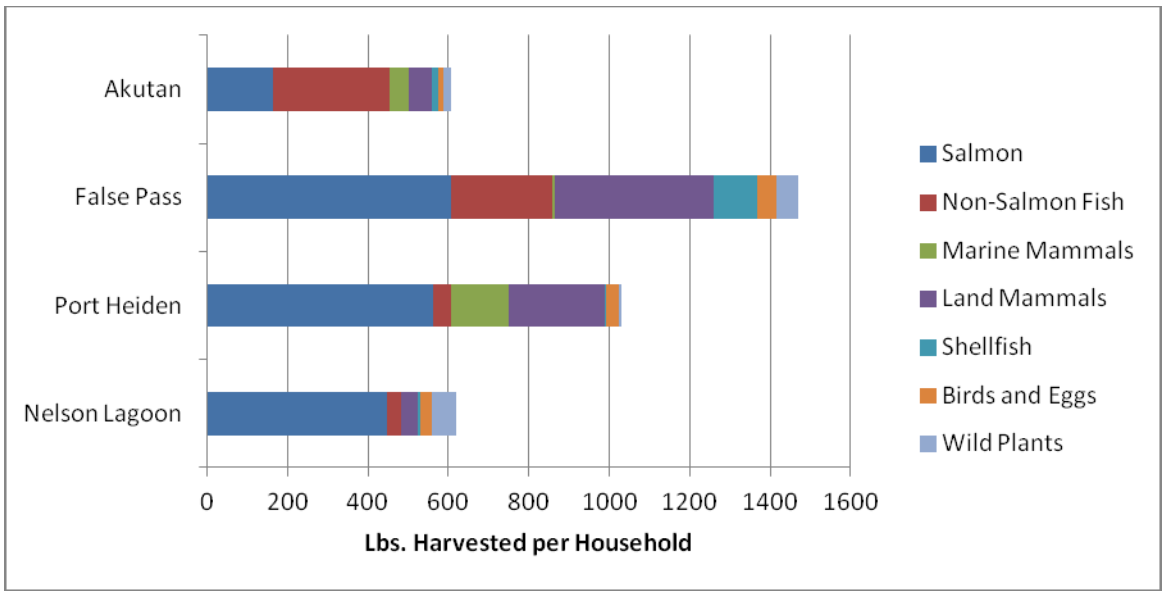

Figure 124. Cumulative pounds harvested per household by community, 2009.

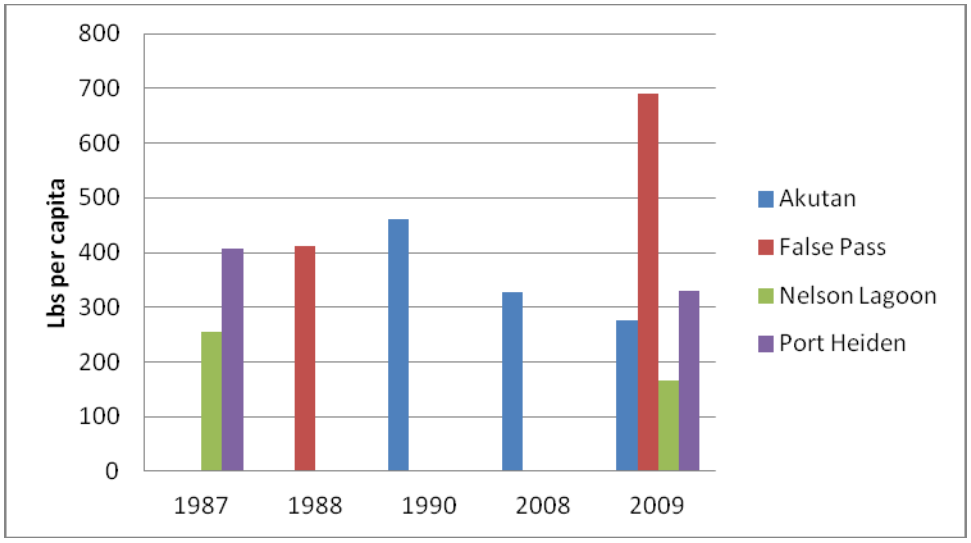

Figure 125. Total harvest of wild foods, pounds per capita, 1987-88, 1990, and 2008-09.

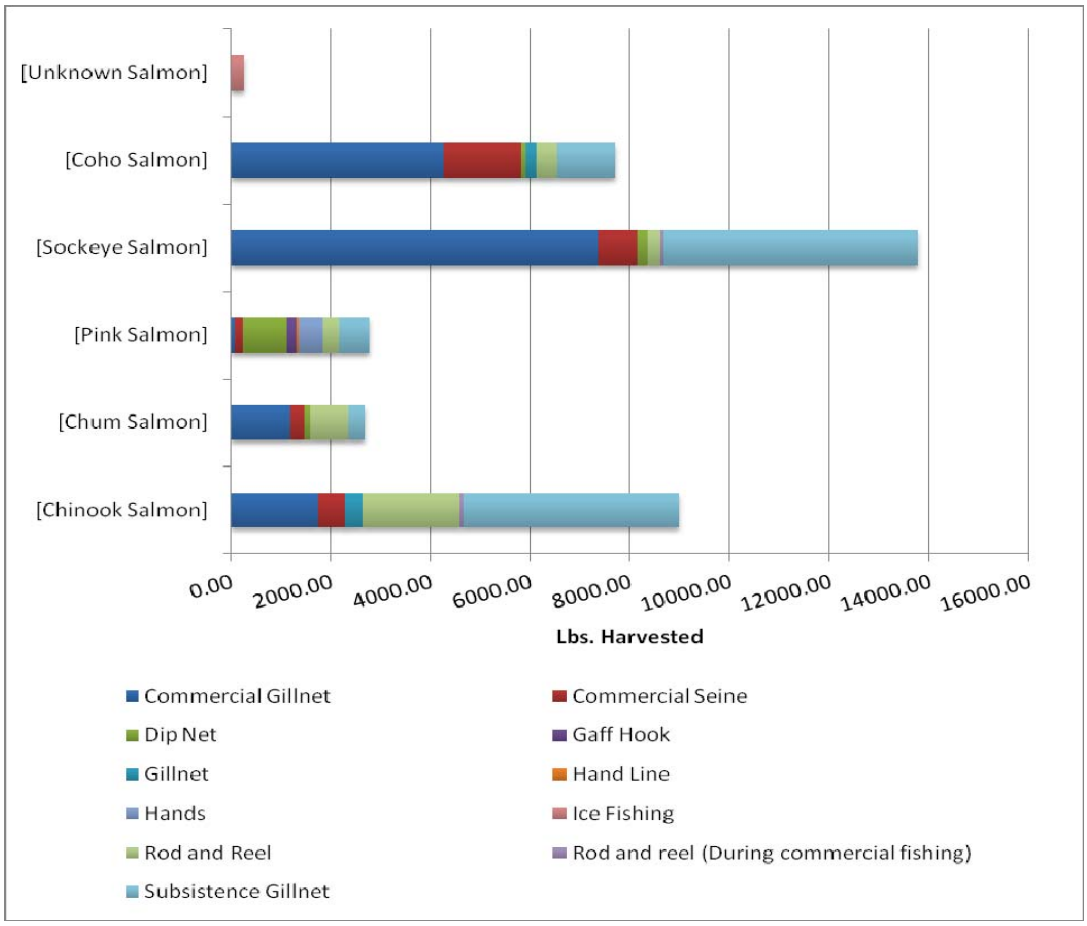

Figure 126. Salmon harvests by gear type and commercial fishing context, 2009.

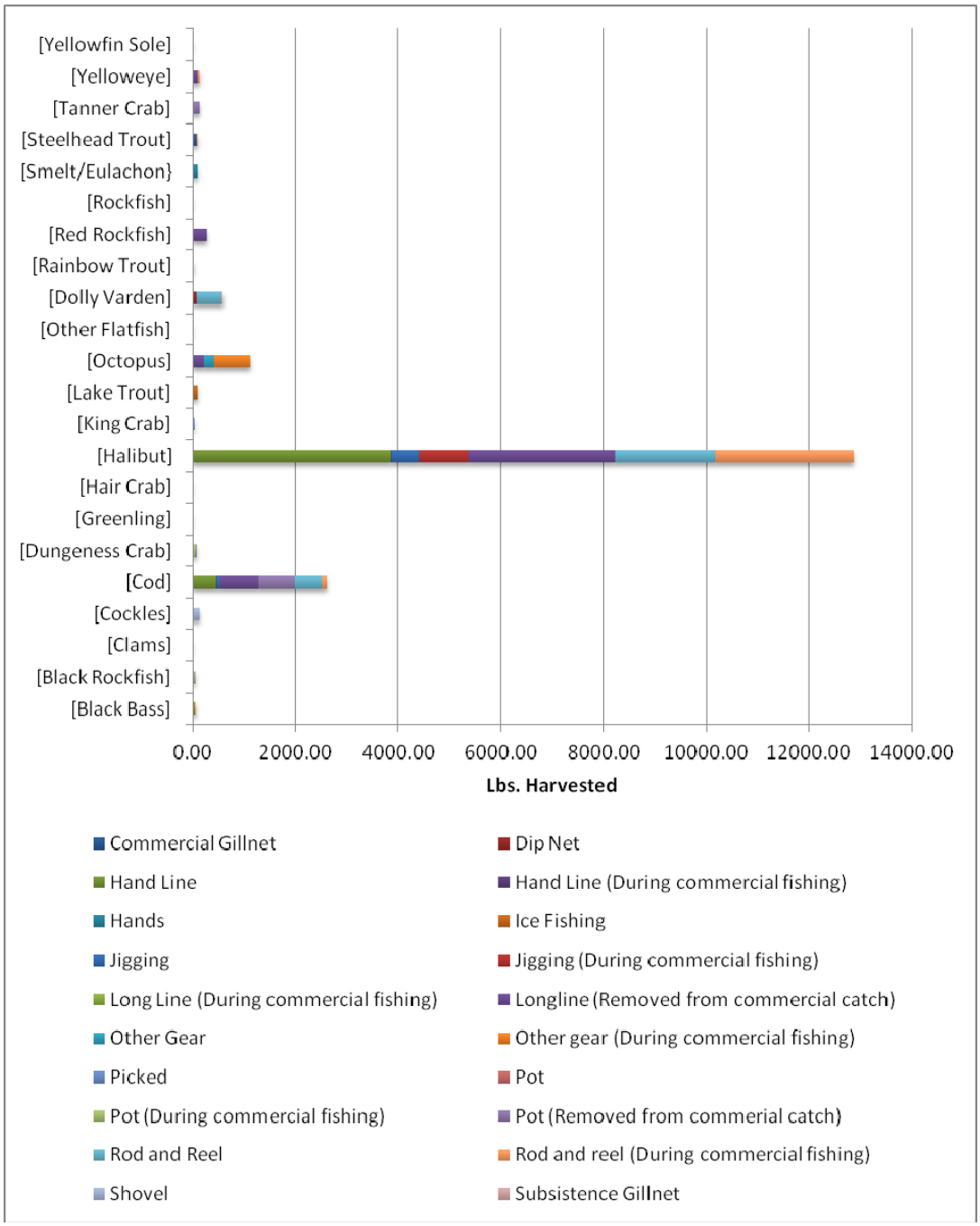

Figure 127. Non-Salmon harvests by gear type and commercial fishing context.

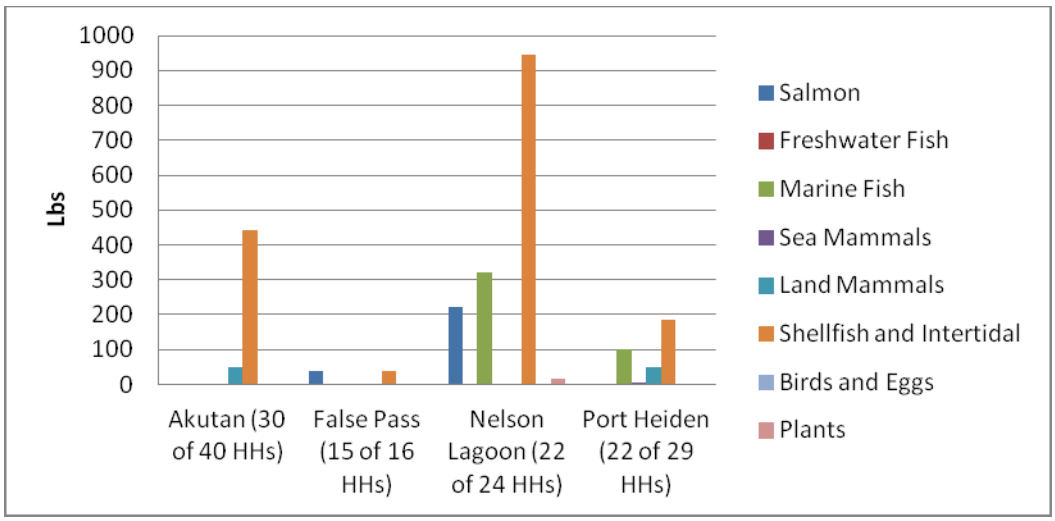

Figure 128. Pounds wild foods purchased by community and species category, 2009

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COMMERCIAL FISHERIES

Commercial fishing activities directly support many subsistence pursuits with equipment, cash, time and labor. Commercial harvest zones are important to the study communities even if the members of the communities do not directly engage in the fisheries (Figure 129). All villages have commercial boats and skiffs. The size and type of boats and skiffs vary with the kinds of permits that are fished from those villages (Figure 130). This means that every village has some access to commercial fisheries.

Figure 129. Dried subsistence salmon (*ukela*) hanging on a commercial fishing vessel, False Pass.

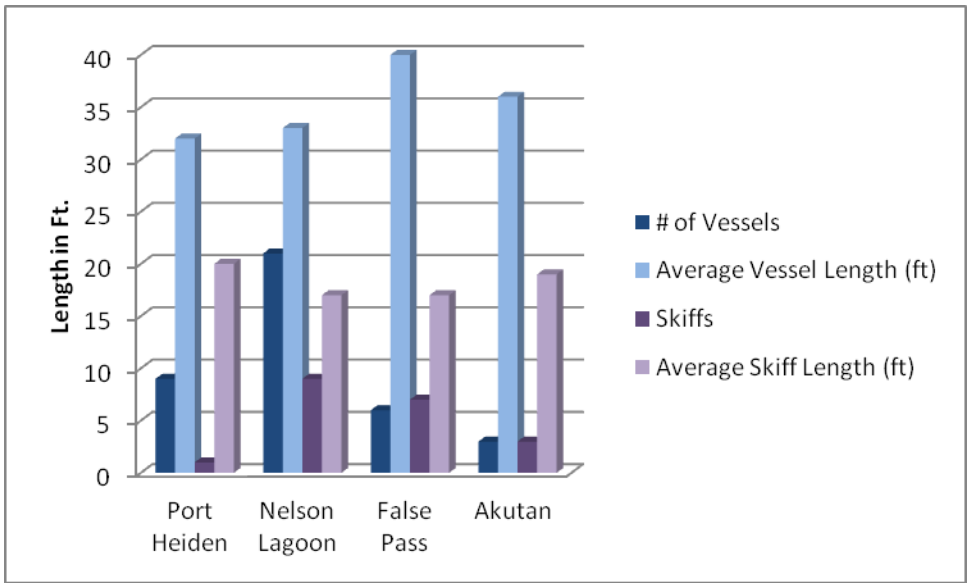

Figure 130. Number of fishing vessels and skiffs by village, sorted by length in feet, 2009.

Fishing Operations, Capacity, and Dependency

False Pass has the greatest diversity of permit holdings for all the villages with nine different types of permits (Figure 131 and Table 30). It also has the smallest number of permit holders and crew members (Figure 132). It is important to point out the fisheries that these villages do not participate in. Without historical, documented relationships to a number of "money fish" in the federal Gulf of Alaska and Bering Sea/Aleutian Islands fisheries, such as king crab and pollock, local communities generally did not have strong participation in these fisheries and, after rationalization and catch share programs, their already meager role has diminished further. Earnings from CDQ shares are the primary way that the coastal villages engage with many of these fisheries.

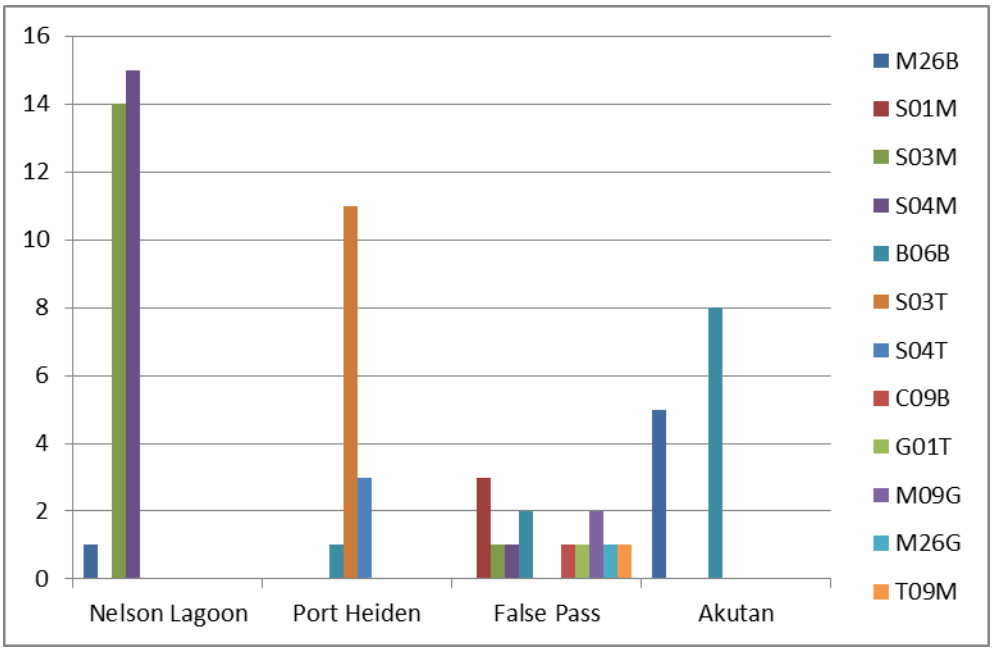

Figure 131. Number of permit types owned per village, 2009. See Table 30 for explanation of codes.

Table 30. Permit Codes, Gear types, and Location for Figure 131.

Species	*Code*	*Gear*	*Location*
Salmon	S01M	Purse Seine	Alaska Peninsula
	S03M	Drift Gillnet	Alaska Peninsula
	S04M	Set Gillnet	Alaska Peninsula
	S03T	Drift Gillnet	Bristol Bay
	S04T	Set Gillnet	Bristol Bay
Halibut	B06B	Longline, under 60’	Statewide
Sablefish	C09B	Pot gear, under 60’	Statewide
Herring Roe	G01T	Purse seine	Bristol Bay
Tanner crab	T09M	Pot gear, under 60’	Alaska Peninsula
Miscellaneaous			
Saltwater Finfish	M26B	Mechanical Jig	Statewide
	M26G	Mechanical Jig	Gulf of Alaska
	M09G	Pot gear, under 60’	Gulf of Alaska

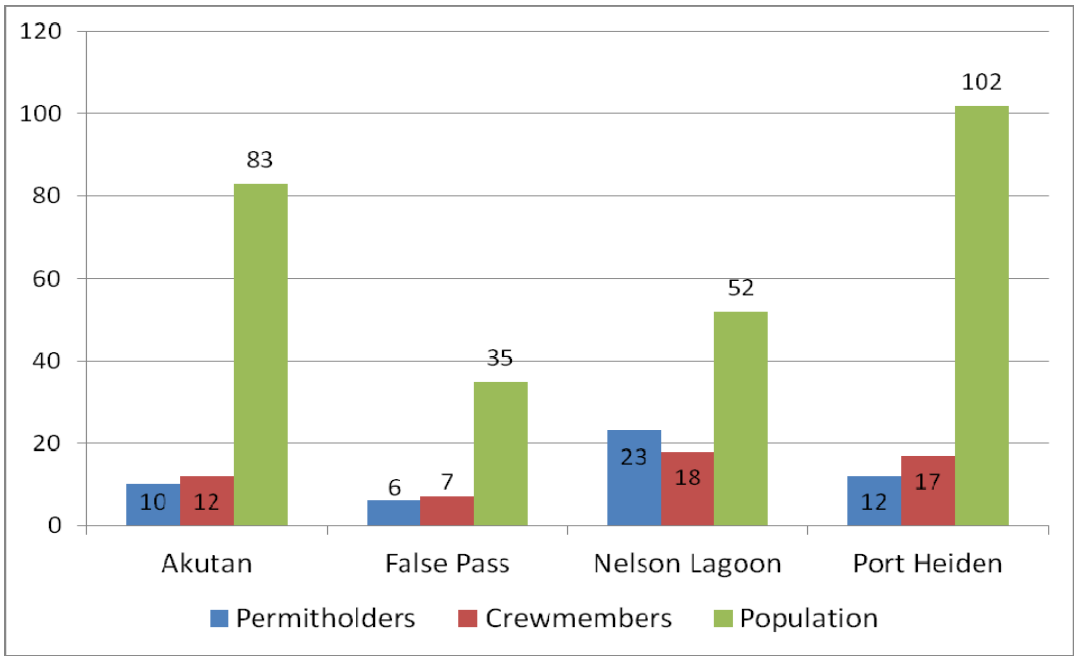

Figure 132. Number of Permit Holders and Crew Members from the Villages, All fisheries, 2009.

Figure 133 shows levels of community dependency on commercial fisheries. Incomes and dependencies from directed commercial fishing are present, but are somewhat misleading, since a significant portion of the non-fishing earnings are financed from commercial fisheries through, for example, fisheries landing taxes and revenue from CDQs. Community level taxes are levied against the fishermen delivering in False Pass at 2 percent, and an additional 2 percent fish tax imposed by the Aleutians East Borough in False Pass and Akutan.

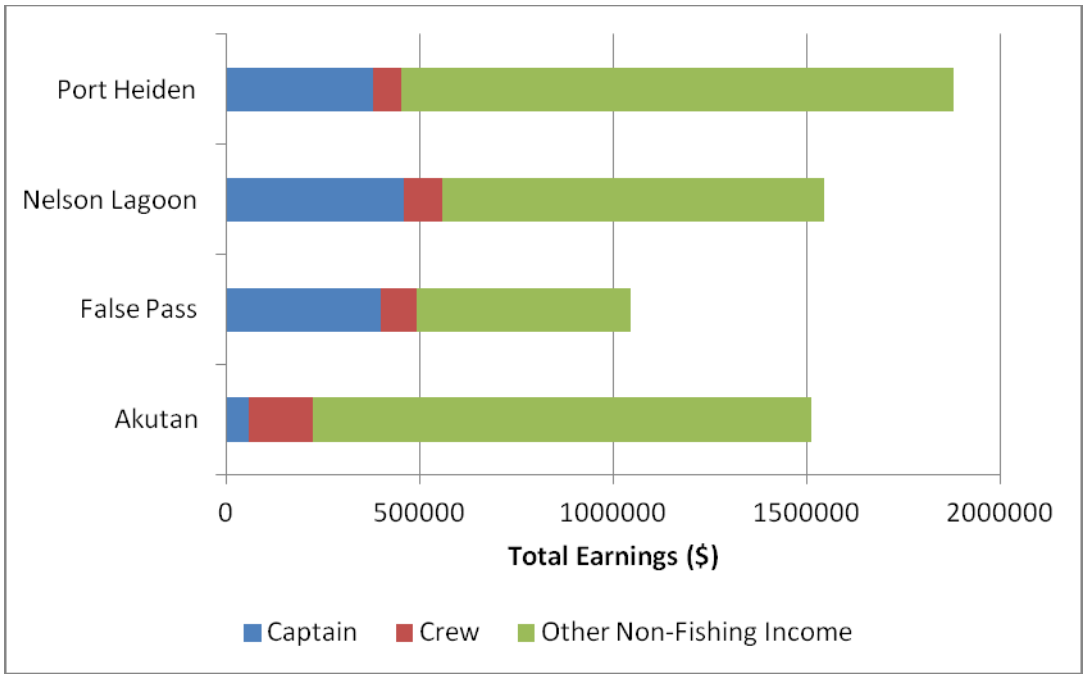

Figure 133. Reported incomes earned by captains and crewmen in commercial fishing relative to non-fishing incomes.

Salmon

The majority of permits and vessels fishing from Nelson Lagoon, Port Heiden and False Pass are engaged in salmon fishing. Akutan fishermen have no salmon permits. Nelson Lagoon supports and almost equal number of drift and set gillnet salmon fishing permits. They fish inside Nelson Lagoon and Port Moller, in the South Alaska Peninsula area, and in the Northern District of Area M. False Pass fishermen fish primarily in the South Alaska Peninsula Salmon Management Area, which includes Kupreanof Point west to Scotch Cap on Unimak Island. The Southwestern District and Unimak District are closest to their village. The South Alaska Peninsula June fishery occurs between June 7 and June 29, with 88 hour fishing periods interspersed with 36 hour closures. Sockeye are the primary target, bringing higher prices at the processors, but all five species are harvested. The post June fishery begins July 1 and ends August 31 with time restrictions interspersed throughout. Pink and sockeye salmon are the most abundant in the area. These fisheries include mixed stocks with portions migrating to Bristol Bay and the Arctic-Yukon-Kuskokwim Regions of western Alaska. A Western Alaska Salmon Stock Identification Project (WASSIP), a comprehensive program on sockeye and chum genetic stock identification to determine stock of origin, is scheduled to release results in 2012 that may help resolve conflicts between regions. The majority of Port Heiden's fishermen are drift gillnetters for salmon with Area T Bristol Bay fishing permits. They fish the Ugashik District of Area T north of their village.

Groundfish

Cod and pollock fisheries are currently booming industries with no stocks of biological concern that support large transient and resident fleets. Processing of groundfish in the Gulf of Alaska and Bering Sea/Aleutian Islands occurs regularly in a shore-based processor in Akutan (Trident Seafoods). No study villages currently have, or have ever had, a significant fleet engagement in the groundfish fisheries but there are significant levels of participation as harvesters and crew members from the vantage point of the villages. The mechanical jig and pot permit holdings for miscellaneous saltwater finfish in Nelson Lagoon, False Pass and Akutan are largely cod fishing permits.

Pacific halibut

Hippoglosus stenolepis have experienced sharp declines in biomass over the past decade from small year classes in the late 1980s, and the growth rate of the fish has slowed so that adults are smaller than in previous decades (International Pacific Halibut Commission 2012). The TAC (Total Allowable Catch) has been lowered annually so that directed IFQ halibut fishermen have taken substantial cuts in their quotas.

The study villages cross three halibut regulatory areas: 3B (Nelson Lagoon and False Pass, 4A (Akutan), and 4E (Port Heiden). These communities are eligible for subsistence harvesting of halibut as rural communities with customary and traditional uses of halibut. Subsistence Halibut Registrations Certificates (SHARCs) are issued by ADF&G's Subsistence Division under contract with NMFS. These certificates collect information on subsistence halibut, rockfish and lingcod harvests. These are mail-out surveys with fairly low response rates (Table 31).

Table 31. Subsistence halibut harvests for the study villages, 2010. Source: Subsistence Harvests of Pacific Halibut in Alaska, 2010 (Fall and Koster 2011) Technical paper #367.

Tribe	Regulatory Area	SHARCS issued	SHARCs returned	# Fishermen	# Halibut	Lbs Halibut	# Lingcod bycatch	# Rockfish bycatch
Port Heiden	4E	3	0	No data	No data	No data	No data	No data
Nelson Lagoon	3B	3	0	No data	No data	No data	No data	No data
False Pass	3B	1	0	No data	No data	No data	No data	No data
Akutan	4A	21	7	0	34	830	5	30

Crab Fisheries

There are three permit holders/captains in False Pass that participate in the state crab fisheries. They hold permits for Tanner Crab pot gear, under 60', fisheries. These three individuals represent the total permit holdings in crab fisheries for the four study communities. *Chionoecetes bairdi,* or Tanner crab, are found in the Bering Sea and North Pacific Ocean. These crab are managed under a federal fisheries management plan, with management assumed by the State of Alaska with federal oversight. The State manages Tanners in registration areas divided by districts. Waters east of the 166° W Longitude line in the Eastern Subdistrict of the Bering Sea District are closed to commercial fishing. The pot fishery developed in the 1970s, peaking in 1977, and declining until it was closed to fishing in 1985 and 1986. It was opened in 1987 and followed a similar peak/crash through the 1990s. It was closed to commercial fishing between 1997 and 2004 because of depressed stocks. It reopened in 2005 and was closed again in 2010/2011. Tanner fishing resumed in January 2012.

EMPLOYMENT AND INCOME

The top employment sources are local government entities and commercial fishing earnings by self-employed captains and crewmen. There is considerable disparity in household income (Figure 134). The majority of income in the villages is earned from wages from jobs, pensions, and Social Security (Figure 135).

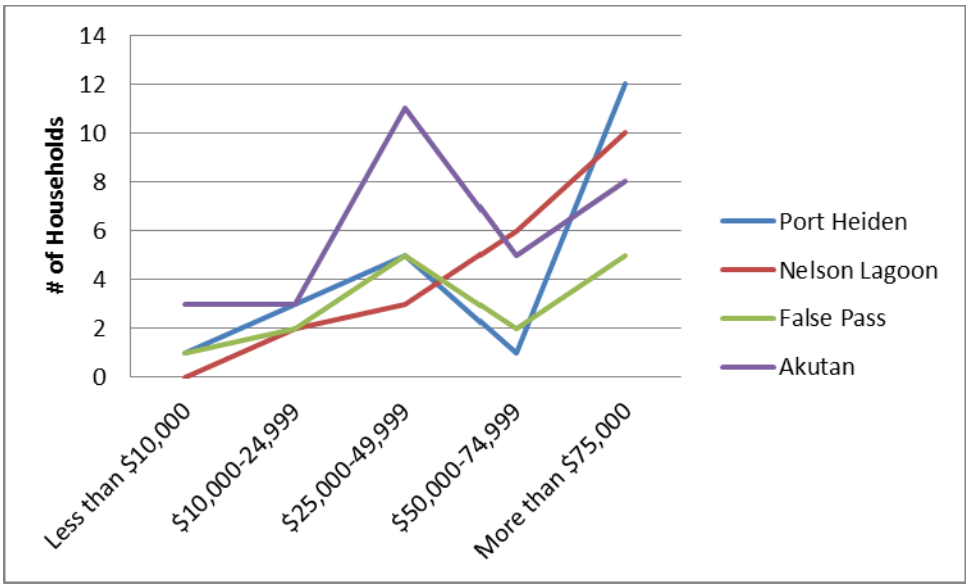

Figure 134. Number of Households in Income Brackets, Total Incomes 2009.

Port Heiden households generally reported the highest incomes from fishing and income earned from their environmental cleanup projects. False Pass and Nelson Lagoon incomes are primarily from commercial fishing with multiple other jobs outside the summer salmon season. Akutan incomes are largely coming from wages earned in local government.

Residents of Alaska are eligible for the Alaska Permanent Fund Dividend (PFD), which in 2009 was $1,305 for every eligible individual. Most survey respondents received the dividend. On a few occasions, it was seized for child support, back taxes, or other debts. In the pie charts below, the category of Dividends reflects the PFD and dividends from regional and village Alaska Native Corporations such as the Aleut Corporation, the Bristol Bay Native Corporation, and smaller village corporations who are able to issue dividends. This category also includes as Elder's Benefit from the Aleutian Pribilof Islands Association. Other sources include public assistance funds such as Food Stamps, Energy Assistance, child support, Women-Infant-Children (WIC) support, Unemployment, and Workers Compensation.

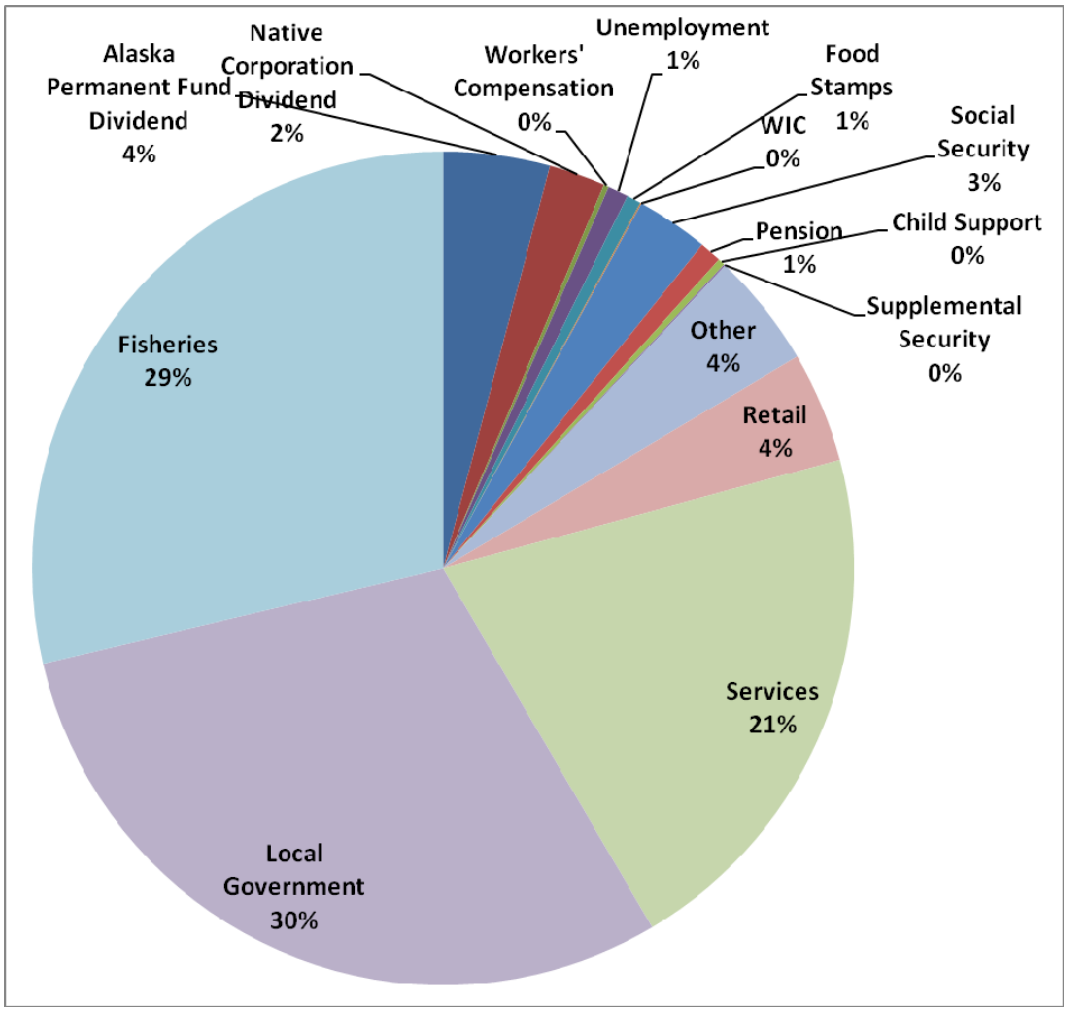

Figure 135. Percentages of income sources for the four study villages, 2009.

HOUSEHOLD EXPENSES

Annual grocery expenses were reported as a significant burden by most households (Figure 136, Table 32). Individuals were surveyed for total household grocery expenses for a year. This usually meant people reported weekly or monthly expenses that were multiplied to cover the entire year. Some were able to report specific annual totals. Some clearly underestimated their expenses.

Surveys asked people to provide costs to maintain their homes and other household expenses. Comparative expenses for rent or mortgage, heating fuel, electricity, propane (if used), water/sewer/garbage fees, telephone, and the cost of cable or satellite television are provided (Figure 137). The survey asked about other goods coming in to households, specifically dry/canned goods, produce, frozen foods, and meat. Orders are made from Sam's Club, Fred Meyer, Walmart, Costco, and SpanAlaska, for example.

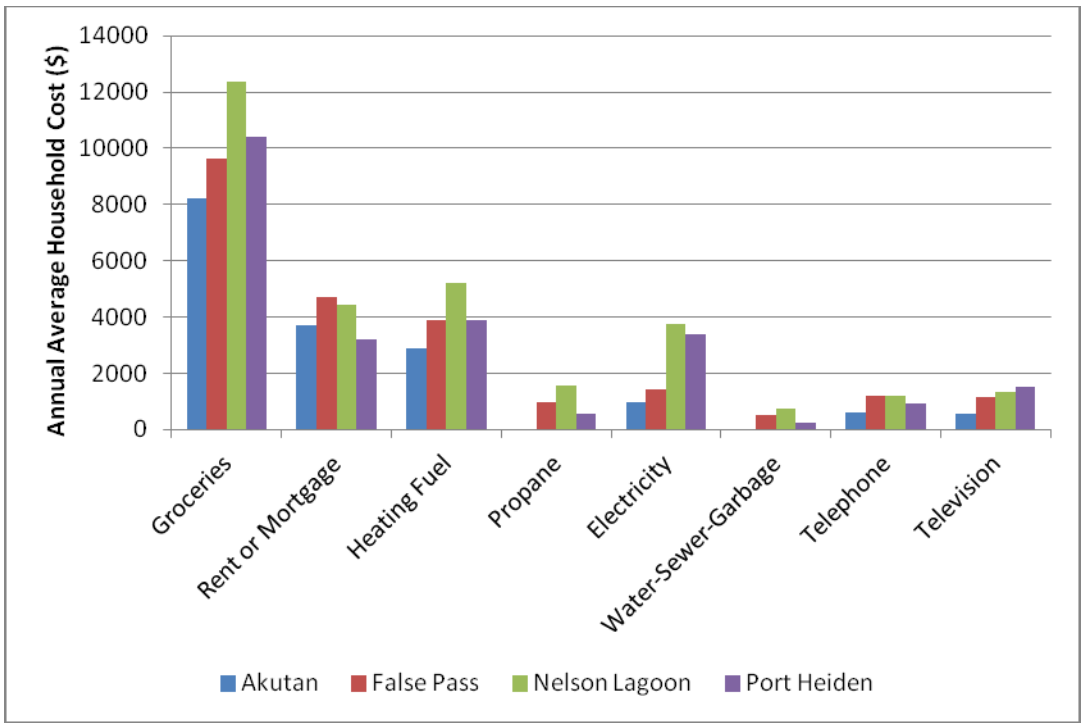

Figure 136. Average annual household expenses by category and village, 2009.

Table 32. Average annual household expenses ($) by expense category and village, 2009.

	Akutan	False Pass	Nelson Lagoon	Port Heiden
Groceries	$8217	9647	12357	10409
Rent or Mortgage	$3685	4686	4425	3200
Heating Fuel	$2902	3899	5192	3898
Propane	$0	972	1577	544
Electricity	$952	1426	3741	3375
Water-Sewer-Garbage	$0	518	748	230
Telephone	$594	1186	1204	913
Television	$548	1144	1331	1528

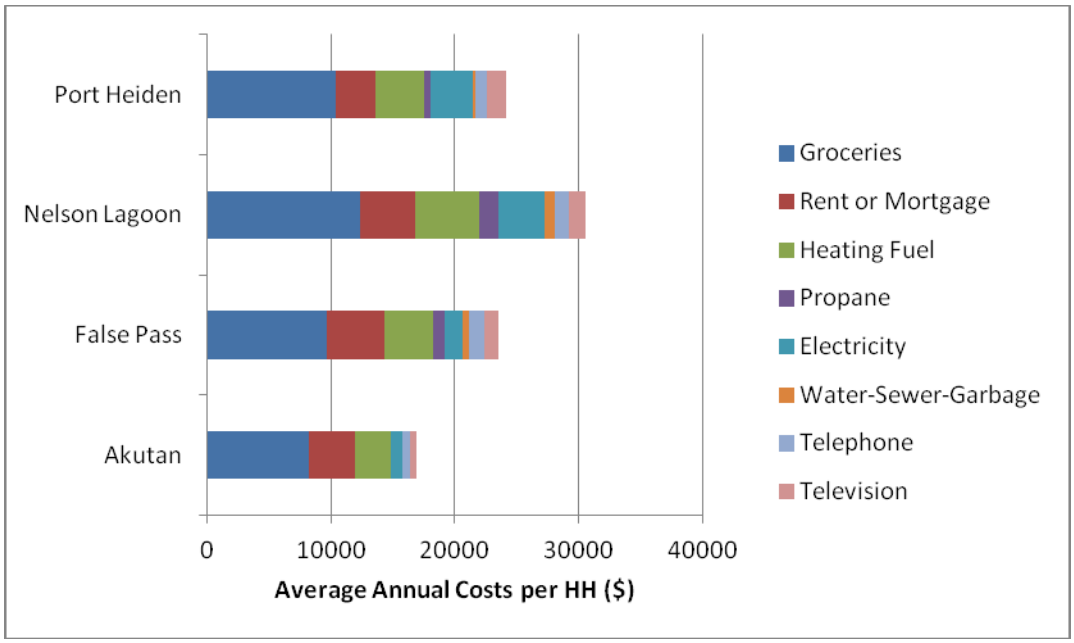

Figure 137. Cumulative household expenses for each study village, 2009.

EQUIPMENT AND ASSETS

Comparative analysis of harvesting equipment owned and used in subsistence harvesting demonstrates that each village has unique needs because of geography and resource availability (Figure 138). Ownership and access to equipment determines a great deal of subsistence accessibility.

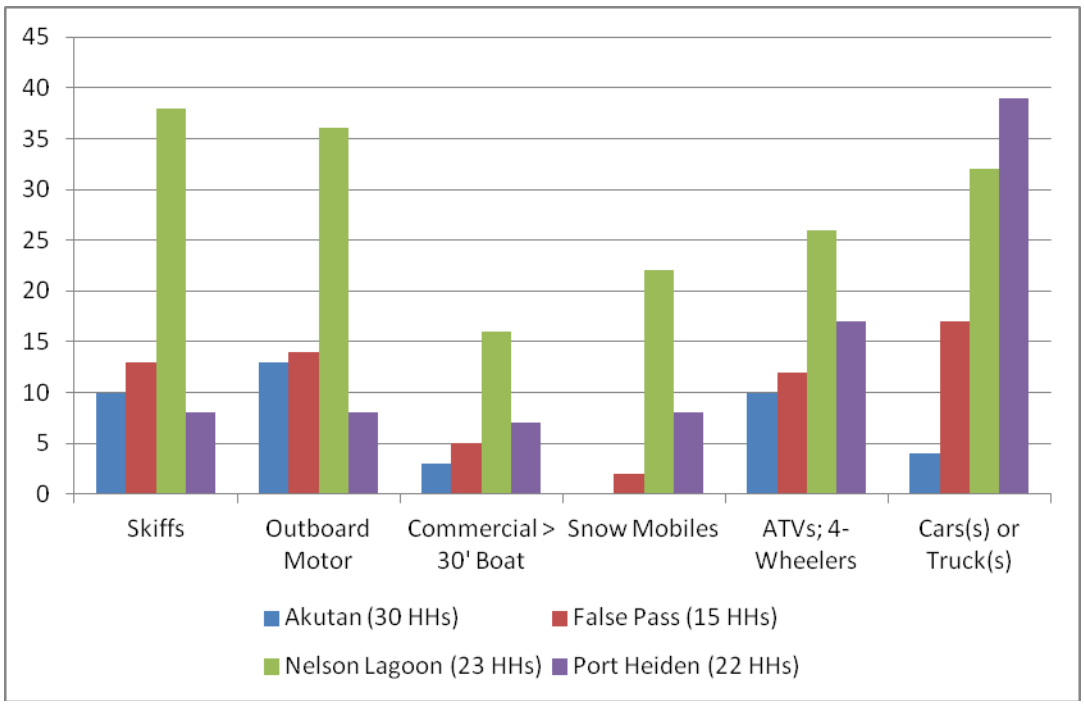

Figure 138. Comparisons of equipment used in subsistence harvesting per study village, 2009.

CONCLUSIONS

These comparative data show the unique structure, challenges and capacities of each community. Villages of similar size in a defined geographic region of the North Aleutian Basin exhibit very different characteristics, subsistence activities, commercial fisheries engagement, and economic development prospects.

CHAPTER 9. COMMUNITY CONCERNS AND VULNERABILITY

ENVIRONMENTAL AND WILDLIFE OBSERVED CHANGES AND CONCERNS

The survey gathered data on observed changes in wildlife in the four study communities. People were asked to name species and describe what was wrong with them, or what improved for them, how many were affected, locations where the changes were observed, and timeframe for the observations. The high volume of observations reported (Figures 139 and 140) indicates a strong awareness of the fish, game, and plants around their villages.

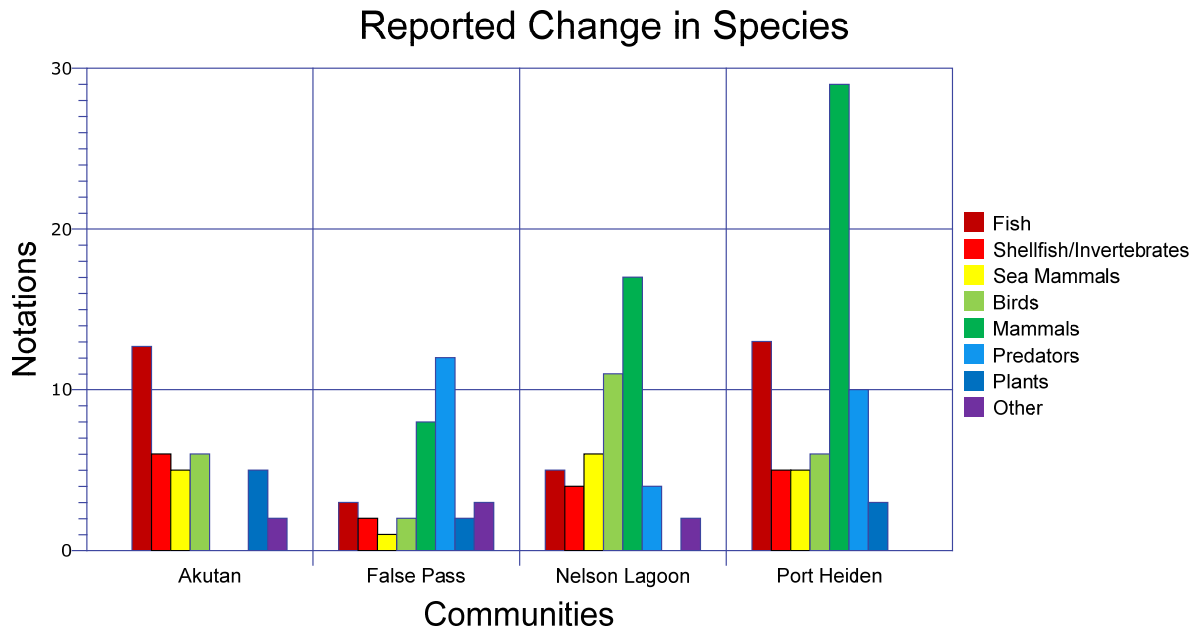

Figure 139. Reported changes in species by community.

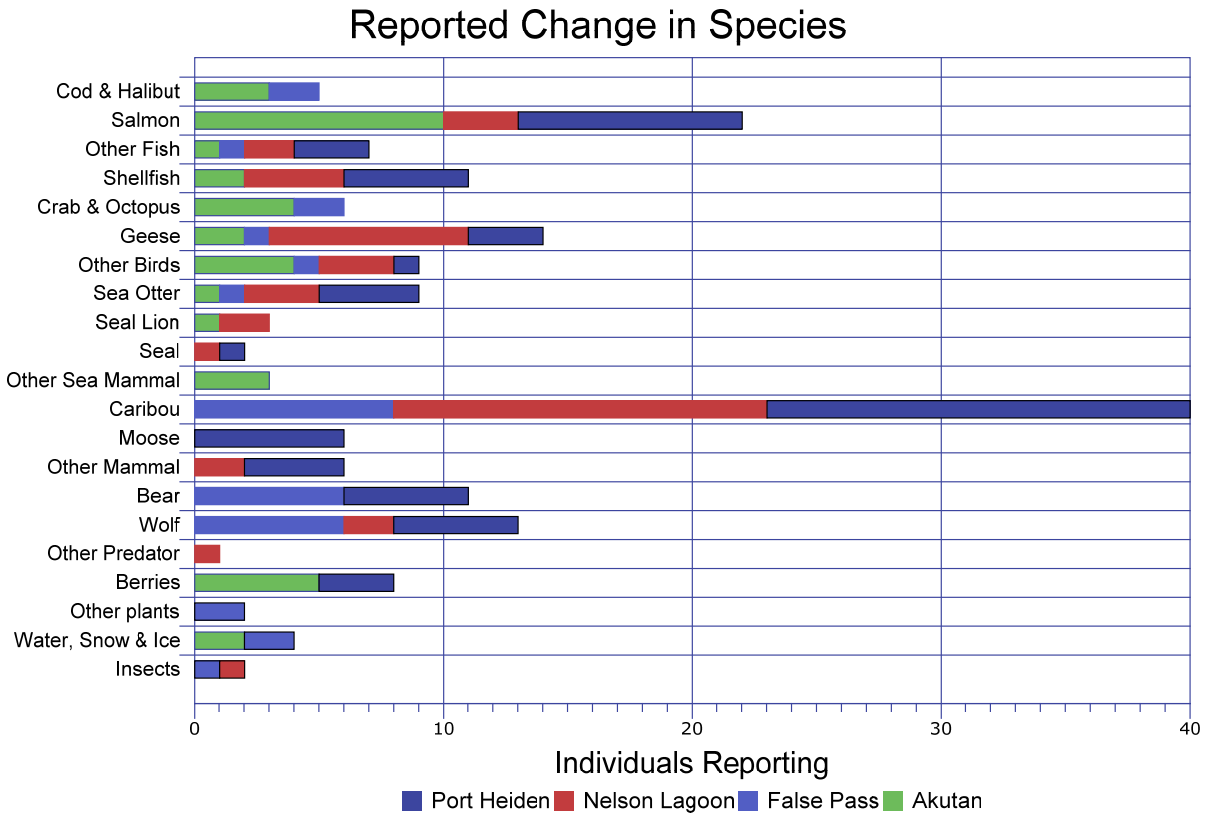

Figure 140. Reported changes in individual species.

As described below, the study communities are already responding to population changes for numerous species. It remains unclear how oil and gas exploration and development could exacerbate, alleviate, or maintain the status quo relative to these populations. This will be revisited below in discussions of development scenarios.

WILDLIFE HEALTH, ABUNDANCE, INTERACTIONS

Wolves and Caribou

In 2009, all hunting for caribou in State Game Management Units 9D and 9E in the study area, and on Unimak Island, were suspended for conservation reasons, including subsistence hunting. From March to June 2011, ADF&G extended wolf hunting and trapping seasons in Units 9 and 10 by Emergency Order (EO #04-01-11). Additional opportunity for hunters and trappers was meant to decrease wolf predation on caribou. Over 90 percent of Unimak Island is part of the Alaska Maritime National Wildlife Refuge and is managed by the Izembek National Wildlife Refuge from Cold Bay. A state plan to reduce the wolf population on Unimak was blocked by federal officials in 2011.

False Pass, Nelson Lagoon, and Port Heiden residents all reported a high population of wolves and the need for predator control. The overabundance of wolves seriously affects people's sense of safety and their use of the outdoors. Many feel constrained in their ability to take walks and

children are sometimes cautioned not to play outdoors. Many people will not even walk between houses. A wolf was spotted near the Port Heiden school grounds during the research team's visit in November 2009, and the village rallied with guns and four-wheelers to try to shoot it before it did harm. During the research team's visit to Port Heiden in March 2010, the bed & breakfast received a phone call identifying a special education teacher in the village of Chignik Lake across the Peninsula as having been killed by a pack of wolves. The woman had been out running on an isolated road and was attacked and killed; four locals riding snow machines found the body (Halpin, ADN, 3/11/2010). Port Heiden hunters have actively tried to eliminate wolves in their local area, Perryville, and near the Chigniks. They have lost dogs, been stalked by wolves, and have seen them take both caribou and moose calves. During a 2010 Fish & Game hunt, after the death of the school teacher, locals complained that wolves ran into Aniakchak National Monument & Preserve to avoid the hunters, and that the federal agencies will not take action on the wolves.

In False Pass, wolves are often spotted in town and a number of village dogs have gone missing. A local man killed a wolf that he found near his house while the study team was working there. Wolves are seen all year long and are often seen during the daytime, which was previously unusual. Nelson Lagoon reported high wolf populations and the associated dramatic drop in caribou population and calf recruitment. Brown bears were also reported at an "all time high," especially in False Pass. They also prey on caribou calves and locals would like to see an increased sport bear hunt. Furthermore, people in Nelson Lagoon, False Pass and Port Heiden were concerned that previously opened sport hunting of caribou bulls damaged their critical subsistence resource.

During the caribou closures, Port Heiden has applied to conduct two types of hunts: an educational hunt and a ceremonial hunt. The educational hunt is to teach hunting to kids the necessary hunting skills for when caribou recover. Two youths were able to conduct an educational hunt. They must do all the work cleaning and processing the animal, and only elders and others in the village get the meat, not the hunters. This is to teach youths that they are hunting for elders and others, not for themselves. Ceremonial hunts are conducted specifically honoring a person and usually accompany a funeral. Meat is served at a potluck where elders have priority in getting portions. In August 2010, ADF&G's Division of Wildlife Conservation issued a memorandum identifying wildlife excluded from ceremonial harvest. Under regulation 5 AAC 92.019, the department must maintain a list of areas and species not eligible for ceremonial harvest because to do so would be inconsistent with sustained yield principles. Unit 9, the North Alaska Peninsula Caribou Herd, was placed on this list for Regulatory year 2011 (through June 30, 2011). They were removed from the 2011-2012 list.

Caribou are living closer to Port Heiden in order to hide out from the wolves (Figure 141), but there is some incentive not to hunt them (Figure 142). Locals are concerned that they have no fear of humans now, and when hunting is allowed to resume, they are worried how the population will behave. Poor caribou health, for example lung disease and worms under the skin, has also been observed by Port Heiden hunters in recent years.

Figure 141. Caribou near Port Heiden. Photo by Kate Reedy-Maschner, March 2010.

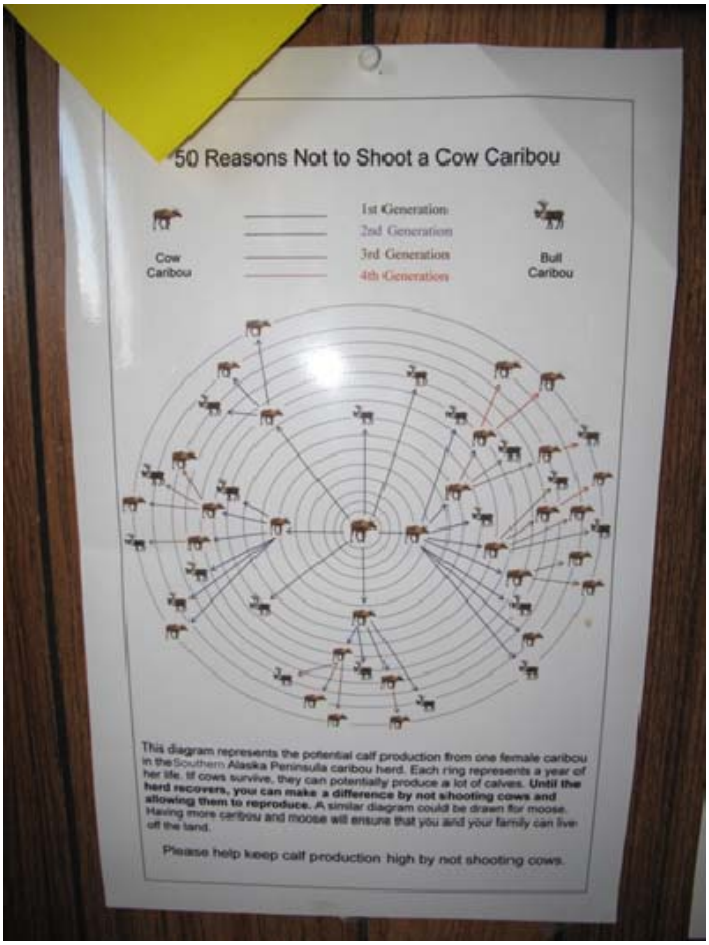

Figure 142. 50 Reasons Not to Shoot a Cow Caribou. Signage posted in the Nelson Lagoon post office. Photo by Kate Reedy-Maschner, March 2010.

Moose and Sport Hunters

The moose population in Game Management Unit 9E is also observed by Port Heiden residents as in serious decline. Hunters said that moose are, "Hard to find anymore. Have to scout in an aircraft." With caribou hunting closed, there was more subsistence pressure placed on moose. One informant said subsistence use climbed from 1-2 moose for the village to 10-20 for annual hunts just after caribou were closed. There are numerous sport guide businesses out of King Salmon operating in the area. “Sport pressure” and “over hunting” were the top reasons given for their decline. For example, one hunter said, "Sport hunters negatively impact the moose population. Hard to find trophy moose anymore.” Groups of hunters are rotated in every ten days to two weeks. Some sport operators have donated moose meat to the village over the years, but that has declined as well.

Sea Otters and Clams

An overabundance of sea otters was reported by members of every village. These are competitors for eating clams and sea urchins with the local people. Cockles were a significant subsistence food for all villages, and they harvest very few today because of sea otters. Over several years with hard winters (especially 2006-2007, and 2011-2012), sea otters have experienced large die-offs. Sea otters need water to keep their pelts clean in order to stay warm. Near Port Heiden and Nelson Lagoon, there was so much sea ice that they could not get to open water and tried to cross land approximately 30 miles to the Pacific side. Many of them died because of the journey and predation by wolves, foxes, dogs, eagles and crows. Local people have found many near death and killed them “out of mercy.”

Other Sea Mammals

Port Heiden is seeing more and more seals every year. Akutan spotted 5,000 porpoises near the island several years previously. All villages reported seeing more and more orcas each year.

Birds, Eggs and Berries

Fewer geese are seen near Port Heiden than in recent years, leaving locals to wonder about changing migration patterns. Others from the community reported an abundance of Canadian geese and pintail ducks. They have been teaching local people not to pick their eggs after their populations dropped to where they could no longer hunt them. Geese near Nelson Lagoon were reported as increasing. Emperor geese hunting has been closed for several years, but many felt they were at high enough levels to open a season once again. Ptarmigan populations are high on the peninsula and Unimak Island.

King eider and Steller’s eider populations were reported as decreasing near Nelson Lagoon. King eiders were also reported as declining near Akutan which was “a damned shame, because they taste good.” There are lots of ducks around Akutan Bay, but mallards were thought to be fewer than they should be. People in Akutan were also worried about fewer murre eggs found. In Port Heiden, Arctic tern eggs have not been harvested since 2005. They are difficult to find. Kingfishers also started to show up in past 3 years in Akutan; they are yellow/orange and believed to be new to the island.

Locations of strawberry patches often are products of seeds in bird droppings. A decrease in all birds that eat berries was also observed in low berry years near Port Heiden and Nelson Lagoon. Berry abundance each year has to do with the harshness of the previous winter and moisture levels. During the study years, Akutan was concerned about blueberry and mossberry abundances.

Fish

Nelson Lagoon, Port Heiden and Akutan residents reported declines in salmon runs. For salmon in general, Nelson Lagoon and Port Heiden put much of the responsibility for salmon declines in their streams, bays, and lagoons on the drift gillnetters of the Area M fleet that fishes between Nelson Lagoon and just northeast of Port Heiden. Effort by the drift fleet affects run strength and escapement inside the Nelson Lagoon where many village residents fish. Port Heiden said salmon are "disappearing" from local streams, and there are more fish with "things wrong with them," such as having yellow tinges, "weird" flesh colors, or looking "odd." Akutan reported fewer salmon in Akutan Bay in recent years, especially sockeye and coho, and that their arrival is later than it used to be.

Port Heiden proposed a salmon monitoring project on Meshik River, essentially a counting tower and weir by Fish and Game, but the low volume of escapement made the project not worth the investment. Meshik River also experiences high winds and flooding, making subsistence fishing there difficult. Beaver dams up river made water levels too low for upriver spawned out sockeye and coho to be collected for smoking. Chinook salmon are also in decline near Port Heiden where Meshik River used to support a large run. In 2010, they were not really coming close to the beach and had to be fished in open water. Coho are harder to find near Port Heiden as well.

Nelson Lagoon residents were also concerned with a sport fishing operation on Sapsuk River. They are concerned with "too many clients," "greed," and the need for proper waste disposal to protect the river. Sport guiding operations also purchase fuel from Nelson Lagoon for planes and boats, which contribute to their economy.

Halibut in both quantity and size are also getting harder to find for False Pass and Akutan's fishermen. False Pass reported an increase in Pacific cod.

Small Mammals

Near Port Heiden and Nelson Lagoon, there are a lot fewer porcupine and snowshoe hare than in previous years. Foxes are increasing on the Alaska Peninsula.

Other

Port Heiden locals have both conducted and participated in recent harvesting research studies for the Bristol Bay Native Association and others. Harbor seal and sea otter surveys have been conducted recently in the region. A local woman enrolled in an Environmental Science Field and Methods Survey class and encouraged the professor to conduct his clam bed survey and a trawl survey in the bay. Results showed that in seaweed areas, there is the most species variety with up to 30 different species in a trawl. The mussels of the area are considered invasive species; they multiply quickly and are suspected to have arrived on barges. Near False Pass, fireweed and wildflowers are harder to find. Akutan reported more octopus than usual. They were also

concerned that crab, halibut, and cod were not showing up in Akutan Bay like they used to. Trident Seafoods dumping their waste was cited as a possible factor. In Akutan too, "People don't hunt as much as they used to. Gas, the price of shells have gone up." Nelson Lagoon also reported more “weird bugs” due to temperature warming. There were also new species moving in: a type of tern with a black head, newer unidentified “little birds,” a ribbon seal on the beach in about 2000, a fur seal tangled in net in 2007, and an abundance of salmon sharks. These and other observed changes are captured in Figure 143 along with positive or negative community views. In addition to local observations, a few marine mammals, several species of birds and one plant occurring in the Aleutians are listed as endangered or threatened under the Endangered Species Act (Table 33). Reasons are varied.

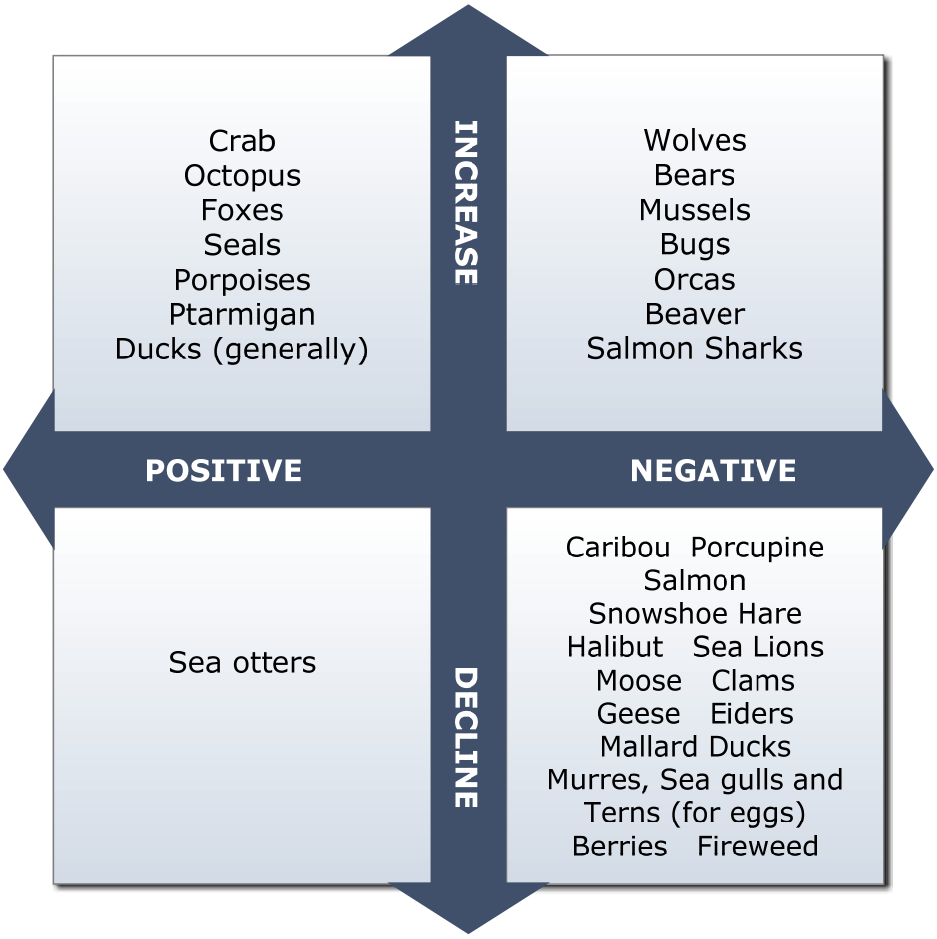

Figure 143. Observed changes in species across the study communities.

Table 33. Species listed under the Endangered Species Act that range in the study region

Common Name	*Scientific Name*	*ESA Status*
Steller Sea Lion (Western Population)	*Eumetopias jubatus*	Endangered*
Northern Sea Otter	*Enhydra lutris*	Threatened
Blue Whale	*Balaenoptera musculus*	Endangered
Bowhead Whale	*Balaena mysticetus*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Right Whale	*Balaena glacialis*	Endangered
Sei Whale	*Balaenoptera borealis*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Short-tailed Albatross	*Phoebaotria albatrus*	Endangered
Steller's Eider	*Polysticta stelleri*	Threatened
Kittlitz Murrelet	*Brachyramphus brevirostris*	Candidate
Aleutian Shield Fern	*Polystichum aleuticum*	Endangered

*Subsistence species for the study communities.

ENVIRONMENTAL AND OTHER CHANGES

Nelson Lagoon

A Nelson Lagoon man has recorded the weather almost every day since 1990, and has a record of climate change, rising sea levels, and erosion. Several people described the changing and eroding Nelson Lagoon spit; a cabin was built at the end of the spit in 1956 and the spit has grown north several miles since then. Because Nelson Lagoon is now a state and federal critical habitat area (primarily for waterfowl populations) they are concerned that erosion will drastically alter the lagoon. Their Tribal Environmental Department has also applied for funds over several years for beach cleanup. Garbage continues to fill the beaches and these funds "saved a couple of [fishing] permits here." Following the tsunami in Japan, this work is expected to increase.

Pollution and Port Heiden

The military left a system of roads behind in and around Port Heiden, and the village spread out along these roads, but only after they experienced massive erosion around the old village site at the Bering Sea's edge in the 1970s and 1980s. The U.S. Army Corps of Engineers built roads with Federal Emergency Management Agency (FEMA) money (taking gravel from the bay and a barrier island that may have further accelerated erosion), and connected them to the military roads. There is strong concern over pollutants from the military remains. The Tribal Environmental office has Indian Environmental General Assistance Program (IGAP) funds and Brownfield site funds to clean up military remains.[12] They have also gained grant funds for water quality, solid waste disposal, and energy assistance. Many residents had used lumber from old military structures as building materials for their homes, and now claim a disproportionate number of cancer deaths. A White Alice Communications (WAC) site remains, and in May to September of 2009, it was the focus of a soil remediation project to remove contaminated soils.

[12] These are Environmental Protection Agency (EPA) funds used to develop tribal capacity for addressing environmental hazards and related health issues in their communities.

Aniakchak Contractors is the for-profit business through the tribe that hired local people to work on the cleanup. They worked with the remediation companies, Weston Solutions and DMZ Soil Solutions, for the remediation. This work resumed in 2011 and 2012.

There are noticeable vegetation changes around the remediation site, and people will avoid picking berries in the area, although some say they often only picked there because the biggest berries came from the contaminated areas. It was a prime ptarmigan hunting spot as well. The people generally alter their harvesting behavior now to go around these areas because of concerns about contamination and hazardous materials. The Tribal Environmental office holds educational meetings about contamination and posts signs to avoid the area but there is no enforcement. Those that do pick berries in the area say that they "wash them extra."

Meshik village is now the old ghost town section on the shore. Everyone moved out because of erosion. They were also worried about the PCBs, leaded paint, and other waste in the old village. Houses had been built out of old military materials and people are now concerned with what was in them. Barrels of substances were lying around that people used to use to melt ice to get their vehicles and boats working. They have had water tested and nothing serious was found, but they claim an alarming cancer rate. Aniakchak Caldera is also blamed for upper respiratory issues and ear infections.

NORTH ALEUTIAN BASIN EXPLORATION AND DEVELOPMENT PROSPECTS AND CONCERNS

The survey asked about support for offshore oil and gas exploration and development and anticipated advantages or disadvantages that may accompany the development scenario. These questions lead to open-ended responses in many cases. Quantifiable elements are examined below.

Village Responses and Survey Results

Port Heiden residents commented that Shell Oil representatives came to Port Heiden twice between 2007 and 2009. The first time they told the people of the village that they had nothing to offer them; they were just informing them of what would happen in the Bering Sea. The second time, they reportedly spoke of local hires, revenue sharing, and other benefits to the community. This change in approach created some concern. Revenue sharing is also very attractive to the community. Given their location, they were interested in participating in construction, spill response, and local jobs.

The City of Akutan was interested in participating in the North Aleutian Basin exploration and development phases. The leadership sees Akun Island (and its new airport) as a key location for storing spill response equipment. The residents are mixed in their opinions of the exploration and development. Some saw it as occurring too far away from Akutan to be of concern or of any benefit.

False Pass leaders were optimistic about serving as staging grounds for oil and gas exploration and development. Others were fearful of the prospects. For example, one man stated, "There is no feasible way oil and gas can happen out there without negative impacts."

One man stated that he gets flyers about the NAB exploration and development but does not read them. He supports it, but mostly because he does not fish anymore. But, he said, “If they can do it up north and in California, then they can do it here too.” He also acknowledged spill dangers because of the frequency of earthquakes, but said that earthquakes are fewer and less intense than they used to be.

Nelson Lagoon has been engaging with petroleum exploration and development for many decades. In 1968-69, an oil well was drilled at David’s River 16 miles down the beach from Nelson Lagoon on the north side of the Alaska Peninsula. It was drilled by Brinkerhoff Drilling Company for Pan American Petroleum (predecessor of AMOCO Production Co.). In August 1969, a 200 foot barge delivered equipment to build roads and an airstrip for Pan American Petroleum. Drilling equipment was brought in and a derrick installed. Some people from Nelson Lagoon were hired for construction. It turned out to be a dry well and was closed down right away.

Given Nelson Lagoon’s close proximity to the North Aleutian Basin proposed OCS lease area it was a greater topic of discussion throughout the community than the other communities of this study. Prior to this research effort, the tides of support for offshore oil and gas exploration and development were shifting, and the president of the Nelson Lagoon Corporation estimated about 40 percent of the village was against the development. Northern Dynasty Minerals’ Pebble Mine in Bristol Bay has influenced opinions of all development. Most discussions of offshore oil and gas exploration and development sparked discussions of the Pebble Mine development. Some do not want Bristol Bay offshore drilling, but do not oppose onshore development because they perceive less onshore risk. Many residents were displaying anti-Pebble Mine hats and bumper stickers during the 2012 community visits. Most are opposed to the Pebble Mine, and approach the North Aleutian Basin project with caution. If managed properly, salmon is considered a renewable resource that will last forever while oil is finite. “Oil and gas has come a long way in safety, but not far enough,” said one man. On the other hand, one man argued, “We can send a man to the moon; why not drill a hole in the Bering Sea?” In Akutan, the wreck of the *Selendang Ayu* in 2005 affected people’s understandings of disaster. "Where the boat went down in Dutch, we saw slicks out there. Skimmers came in to the bay to clean up."

Leaders were becoming more aware of global activities of the petroleum corporations. They were reading about Shell’s activities in Nigeria, for example, and industry’s other foreign activities that “don’t give me much confidence.” Oil companies have paid for leaders from Nelson Lagoon to observe operations in Norway, the North Slope, Cook Inlet and Sakhalin. One major concern of local leaders and harvesters was the size of the corridor needed for pipelines. In the leading development scenario released by Shell Offshore Inc., a pipeline crosses the Alaska Peninsula through Herendeen Bay to a Liquid Natural Gas (LNG) plant on the Pacific side. Herendeen Bay cannot experience such a corridor according to local people because the corridor would destroy all the resources there. Herendeen Bay is locally just called “the bay” and is something of “a special place” in terms of resource abundance. In the 1980s, when petroleum exploration was considered for the region, leaders spoke of their trips that industry provided to the Gulf of Mexico to see other operations.

Nelson Lagoon leaders expect positive outcomes in revenue sharing. Since they only expect one or two people from Nelson Lagoon to take oil and gas jobs, instead revenue sharing would "create entrepreneurship," job development, infrastructure and "allow us to survive." There has been no training of Nelson Lagoon residents for petroleum jobs, nor has it been promoted locally.

Fishermen spoke of the difficulties in getting salmon escapement in the Nelson Lagoon system and fears that "it will dry up." "You add oil and gas leases on top of that and now you got something to worry about." As one community leader stated, "It is more controversial now than it was" in Nelson Lagoon.

The potential lease sale in Bristol Bay was an evolving story throughout the study period. This project surveyed village participants in February and March 2010 *before* the Obama Administration canceled the lease sale option. Since then, there have been private and public disputes about this process. Publicly, Aleutians East Borough Administrator Sharon Boyette wrote a Compass piece for the *Anchorage Daily News* on April 2, 2010, expressing the disappointment of the region, and particularly of the fishermen of Nelson Lagoon and False Pass. On April 28, 2010, resident fisherman and pilot from Nelson Lagoon Theo Chesley responded with his own Compass piece in the *Anchorage Daily News* stating that the Borough was not accurately representing regional concerns and there was no widespread support.

It became clear that most questions about the exploration and development could not be captured in yes or no responses. "Do you support or oppose the development?", for example, elucidated many pros and cons from respondents, seeing multiple sides to the project. Figures 144 attempts to quantify and show graphically this range of responses between communities. Qualitative descriptions, however, provide the most guidance on local responses and are described below. Figures 145 and 146 summarize responses to questions related to exploration and development and subsistence harvesting. Nelson Lagoon's proximity to the North Aleutian Basin site is evidenced in their responses since they indicated they expected more local effects. The majority of subsistence users of the development site live in Nelson Lagoon. They expected changes in the harvest of key species, particularly salmon and caribou. Port Heiden expected the same harvest changes. These resources could be harvested away from the sites for many people, but for others the development corridor was the sole source. Employment expectations were generally low across the board for survey respondents, but they were hopeful others in the community would be employed in jobs related to oil and gas exploration and development.

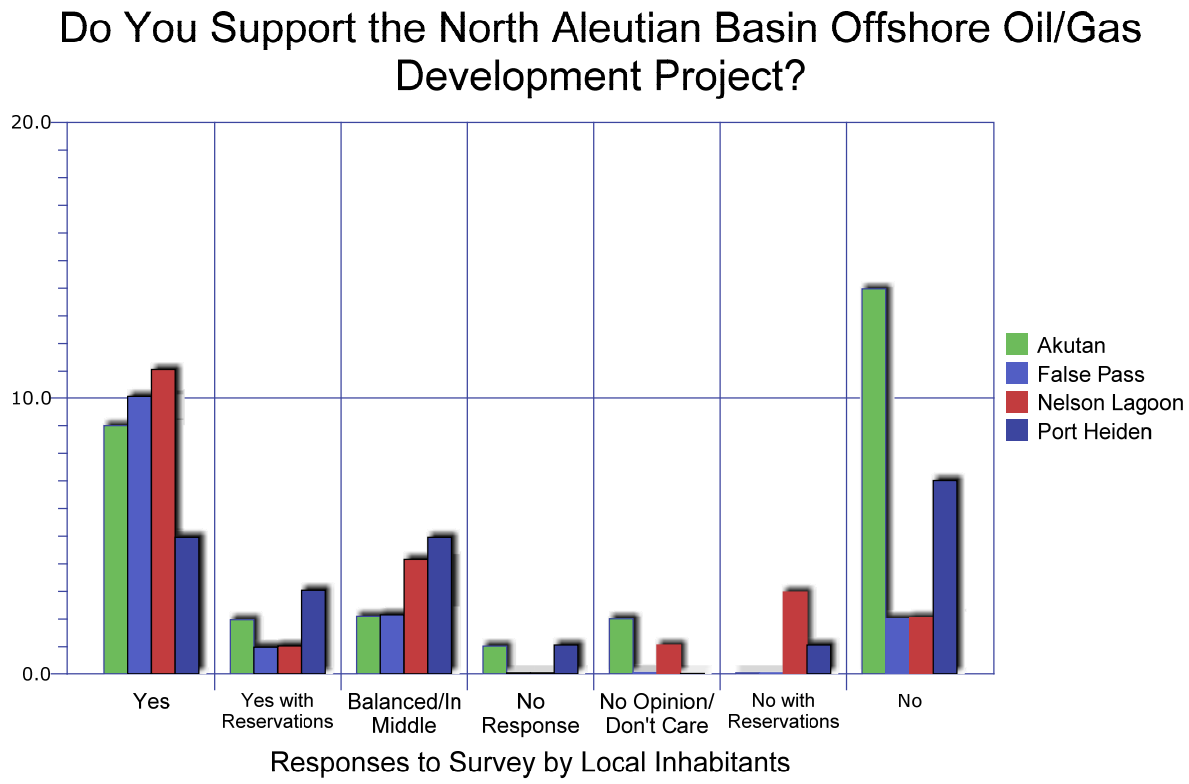

Figure 144. Local support for North Aleutian Basin exploration and development.

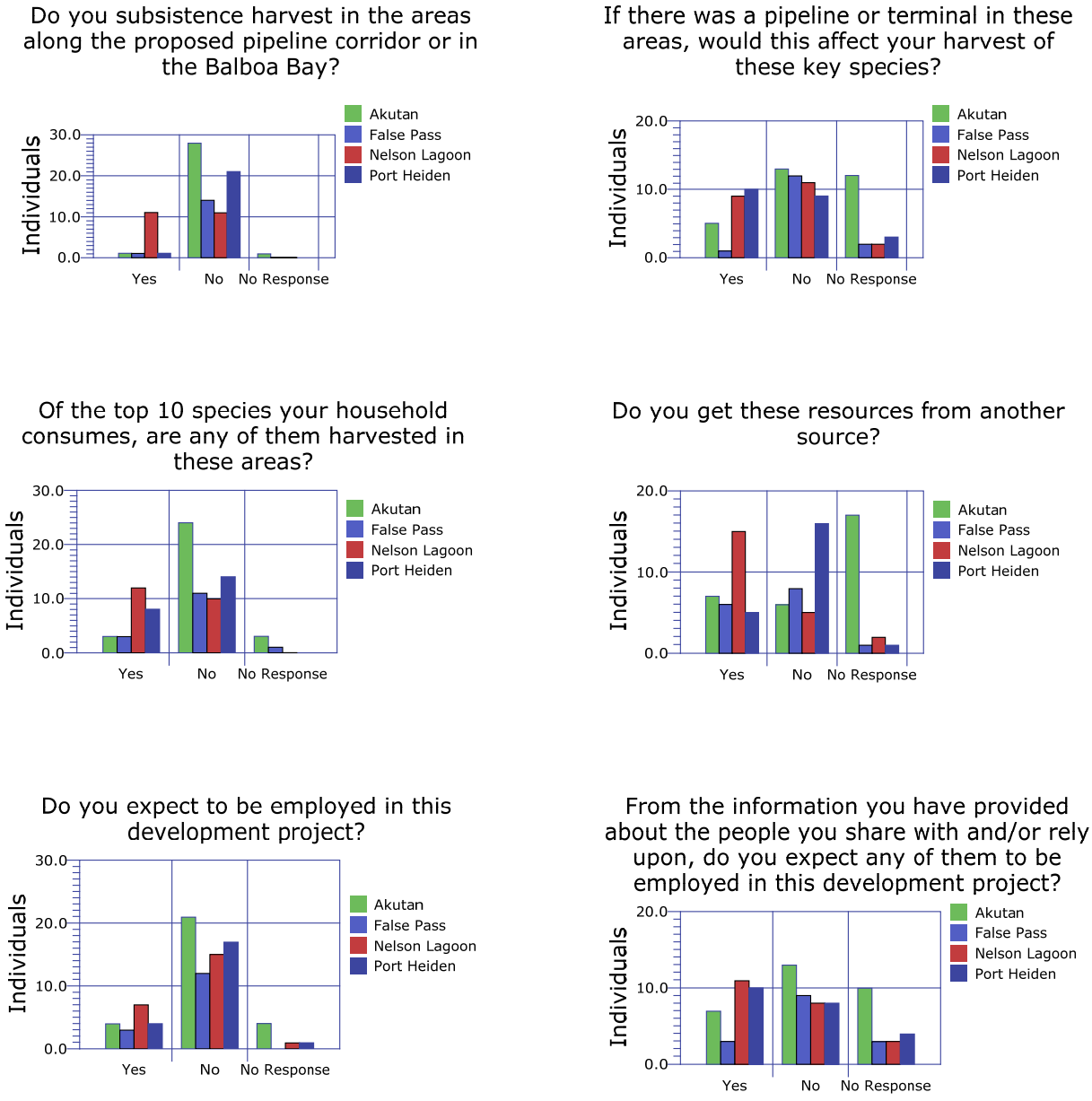

Figure 145. Concerns related to subsistence harvesting.

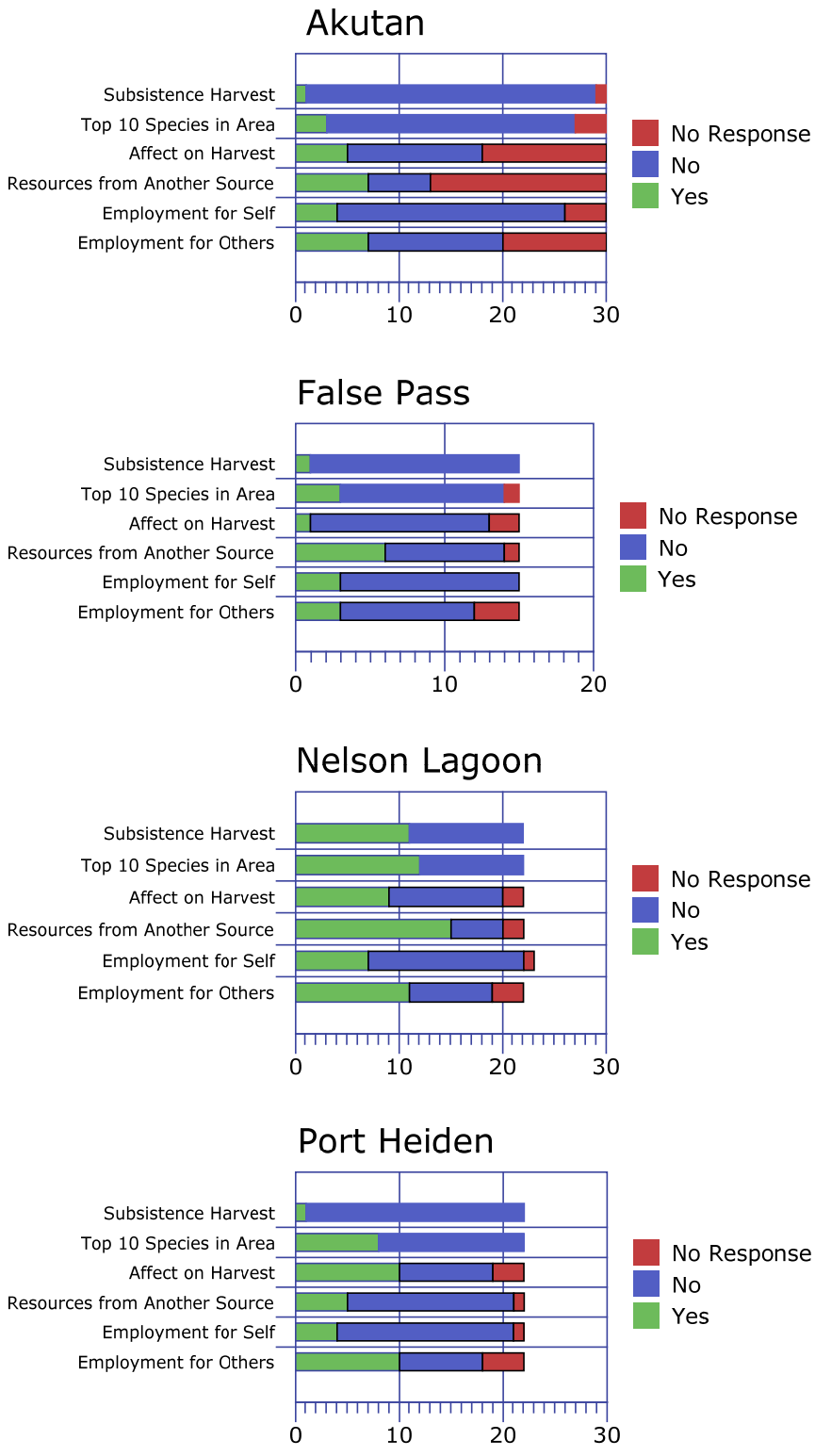

Figure 146. Concerns and prospects for potential exploration and development.

Numerous speculative concerns were expressed by residents of the study villages ranging from water and air contamination to habitat impacts to economic issues. Here they are broken down by subject and theme. Villages from which the concern originated are indicated in parentheses.

Local Economies

- Will help the younger generation (PH)
- "Would like to see training and employment opportunities." (PH)
- "We were told they weren't going to hire." (PH)
- Fuel sales would increase (PH)
- "We gotta do something here. There's no work. No jobs. Food and fuel prices are high" (AK)
- "Hoping they can do internships and hire locally." (AK)
- "It would boost our economy. More jobs, more people. The school is going down." (NL)
- "Boost our economy, give people some jobs. Or this village will die of starvation." (NL)

Local Capacity

- "We have no training for underwater welding. We need good vocational program for kids." (AK)

Fisheries

- "Maybe affect the fish migrating through." (PH)
- "Could eventually affect fisheries, but need more information." (PH)
- "May force a re-route in migration patterns."
- "Fish might [be affected] if something happens." (PH)
- "Might affect fish migrating through." (PH)
- "Potential to affect, but not fully educated in science, but … fear need more information." (PH)
- "No impact concerning fish availability? It will have a negative effect on the fish, salmon." (AK)
- "If something goes wrong and there is a huge oil spill, there goes our fish and our king crabbing." (NL)
- "Not wanted. Danger to mess up the whole fishing lifestyle." (AK)
- "It's gonna affect us in negative ways. Especially hunting and fishing." (AK)
- "Salmon, halibut—everything is linked to up there [Nelson Lagoon]. And all the ducks." (AK)

Terrestrial Mammals

- "Oil company won't have any effect [on caribou]. Drill holes didn't have any effects. Roads always full of caribou." (NL)

Birds/Marine Mammals

- "Big species migrate through there." (AK)

Subsistence

- "Salmon, plus the caribou herd goes down there." (PH)

- Fish, seals, geese, walrus, “all the species run up through there." (PH)
- "That's where our fish come from." (PH)
- "Increase human influences, user access." (PH)
- "If there was an accident, everything would be affected." (PH)
- "Not enough information coming to us. I'm scared about the subsistence, our territory, our waters.” (PH)
- “All it takes is one mistake to wipeout halibut and crab. What does it outweigh? We want money but could lose a livelihood” (NL)
- “[A spill] may force a reroute in migration patterns.”

Energy

- "If pipeline comes in, then doable, but not instantly. But it would change the energy consumption around here." (PH)
- “Don’t want to count on that foreign oil anymore.” (PH)
- “If it lowered our gas and oil prices [I support it].” (PH)

Transportation & Infrastructure

- "Possibly as a tribe, our LLC (Aniakchak). We could be a staging area, since we have the runway." (PH)
- "If NG pipeline comes in costs could change but not instantly, but it would change the energy consumption around here." (PH)
- "Hope for airport to be part of response." (AK)
- “False Pass would be a nice staging area.” (FP)
- “Might be easier to get resources out here. Might bring in more barges.” (PH)

Risk

- "Know it’s coming but holding out for technology will help with problem." (PH)
- “It’s not if, but when, there is an oil spill.” (PH)
- "I think it’s crazy. It’s the Bering Sea. Don't think the technology is right this time." (AK)
- "Economic development is welcome, but the chance of a leak is troublesome. [John] used to fish in Balboa Bay and said that is prime ground for crab and much of the salmon species." (AK)
- “Don’t want any accidents like Valdez. Don’t care for Pebble Mine.” (AK)
- “I used to be a commercial fisherman. Oil and fish don’t mix. It’s too high a price for this development” (AK)

Habitat

- Possibility of spills ruining the habitat (AK)

General

- "We shut down early 1980s one. My family has made a living out of Bering Sea. Had dumped $7 million into the corporation. Whole family involved in fishing. Don't think it's gonna go. On shore angle drilling -- would support that." (AK)
- “Big effect. Just being built and being there will change things.”
- “Foregone conclusion to develop, so why not support it.” (PH)

- “More people and traffic and pollution.” (PH)

Occupation, Movement, Settlement

- "More people subsisting on the same resources." (FP)
- "If it gets bigger-more people, just depends on the people who come in. Most of the time it's good." (FP)
- "Would help. Need some new blood." (FP)
- "Might bother some of the elders with the extra activities going on. Might be good for younger people to have stuff to do." (FP)
- [Village population change?] "Not here" "If it were closer, yes." "If it was here in these waters” (PH)
- “It would bring more people to the region. Good for the economy. Good for town; probably save this town.” (FP)
- “We need more kids here” (FP)
- “Have got to develop it. Take a chance and make it better. People need jobs. Fishing isn’t what it used to be.” (FP)

Community/Social Problems

- “Economy would get a boost but could destroy fishing. Oil and gas exploration will not bring families to the community. We got an exodus in the borough. Kids are leaving or following parents. Perception of impact is not really impact. People that do fish only eke out a living. Cannery helps, but it doesn’t bring in family, only single men who bring in problems of their own.” (NL)
- “More Westerners here and less Native culture. Development brings that in.” (PH)

Other

- “I stay out of it.” (PH)
- “Need more information. Mixed feeling.” (PH)
- “Not sure. Half and half on it. Don’t know. Undecided.” (PH)
- “Be cautious. It’s good for employment, dangerous for subsistence.” (PH)
- “Shell has been here. Kind of like Pebble.” (PH)
- “In support of the permitting process. Wait and see.” (PH)
- “Corporations, oil companies might buy up a lot of land. Lot of red tape.” (NL)

DEVELOPMENT SCENARIO

The leading proposed development scenario was presented by Shell Offshore Inc. in Anchorage in October 2006. Their presentation included a slide similar to Figure 147 indicating what the project might contain. There would be 2-4 offshore platforms in the Bering Sea, a pipeline to the peninsula and overland to a Liquid Natural Gas (LNG) plant at Balboa Bay on the Pacific side. Tankers would then transport petroleum to the U.S. west coast. The timing of the development from the Lease Sale to the Construction phase was projected to take seven years (NAB Information Status and Research Planning meeting, 2006). From a proposed 2010 Lease Sale, construction at the NAB site would have begun in 2017, oil production would have begun approximately 2020 and gas production would have begun in 2525.

Shell Offshore Inc. also presented financial and employment impact potential which included approximately $7 billion in royalties of which a portion could include revenue sharing with local government.

A construction phase was projected to last 5 years for both the pipeline and LNG plant offering between 2,000 and 4,800 jobs. An operating phase, projected to last 25 years, offered a total of approximately 650 jobs at the LNG Plant, Onshore Facilities, in Platform Maintenance, and Platform Operations. A “job pyramid” created by Dr. Scott Goldsmith from ISER and based upon Kenai Peninsula data projected that for every one Oil and Gas Industry worker, there would be about 6 positions in the community supported with public revenue. Thus, 650 operator and contract staff positions (with average annual salaries of $85,000) would potentially be accompanied by 3,900 community jobs (with average annual salaries of $38,000). Oil and gas workers would be involved in drilling, coring, maintenance, logistics, transport, spill and emergency response, among many other positions. Platforms typically have two crews of about 46 personnel each working at the same time, and four crews per platform. Community employment could be in services (hotels, restaurants, transportation, emergency, infrastructure, government agencies, and construction, for example) and goods (food, fuel, housing, vehicles, clothing, household items, and office products). LNG Plants typically have one crew of 141 workers.

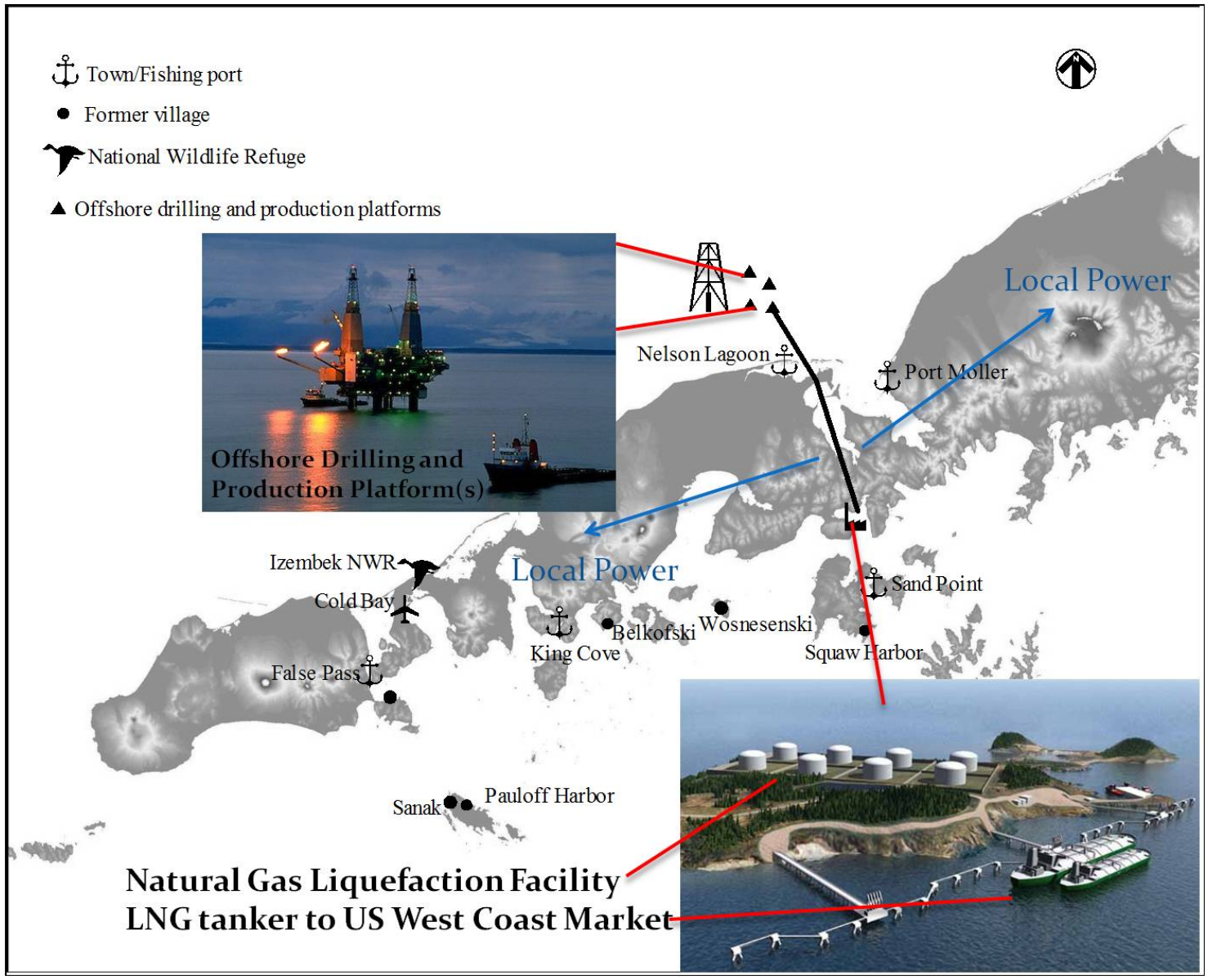

Figure 147. Schematic map of potential development facilities.

In the final installment of *The Pipeline* (Aleutians East Borough Newsletter) March 31, 2010, pages 2-3, local people were looking forward to other benefits as well:

> "Other benefits would have included energy resources for the nation, a local source of fuel and energy, enhanced spill response in the busy shipping lanes of the North Aleutian region and enhanced search and rescue. Geologists believe the area is predominantly gas prone. The mean, conventionally recoverable resource amount is estimated to be 12.8 trillion cubic feet equivalent of natural gas. Oil is a secondary resource. The mean, conventionally recoverable resource amount is estimated to be 753 million barrels of oil. Taxes derived from the lease sale would have been considerable: $546 million in Ad Valorem Tax could have been generated from a liquefied natural gas plant; $12 billion in federal income tax; $7 billion in royalties; and $850 million in state and local taxes."

Sand Point would likely see population growth and community changes if the LNG Plant was situated in Balboa Bay, however Sand Point was not included in the research contract. Cold Bay could also potentially feel some effects, given its large runway, its role as airport hub, and its proximity to the proposed development site, but it too was not part of the contract. Therefore, we will analyze only the four study communities for how they might change should the project continue. This phase of the project occurred after the development project was cancelled by the Obama Administration, and many residents felt like it was a moot point to even consider exploration and development scenarios, but still had plenty of say about the leading development plan.

Nelson Lagoon would have likely served as staging grounds for large portions of the construction, operation, and removal phases. A Nelson Lagoon resident on the trip to Sakhalin described below commented extensively on the large corridors required for pipeline construction. Photographs from the trip showed broad swaths of ground that had been bulldozed for the pipeline's path. Should this same corridor be required for a pipeline through Herendeen Bay to Balboa Bay, Nelson Lagoon would lose critical subsistence areas.

Cold Bay and Port Heiden airports currently serve as emergency services centers for Bering Sea rescue operations. Most residents in Port Heiden felt as though the exploration and development was not close enough to the village to affect real change in the community unless there was a spill or disaster. Cold Bay had a large runway and can already accommodate increased air traffic. False Pass leaders expressed a desire to serve as staging grounds as well, since vessel traffic through the pass would likely increase.

MODELS OF DEVELOPMENT IN ALASKA AND ABROAD

Regional leaders were invited to view other exploration and development models involving petroleum and fisheries interactions. These activities described below influenced their sense of NAB exploration and development and variously appeared in interviews.

Sakhalin

In 2007, Shell Oil invited several regional representatives to Sakhalin to view how commercial fishing and oil and gas industries co-exist. They toured an LNG plant, saw a nursery

enhancement project, and met with local leaders, fishermen, and indigenous peoples. They did not have time to tour the pipeline and offshore platforms from the northern part of the island.

Norway

Norway has a long tradition as a fishing nation. They have a large coastal fleet spread along the Norwegian coastline, and a smaller offshore fleet. The nation has been production oil since the 1970s. In March 2008, Aleutians East Borough and Lake & Peninsula Borough representatives joined an Arctic Sea Studies Tour and Energy-Fisheries Coexistence conference in Bodø, Tromsø, and Hammerfest, Norway. Development in Hammerfest had particular significance for NAB communities where large and small fleets work next to oil and gas operations, and the community is a support base for Barents Sea development and the Snøhvit LNG plant. Just after the trip, Aleutians East Borough administrator Juettner wrote, "Its population has stabilized as a result of the offshore development, while the number of fishermen is increasing."

Gulf of Mexico

In 2008, Aleutians East Borough and Bristol Bay representatives toured offshore oil platforms in the Gulf of Mexico, hosted by Shell. This is before the Gulf oil spill and responses were positive.

OTHER DEVELOPMENT PROJECTS

Community leaders continually seek out new opportunities and local economic development projects. Each of these projects could potentially affect subsistence harvesting and sharing behavior. Several that are planned, ongoing, or completed during this project are briefly described here to show that any oil and gas development will happen alongside other projects already occurring, and coordination will be required.

Akutan's Geothermal Development

Akutan was rated as having the best geothermal development prospects for the entire state of Alaska. In 2010, drilling began as part of an exploratory project. Akutan receives power through a diesel generator. If significant geothermal resources are located, it may be possible that a new geothermal power plant will be developed in Akutan. Local residents are excited by the potential. "Geothermal energy is huge potential. We have the technology, the need. We should dive into it. If there's a hot water spill, so what?"

Akutan Airport

Transportation in and out of Akutan is a significant challenge for the community and for Trident. The village was serviced primarily by seaplanes built in the 1940s (which are expensive to maintain), the state ferry in the summer months, and (rarely) transport and fishing vessels moving between Akutan and Dutch Harbor. The plan was to connect the airport with the village using a costly hovercraft to shuttle passengers. A $75 million airport project on Akun Island was in the planning stages at the start of this project and was completed in 2012. In the Fall 2011, there was some media reporting about an "airport to nowhere" because Akun is uninhabited and it is a six mile trip over open seas to get to Akutan. There is no space on Akutan itself for a runway.

The airport consists of a 4,500-foot paved runway, taxiway, apron and Sand Storage Building. Improvements on Akun Island include a hovercraft facility site consisting of a ramp and pad. The hovercraft facility and the airport are linked by an access road. This project will also construct a hovercraft facility at the head of Akutan Bay that will include a ramp, pad and maintenance building. The existing amphibious ramp next to the village was altered to accommodate the hovercraft.

Akutan Boat Harbor

The Aleutians East Borough and U.S. Army Corps of Engineers' $31.9 million harbor project in Akutan began construction in the summer of 2010. The harbor site is at the head of the Akutan Bay and will provide mooring and refuge for approximately 60 vessels. An access road is also being constructed between the village and harbor site.

False Pass Tidal Energy Development

In March 2011, the City of False Pass submitted a grant application to the state Department of Energy's Emerging Energy Technology fund (EETF) for tidal energy exploration. The project is to assess ocean current velocities near False Pass to determine development prospects and transmission distances. If the project seems feasible, permitting and design work could begin leading to an electrical generation system power by ocean currents serving False Pass (Hennigh et al. 2010; Lavrakas 2011).

APICDA Wind Energy

As part of a pilot renewable energy project, APICDA installed wind turbines in three of its villages. The Nelson Lagoon Electrical Cooperative installed a wind-measuring meteorological (met) tower to help determine whether wind turbines are feasible. The design of the wind turbines will depend on data from the met tower, as well as the best way to integrate wind power in the current diesel power system. Permitting and bird affects studies are in the planning stages. False Pass also put in a meteorological (met) tower to measure wind energy potential. Because of its location in a pass near mountains, there is high wind turbulence that may make it difficult to develop. They are considering studying other nearby sites for less turbulence. The pilot program was extended to Akutan and tied to its electrical grid (Figure 148).

Figure 148. Wind turbine being erected in Akutan, February 2010. Photo by Crystal Callahan.

False Pass Processor

Bering Pacific Seafoods, the CDQ funded processing plant in False Pass, is adding new processing lines, expanding their bunk houses, and hoping to add halibut and cod processing over the next few years. This will hopefully attract more people to the community and support the local fleets.

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CHAPTER 10. CONCLUSIONS

RESEARCH HYPOTHESES REVISITED

To conclude, research hypotheses are reconsidered in light of study findings. Each pair of hypotheses is considered together.

- $H1_1$ Current social networks are organized around central nodes made up of either the most successful commercial fishermen or a senior matriarch directly related to one or more of the most successful commercial fishermen. Should any one of these nodes change roles in the network, there will be a disruption in the subsistence and sharing economies.
- $H1_0$ Current social networks have sufficient depth that should any primary node leave the subsistence and sharing network, other nodes will fill any voids created by that disruption.

The network data presented, in which most sharing and food harvest distributions occur around key individuals and entities, confirms $H1_1$. Missing from this hypothesis, however, are the entities such as Peter Pan Seafoods and Trident Seafoods from which the majority of crab, and in some cases cod, are distributed. Should any one of these nodes change roles, that is, leave the community, take a construction job in oil and gas, or die, for example, there would be disruptions to the sharing economy. The "30/70 rule" identified by the Subsistence Division of the Alaska Department of Fish and Game, that is, 30 percent of households account for 70 percent of the total harvest, appears to hold true in these communities (J. Fall, pers. comm.). These highly productive households also tend to hold the wage jobs in the community, have greater social and material resources, and are in the middle and elder generations. While each community has a few key harvesters, the loss of one of these key harvesters could have devastating results, especially where there is no clear successor. The burdens on key harvesters will increase. That said, there often are "successors," or people who could potentially take over a fishing boat and subsistence burdens, although they may not exactly duplicate the work of the previous person. Many key harvesters are fully aware of their own importance, and are not likely to change their roles without reason or making arrangements to support their dependents. Should an entity change its role, for example crab becoming cost prohibitive to the local people, villages would likely lose a substantial portion of this high status food. Access by the other communities would then be dictated by sharing networks from communities with greater subsistence crab access, such as King Cove and False Pass.

There are some networks for which there is a sole provider, or at least one so dominant, such as cattle in Akutan, or moose provided by sport hunters in Port Heiden, that any disruption in that single source would result in the collapse of the network – there are no back up sources. On the other hand, halibut, octopus, salmon, and a number of the more "traditional" taxa have considerable network depth. The networks associated with plant foods are the only networks organized around women. These are either senior matriarchs or young women participating in subsistence with some network depth for sustainability.

- $H2_1$ A disruption in the commercial fishing industry, either through natural disaster, industrial accident, or through economic development where commercial fishing becomes a secondary enterprise, will have influence on networks and cause their disarticulation and reorganization.
- $H2_0$ A disruption in the commercial fishing industry will be mitigated through success in other commercial areas since new economic opportunities are often best articulated by the most successful fishermen, and economic expansion in the region will lead to the strengthening and expansion of traditional networks.

It is clear in all communities that commercial fishermen have greater access to quantity and variety in their subsistence harvesting through access, space, time, resources, and labor. They possess the equipment and can recruit labor for hunting and fishing expeditions. They can also travel farther to other subsistence harvesting grounds. These men typically wear multiple hats in the communities, managing the tribes, corporations, cities, businesses, and pursue new economic opportunities continually. While these individuals are creative entrepreneurs, commercial fishing is the foundation for Nelson Lagoon, False Pass, and Port Heiden, and a disruption in access would have negative social and economic consequences. These networks could certainly reorganize, and it is expected that the same few people would likely still carry the burdens of maintaining traditional networks. But we have also definitively shown that access to a commercial boat is the defining variable in the distribution of subsistence resources.

These communities have already experienced significant disruptions in the commercial fishing industry through harvest volatility, fuel costs increases, salmon price fluctuations, and shrinking local fleets and populations. Harvesting and sharing burdens have increased for some, but this is tempered by population decline in the villages. In Akutan where commercial fishing is not the primary income source and cultural foundation for the villagers (although their economic base is supported by Bering Sea fisheries), it is still the primary means by which key harvesters have the resources and flexibility to harvest large quantities and travel great distances.

- $H3_1$ Since the subsistence economy is based upon local land use and interactions between traditional subsistence and modern commercially harvested enterprises, a disruption in access along the subsistence-commercial continuum caused by a ship grounding, landscape restrictions due to pipeline and facility construction, oil spills, or similar factors could lead to a change in traditional economies, a breakdown of sharing networks, and community abandonment.
- $H3_0$ A disruption in access along the subsistence-commercial continuum caused by a ship grounding, landscape restrictions due to pipeline and facility construction, oil spills, or similar factors will have small local effects but will not alter the basic structure of sharing networks.

There are current issues of decreased access to key species, such as caribou and Emperor geese, that have produced difficulties in maintaining sharing networks. While moose meat and bear have emerged as substitutes for caribou in Port Heiden, False Pass has turned to buying store-bought meats and has increased their harvest of island raised beef to fill this gap. Nelson Lagoon does not have this option, and is purchasing most of their meat with high freight costs. But the larger issues are the disruption for hunting groups, butchering groups, and sharing networks

surrounding this critical species. While the changes in these species have various natural and human-induced causes, declines in species and subsequent closures related to human-induced oil and gas activities would further stress these sharing networks.

A large pipeline from offshore platforms across Nelson Lagoon, through Herendeen Bay, and ending in Balboa Bay would likely require construction crews plowing up the tundra, altering habitats, potentially removing clam beds and berry picking areas, for example. Herendeen Bay, especially around the old village site, is a crucial harvesting area for many species not available elsewhere, such as shrimp. Alaska Native allotments and cabins are heavily used and valued by the village. Losses in this critical zone could certainly breakdown sharing networks emanating from the area. More disastrous events, such as natural gas leaks and oil spills, could pollute the lagoon system, especially the waterfowl, and negatively affect salmon spawning lakes and rivers. Oil spills could close commercial fishing in the region temporarily during cleanup, which would devastate many households that rely exclusively or significantly on salmon fishing. Special care should be taken to avoid subsistence harvest areas if any near-shore or onshore ground disturbance were to occur in the future.

- $H4_1$ An influx of wealth with strong paying jobs could increase subsistence harvests because these practices are intimately tied to wealth and access to technology.
- $H4_0$ An influx of wealth with strong paying jobs could decrease subsistence harvests as these practices become superfluous to other wealth options.

It was expected that the wealthier individuals in each community bring in the greatest amount and variety of subsistence resources and, thus, wealth will likely continue to support or even expand subsistence access. What was found was that income is not the key variable. In fact, income is not a good predictor of subsistence harvests, sharing, and redistribution. Rather, it is boat ownership and access to commercial fisheries that is the key measure of whether or not one is a provider. Thus, jobs that remove key people from commercial fishing will result in a catastrophic reduction in access to subsistence foods for all members of the communities. If local hire is indeed a priority with training and recruitment, and these jobs become attractive to key harvesters, reorganization of sharing networks would have to accompany these losses. Wealth from oil and gas could support other non-industry employed people to continue or even expand their subsistence harvesting.

- $H5_1$ Changing work roles of subsistence harvesters (e.g., from commercial fisherman to platform worker) will exclude key harvesters at significant times during the year leading to lower subsistence harvests, less subsistence food sharing, and less community cohesion.
- $H5_0$ Changing work roles of subsistence harvesters (e.g., from commercial fisherman to platform worker) will increase participation in subsistence activities by other members of the community leading to increased subsistence harvests, increased subsistence food sharing, and increased community cohesion.

It is clear that the loss of even a single key harvester in a community could have cascading negative consequences to the households who rely upon that individual. On the other hand, key harvesters are keenly aware of their importance within and beyond their own households, and would be unlikely to abandon these responsibilities. It is unlikely that subsistence harvests will

simply increase if key harvesters take jobs in the oil and gas industry, since wealth (boats) is still required to increase harvests. But it is also clear that those who are the top producers today are likely to stay in that position. Those who today do not produce surplus subsistence foods are unlikely to do so in the future even if it was needed by the community.

- $H6_1$ The increased wealth produced by increased development and economic expansion in the region will change sharing networks from subsistence/commercially harvested foods to goods and products imported from Anchorage and elsewhere.
- $H6_0$ The increased wealth produced by increased development and economic expansion in the region enhance sharing networks by the addition of goods and products imported from Anchorage and elsewhere to the subsistence/ commercially harvested foods already harvested.

Again, because commercial fishing wealth is a crucial factor in subsistence harvesting and sharing, this certainly appears to include other items as well. People already incorporate friends and relatives in Anchorage and beyond into their sharing networks, and these networks involve a flow of subsistence/commercially harvested foods out, and range of other goods and products unavailable in the villages back in. Wealth will support subsistence and commercial activities, not replace them, at least for those who translate their wealth into the commercial fishing enterprise.

- $H7_1$ An influx of resident industry employees with subsistence access would strain local resources and local access, leading to a breakdown in local subsistence activities, sharing networks, and traditional culture.
- $H7_0$ An influx of industry employees will not affect subsistence access because of the transitory nature of their residence.

Nelson Lagoon is already stressed because of the increase in sport hunting/guiding operations in the region. An influx of resident employees could gain subsistence harvesting rights in a short time and further stress the region's resources. They have also benefited from operating their own the sport outfits in their community. Port Heiden shares this stress over sport operations, seeing a decline in their moose and having to move onto bear harvests. They receive moose meat from trophy hunters on occasion, but are now ordering large amounts of beef.

Industry employees gaining residency and subsistence rights would present problems for their already stressed resources. It is not possible to speculate on the nature of the industry employees resident patterns, but it seems clear that a sudden increase in residents to the communities would stress local services and resources. New residents, and even visitors, to villages are easily incorporated into sharing networks, but a sudden increase would likely produce negative effects. False Pass is actively recruiting new residents to boost their population, and would support an increase in residents, although they do not have the housing available. Akutan and Nelson Lagoon do not have additional housing to support residents. Port Heiden has recently constructed many new homes and an entire subdivision to accommodate an influx of people moving in for the environmental cleanup work. This influx of people, primarily friends and relatives from other Bristol Bay communities, has been positive for the village.

FURTHER OBSERVATIONS (FROM APPENDICES 1 AND 2)

The geographic data described in Appendix 1, which we refer to in the context of Traditional Ecological Geographies (TEG), provides critical insights. Those with the commercial fishing boats and permits have the largest subsistence ranges and harvest the greatest number of species. Those without permits and boats tend to harvest in the immediate vicinity of the village and harvest a fewer number of species. This finding highlights the importance of commercial fishing access to the subsistence enterprise.

Two areas of investigation that have not been described so far is the role of kinship and marriage in these transaction networks, and the return investment for being a top provider. In Appendix 2 we showed these to be closely related. When we measured the genetic distance between every two individuals in the entire survey, we found that this had no influence on the redistribution of subsistence goods and it was subsequently not included in this report. In fact, because this is a bilateral kinship system, with recognition of both sides of the family, it was immediately found that blood relations and marriage relation carry equal weight. We further found that while, in the smaller two and three node networks, individuals were often related in some way, in the larger networks we found little evidence that either blood or marriage relations were dominant; about half of the connections were related, and half were not – approximately what one would expect from a village as a whole.

This ties in closely to the Return Index (RI), which is our measure of return on investment when one gives food away, which was also elaborated on in Appendix 2. All anthropological investigations of gifting, redistribution, and exchange have made the case that one is more likely to participate in a negative exchange with a relative than a non-relative. That is, one is more likely to give salmon to an uncle, and expect nothing in return, than one would with someone who was completely unrelated. Our Return Index (RI) data show clearly that providers are giving away much more than they are getting in return. If this is not kinship, then what is it? The clearest explanation is prestige and status. Those individuals regularly named in the survey as having a positive role on community life are most often the key providers resulting in community and regional recognition.

One of the key findings of the network analyses was that income played no significant role in whether or not one was a provider of subsistence goods. Rather, ownership of a commercial fishing permit and boat was the dominant factor in redistribution.

SUMMARY

Summarized findings from the North Aleutian Basin study area, as documented in this report and Appendices 1 and 2 include:

- The Aleut (Unangan) and Alutiiq people of the North Aleutian Basin region share a similar lifestyle and culture based around subsistence and commercial harvesting of wild resources. This lifestyle is also shared with non-Native residents in these communities.

- North Aleutian Basin study community residents harvest a range of wild terrestrial and marine species in the immediate vicinity of their villages. Those with access to commercial fishing boats have an expanded range, which is still limited by the range of the fishing grounds.
- Each community has unique challenges in maintaining access to subsistence resources.
- Each community has relatively recent establishment dates and histories, having been created in the past two centuries from consolidation of shrinking villages located nearby. Fisheries and educational opportunities are primarily responsible for this shift.
- The majority of leaders in the four study communities support oil and gas exploration and development, while the views of the village populaces are mixed.
- The volatility of commercial fishing corresponds to a volatility of support for non-fishing economic development.
- Subsistence research in this region has largely constituted a number of single-year community surveys and directed studies of particular species conducted by state, federal, independent, and Alaska Native organizations.
- The commercial fishing monetary economy both contributes to the ability to subsistence harvest and is also a pursuit in and of itself. In many cases involving fishing, commercial and subsistence harvesting practices are blurred.
- Salmon are keystone species for False Pass, Port Heiden and Nelson Lagoon. Caribou and geese are keystone species for Nelson Lagoon and Port Heiden. Seals, salmon and shellfish are key species for Akutan. Several keystone species have been closed to harvesting due to population concerns for the past several years.
- Increases in non-local harvesters through guided hunts, tourism, or as commercial fishermen is a growing concern for the Alaska Peninsula communities. Oil industry workers would exacerbate these concerns.
- Sharing of wild species is a frequent and universal practice across all four communities.
- Harvest methods are modern and efficient, and generally involve commercial fishing gear, skiffs, all-terrain vehicles, nets and guns.
- Wild species are harvested in their season of availability and may be influenced by processing capabilities, other economic pursuits, and state and federal regulations.
- Various agencies monitor the harvests of particular species such as migratory birds, halibut, harbor seals and sea lions. These often rely on voluntary reporting which underestimates harvests.
- Social networks are structured around a few key providers. For nearly all species, these providers have direct access to the commercial fishing industry; especially needed is a boat.
- 98 percent of all individuals identified in the surveys can be connected in one massive network.
- The most durable and resilient networks appear to be those focused on what might be considered traditional species. Networks involving less traditional taxa, such as crab or cattle, are more vulnerable to the loss of the provider.
- Income is not a predictor of subsistence provision, but boat ownership is. This means that a sudden influx of new wealth will not translate into more subsistence, unless that wealth is converted to commercial permits and boats.

- The Return Index (RI) for providers of subsistence goods and receivers of subsistence goods indicates, across every category of resource, that the providers give away significantly more than they get back, at least in relation to foods.
- Concerns over the Pebble Mine project in Bristol Bay influence people's opinions of the North Aleutian Basin potential oil and gas exploration and development.

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NORTH ALEUTIAN BASIN SPECIES

Commonly used subsistence and commercial species from the southern Bering Sea region and local terms for key foods used today.

Terrestrial Mammals	***Marine Mammals***
Caribou (*Rangifer tarandus*) Domestic cow, feral (*Bos taurus)* Porcupine (*Erethizon dorsatum)* Red fox (*Vulpes vulpes)* Brown bear (*Ursus arctos)* Moose (*Alces alces*)	Harbor seal (*Phoca vitulina)* Harp seal (*Pagophilus groenlandicus)* Northern fur seal (*Callorhinus ursinus)* Steller sea lion (*Eumetopias jubatus)* California sea lion (*Zalophus californicus)* Sea otter (*Enhydra lutris)* Whale (multiple species)
Fish	***Marine Invertebrates***
King salmon (*Oncorhynchus tshawytscha)* Sockeye salmon (*Oncorhynchus nerka)* Chum salmon (*Oncorhynchus keta)* Pink salmon (*Oncorhynchus gorbuscha)* Coho salmon (*Oncorhynchus kisutch)* Pacific herring (*Clupea harengus*) Dolly varden (*Salvelinus malma)* Pacific cod (*Gadus macrocephalus)* Black cod (*Anoplopoma fimbria)* Pacific halibut (*Hippoglossus stenolepis)* Red rockfish (*Sebastes alutus)* Walleye pollock (*Theragra chalcogramma)*	King crab (*Paralithoides camtschatica)* Tanner crab (*Chionoecetes bairdi*) Snow crab (*Chionoecetes opilio)* Butter clam (*Saxidomus gigantean)* Pacific littleneck clams (*Protothaca staminea)* Razor clam (*Siliqua patula)* Octopus (*Octopus dolfleini)* Black katy chitons (*Katharina tunicata)* Mussels (*Mytilus edulis)* Snails (*Fusitriton oregonensis)* Sea urchin (*Strongylocentrotus droebachiensis)*
Waterfowl and eggs	***Plants/Berries***
Canada goose (*Branta canadensis)* Brant (*Branta bernicla)* Emperor goose (*Philacte canagica)* Pintail (*Anas acuta)* Mallard (*Anas platyrhyncos)* Harlequin (*Histrionicus histrionicus*) Goldeneye (*Bucephala clangula)* Willow ptarmigan (*Lagopus lagopus)* Seagull eggs (*Sternidae)* Arctic tern eggs (*Sterna paradisaea*)	Salmonberries (*Rubus chamaemorus)* Cranberries (*Vaccinium uliginosum)* Mossberries (*Empetrum nigrum)* Blueberries (*Vaccinium uliginosum)* Wine berries (*Cornus suecica)* Petrushki (*Ligusticum hultenii)* Pushki (*Heracleum lanatum)*

Food	Russian term	Aleut and Alutiiq term
Wild parsley	*Petrushki*	
Cow parsnip	*Pushki*	
Whale meat		*Ulla*
Half-dried salmon		*Ukela*
Black katy chiton		*Bidarki*
Chum heads (eaten raw)		*Chumela*
Seal oil		*Chadu*
Easter bread	*Kulich*	
Tundra/Labrador Tea		*Caa'uq*
Fur seal pups		*Alakuduk*
Eskimo ice cream		*Agutaq*
Alaska spinach		*Qurrkiq*
Aleut ice cream		*Tagao*

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the sound use of our land and water resources, protecting our fish, wildlife and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island communities.

The Bureau of Ocean Energy Management

The Bureau of Ocean Energy Management (BOEM) works to manage the exploration and development of the nation's offshore resources in a way that appropriately balances economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development and environmental reviews and studies.

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