Technical Report

For

BEST-BSIERP Bering Sea Project
Subsistence Harvest Monitoring and Local and Traditional Knowledge
St. Paul Island, Alaska

Prepared by

Aleut Community of St. Paul Island, Alaska
Tribal Government
Ecosystem Conservation Office

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Subsistence Harvest Monitoring Results from 1999 to 2010 and Local and Traditional Knowledge Interview Results for St. Paul Island, Alaska

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INTRODUCTION

HISTORY AND CULTURE

The ancestors of the Unangan (Aleut) people of the Pribilof Islands (St. Paul and St. George Islands) were almost entirely dependent on sea mammals for their food, clothing and fuel. Unangan were skillful sea mammal hunters and navigators of the sea, traveling the waters of the Aleutian Islands in their highly maneuverable and efficient kayaks (iqyax). Unangan were conservative with their resources from the land and sea, and respected the natural reproductive cycles of the animal populations (Torrey 1978).

The Pribilof Islands were uninhabited until 1787 when Gerrassium Pribylov brought 137 Unangan hunters to the islands to harvest northern fur seal pelts, a lucrative source of income for the Russian government. The Aleut settlers followed their traditional subsistence diets, based on hunting marine mammals such as sea lion and fur seals and gathering native roots and berries. They periodically supplemented this diet with Russian food supplies brought in by ships. After the Pribilof Islands passed into American hands with the purchase of Alaska by the U.S. government, the Aleuts became "wards of the government" paid in store credit. The government shipped in cheap, inferior canned goods which arrived every few months and "allowed" hunting and fishing once a week to supplement the inadequate meager allotment of canned goods. The federal government began a slow withdrawal from the islands, completed in the 1980's.

ENVIRONMENT AND GEOGRAPHY

St. Paul Island is the largest of the Pribilof Islands, a five-island archipelago in the central Bering Sea. It is located between latitude 57°06' and 57°15' north and longitude 170°05' and 170°25' west, approximately 800 miles southwest of Anchorage and 300 miles northwest of Unalaska in the Aleutian Chain (see Figure 1). The most obvious physical characteristics of the Pribilof Islands are their isolated, remote location, and harsh climate. St. Paul Island is less than 14 miles long and 8 miles wide and is covered with rolling hills, numerous cinder cones, and vast areas of sand dunes and beaches. Typical weather of these treeless, windswept islands is fog and wind. Temperatures usually range from 37°F to 51°F in summer and 19°F to 36°F during winter (Alaska Geographic Society 1982). The village is concentrated in the City of St. Paul at the island's southern peninsula (see Figure 2). St. Paul Island supports astonishingly high concentrations of marine mammals, seabirds, fish, and invertebrates.

ECONOMY

St. Paul's population of 479 is 87 percent Aleut (Alaska Native) and 13 percent non-Aleut (2010 census data). The community had a history of economic distress prior to the current national economic crisis. The U.S. Census, 2006-2010 American Community Survey indicates that the income of 17.7 percent of the residents in St. Paul is below the poverty level. The Alaska Department of Labor and Workforce Development estimates that 71 percent of the potential workforce was employed in 2009, and 61 percent of these workers were employed in all four quarters. The 2010 population of 479 is a loss of 53 residents since the 2000 census. These estimates support the community's experience of a steady outmigration of community members, partly due to the slender job opportunities on the island. The Alaska Department of Labor's

estimate of 61 percent of residents working all four quarters would be much lower without the loss of these community members.

PROJECT DESCRIPTION

The Bering Sea Integrated Ecosystem Research Project (BSIERP) was a five-year project seeking to understand how climate change is affecting the Bering Sea and the people who live on its shores and depend on its resources (http://bsierp.nprb.org/). The Local and Traditional Knowledge (LTK) component of BSIERP involved residents in five Bering Sea communities: Akutan, Emmonak, St. Paul, Savoonga, and Togiak. In each community, the effects of climate change are being experienced first hand, and traditional knowledge about these changes was gathered through harvest surveys and monitoring, and through interviews with hunters, fishers, youth, and elders. This report contains the subsistence harvest monitoring results for northern fur seal, Steller sea lion and reindeer, and the LTK interview results for St. Paul.

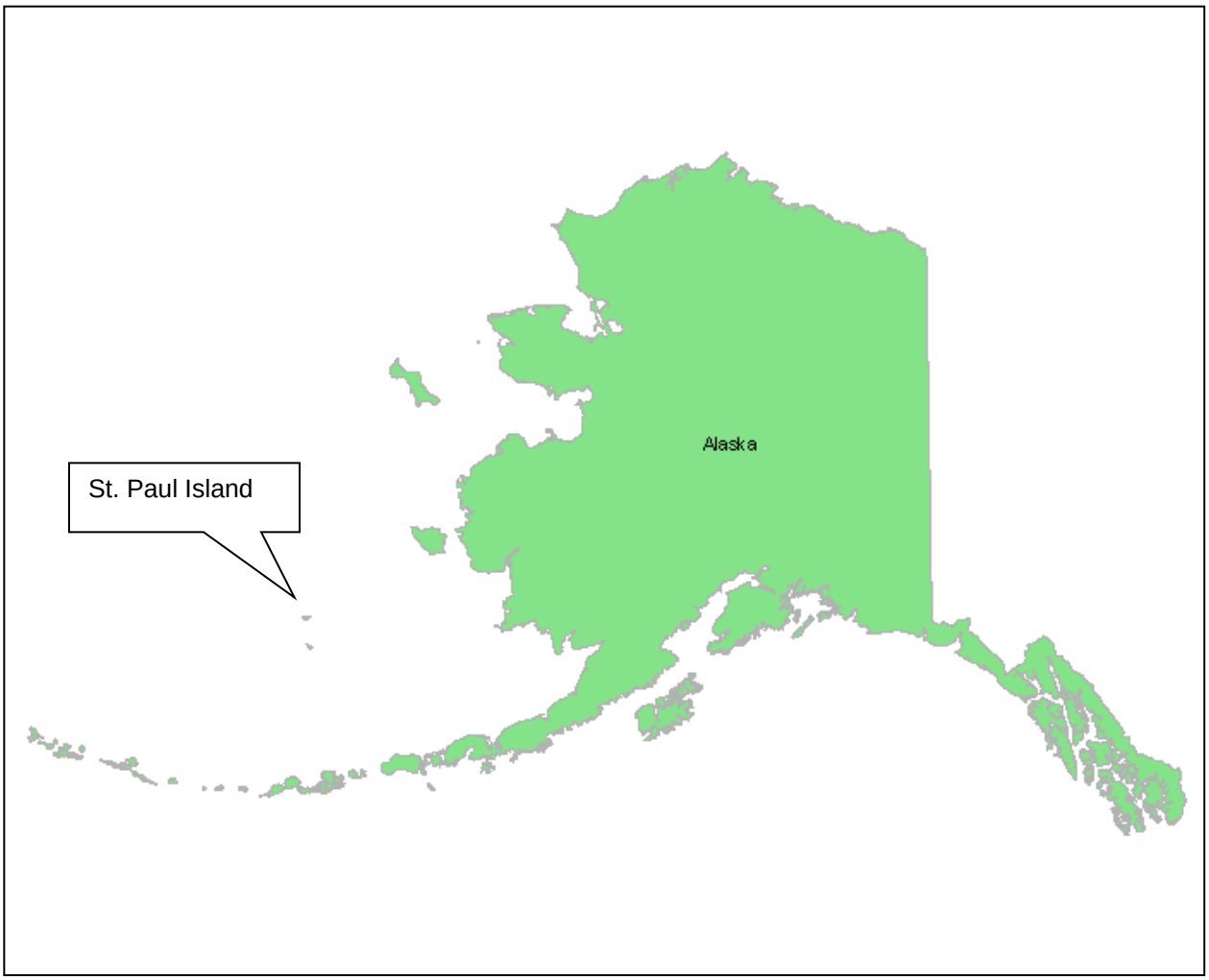

Figure 1 - Location of St. Paul Island, Alaska.

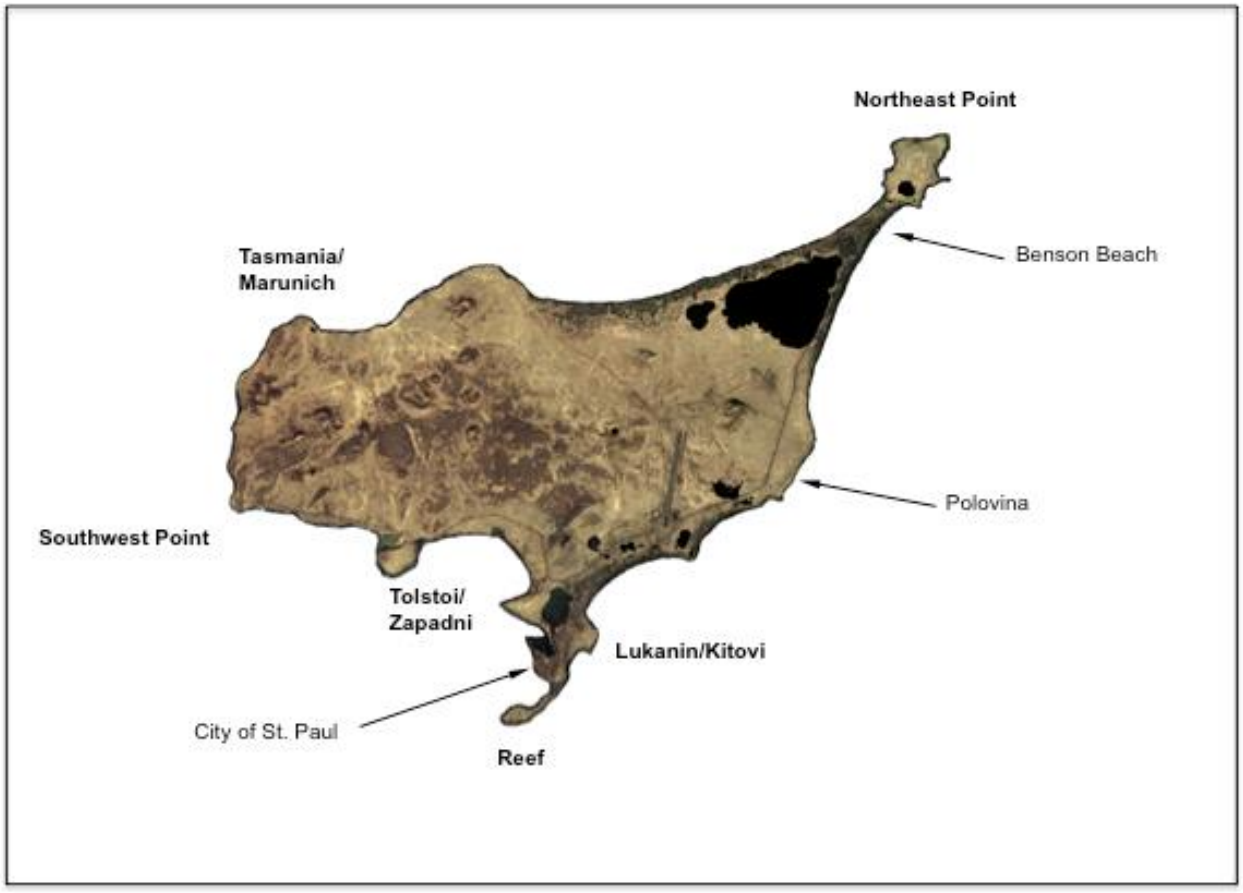

Figure 2 - St. Paul Island and the location of the City of St. Paul and major hunting regions.

METHODS

SUBSISTENCE HARVEST MONITORING

The real-time harvest monitoring method established by the Ecosystem Conservation Office (ECO) under its Tanam Amgignaa (Island Sentinel) Program allows for the collection of local harvest data within a 12 to 48 hour period through the establishment of a multitude of communication methods ranging from voluntary participation/reporting to required reporting of local harvests via a tribal ordinance, to active and persistent communication with hunters, fishermen, and gatherers by ECO staff. Data collected in the field is entered into the Island Sentinel Database. With the data collected using the real-time harvest monitoring method we can analyze levels and spatial and seasonal trends in harvest rates seasonally, annually or between years.

Northern Fur Seal

The subsistence harvest of northern fur seals on the Pribilof Islands, Alaska is ruled by regulations (50 CFR 216.71-.74) established under the Fur Seal Act and Marine Mammal Protection Act. The regulations impose a number of restrictions on the harvest of fur seals and were developed to transition from a commercial harvest to a subsistence harvest. The subsistence harvest for northern fur seal meat began in 1984 when the commercial harvest for seal pelts ceased. Only subadult male fur seals (2-4 years old) are killed for food during the subsistence harvest season. The harvest has occurred annually since 1984 and fur seal meat continues to be an important traditional food for Unangan of St. Paul Island.

The fur seal harvest is a well-established activity, implemented similarly to the commercial harvest for pelts only on a smaller scale in order to meet the community's needs. In recent years harvests have been scheduled to occur on a weekly basis during the 23 June to 08 August season, and daily near the end of the season. The Aleut Community of St. Paul Island Tribal Government receives requests for seal meat prior to a scheduled harvest and works with the harvest foreman and volunteer sealers to fulfill the community's subsistence needs. The subsistence harvest method involves organized herding of subadult male northern fur seals. Male fur seals are gathered by driving them from their haulout areas to a specific killing field where they are held in a large group. Five to ten seals are then cut from this large group and driven to a group of three to four men who stun the seals by hitting them on the skull or upper neck with a solid wooden club. The seals are dragged a short distance away from the killing area where the chest and heart are cut open. The seals are then skinned and butchered for human consumption. Harvest regulations require the National Marine Fisheries Service (NMFS) to publish a summary of the harvests every three years and a discussion on the number of seals expected to be harvested annually over the next three years to satisfy the subsistence requirements of St. Paul. Since 1999 the yearly harvest estimated range (i.e. quota) has been 1,645 to 2,000 fur seals. If the community reaches the lower limit of this range and still has unmet subsistence needs, the Tribal Government of St. Paul Island may request from NMFS to harvest more fur seals up to the upper limit of this range.

To safeguard the existence of the northern fur seal and Steller sea lion, the Aleut Community of St. Paul Island and NMFS entered into a co-management agreement in June 2000, and have since

been working together to establish a process of shared local responsibilities regarding the management and research of fur seals and sea lions.

Since 2001 the ECO Director/Manager and Tanam Amgignaan (Island Sentinels) have monitored and performed the humane observer functions for the subsistence fur seal harvest, and have compiled and prepared harvest summary reports for NMFS – an important element of the co-management agreement. ECO monitors and records the number of fur seals harvested and the sex and age class of harvested fur seals. This report includes fur seal subsistence harvest monitoring results for 1999 to 2010.

Steller Sea Lion

Steller sea lion hunting occurs predominantly during two time periods: 1) September through December and 2) January through May. Northern fur seal rookeries are closed to unauthorized access (including Steller sea lion hunting) from June 1st to October 15th each year to reduce disturbance to northern fur seals (50 CFR 216, subpart G, Pribilof Islands Administration). Rookery access to one traditional sea lion hunting area, Sea Lion Neck, begins on September 1st after most of the fur seals have vacated the area. Some hunting may occur during June through August in areas of the island that are not inhabited by fur seals.

On St. Paul Island, sea lion hunting is primarily a land-based activity. Sea lions are hunted either while they are in the water or on land using high-powered rifles ranging from 22-250 to 300 caliber fired from traditional hunting blinds or other vantage points. On St. Paul Island, sea lions usually haul out during the summer and fall months. The primary areas for sea lions to haul out are at Northeast Point and on Sea Lion Rock off of Reef Point. However, sea lions do haul out at other locations around the island including but not limited to Polovina, Kitovi, Lukanin, Tolstoi, Zapadni, and Southwest Point (see Figure 2).

The data used to estimate the sea lion harvest on St. Paul Island is gathered through a combination of voluntary hunter participation, reporting requirements, and active communication with hunters by the ECO staff. In the fall of 2000, the ECO required all hunters to report all harvested and struck and lost sea lions within 24 hours. During the 2004 season, hunters were asked to report to the ECO or a staff member within 24 hours and to provide additional information about the date and location of the harvest and the sex and estimated age of the harvested animal, if known. The Tanam Amgignaan actively communicate with hunters on a regular basis during the hunting season and remind hunters to report successful harvests and struck and lost sea lions. The Tanam Amgignaan are able to collect both harvest data and biological samples from retrieved sea lions directly from hunters immediately following the butchering process. This report includes sea lion subsistence hunting monitoring results for 1999 to 2010.

Reindeer

In 1911 twenty-five reindeer were introduced to St. Paul Island from Unalakleet. By 1938 this herd grew to a peak population of more than 2,000 reindeer, three times the carrying capacity of the island (Scheffer 1951). By 1950 the herd was reduced to eight animals. The herd then grew to a stable population of 600 reindeer by 1992 (Swanson and Barker 1992). In 2000 ECO made

a concerted effort to monitor and obtain an accurate count on the reindeer herd. Yearly counts were made until 2007. Herd counts from 2008 to 2010 are estimates reported by hunters during the hunting season.

Reindeer population monitoring is essential to prevent overgrazing of lichen and other forage plants. Swanson and Barker (1992) recommend that in the absence of a grazing management system, the population on St. Paul Island should be reduced. The Tanadgusix Corporation owns the reindeer herd and ECO manages the hunting of reindeer in an effort to keep the herd size at an optimal level.

The hunting season for reindeer on St. Paul Island is open from July to March and closed during calving season. Hunters use firearms that range from 223-300 caliber, and the ammunition is usually 5.56 mm projectile. While most hunters walk to find the reindeer, others choose to use an all-terrain vehicle. In the winter there is the possibility to use a snow machine. Reindeer hunting includes locating the herd on the island or at least having an idea of the general area that they are in. Then there is the hunting and removing of the reindeer. After getting the hunted reindeer to town, the hunter will flesh the reindeer then hang to cure the meat. After the curing process the hunter will then cut and separate the meat for food.

The data used to estimate the subsistence and sport hunting of reindeer on St. Paul Island from 1996 to 2009 was gathered through use of a mandatory regulated permit system. Sport hunting is by visitors to St. Paul Island and requires the visitor to pay ECO a fee before receiving a hunting permit. The permit system has been adapted over the years to include additional information about the hunting activity. In the fall of 2000, ECO required all hunters to report every harvested reindeer within 24 hours. During the 2004 season, hunters were asked to report to ECO or a staff member within 24 hours and to provide additional information about the date and location of the harvest and the sex and estimated age of the harvested animal, if known. The combination of the self-reporting requirement, field monitoring, and communication with hunters led to 100 percent reporting of reindeer harvested on St. Paul Island since 2000. This report includes reindeer subsistence and sport hunting monitoring results for 1996 to 2010.

LOCAL AND TRADITIONAL KNOWLEDGE

ECO sought community involvement in the LTK component of BSIERP through participation on a Community Advisory Board (CAB). ECO identified 16 residents as potential CAB members who represent the St. Paul community, such as youth, elders, hunters, fisherman, and users of subsistence foods. These community members were sent a letter of invitation describing the CAB's role and involvement in the project. The role of the CAB was: 1) to assist with the planning and design of the tools to document, characterize, and quantify local harvest practices and changes thereto, 2) to assist with the planning and design of the tools document and characterize local understanding of the Bering Sea ecosystem structure and function to allow comparison with biological understanding and sharing of knowledge between both ways of knowing, 3) to assist with coordinating LTK activities with other BSIERP and BEST research for maximum mutual benefit through exchange of information and collaborative analysis and interpretation, 4) to assist with providing support for community research activities by connecting community researchers with one another, by helping the community find other

expertise and information they seek, and 5) to identify the need for additional research activities and funding, and to determine how to seek such funding and create additional activities.

Out of the 16 community members identified, four CAB members were recruited (an elder, a fisherman, a hunter, and a youth). The CAB held three meetings during which the LTK interview topics were developed. ECO and the CAB identified interview questions from various sources such as the Pribilof Islands Collaborative, an Ecotrust socioeconomic survey, and from a marine mammal researcher, to name a few. ECO staff developed the interview form made up of 408 questions. ECO and the CAB identified 33 potential interviewees to cover a range of social groups (elders, fishers, hunters, young adults, and youth) in St. Paul. The LTK project assistant (and interviewer) contacted these people, of which 11 agreed to participate. The participants were interviewed in St. Paul in 2009. Interview sessions were held at the Tribal Government office or in the interviewee's personal home, and either audio or video recorded. Interview questions covered the following topics: 1) Demographics, 2) Customary Traditional Practices, 3) Commercial Fisheries, 4) Environmental Quality, 5) Seasonal Cycles, 6) Northern Fur Seals, 7) Other Marine Mammals, 8) Black-Legged Kittiwakes, 9) Thick-Billed Murres, 10) Other Birds, 11) Halibut, 12) Crab, 13) Other Fish, 14) Ocean Conditions, 15) Environmental-Weather Conditions, 16) Sea Ice Conditions, 17) Education and Outreach, and 18) General Human Impacts (see Appendix I for interview form). Out of the 408 interview questions, 165 questions provided yes or no answers that were entered into an Excel spreadsheet and coded. Percentages of these answers were calculated for each question, and figures were created in Excel. This report includes the LTK interview results for St. Paul Island.

RESULTS

SUBSISTENCE HARVEST MONITORING

Northern Fur Seal

A total of 109 subsistence fur seal harvest events were conducted from 1999 to 2010 on St. Paul Island with a total of 6,142 subadult males harvested. Fur seals accidentally struck and killed during this time period include a total of seven adult males and 15 females, and a total of 15 fur seals (unidentified age classes) that died from hyperthermia (see Table 1). The meat from subadult male fur seals that died from hyperthermia during the harvest was usually taken for consumption, and the carcasses from the adult males and females were necropsied by a veterinarian. The demand for fur seal meat has declined steadily during this time period and has remained at around 300 animals harvested each year from 2008 to present (see Figure 3).

Steller Sea Lion

A total of 287 Steller sea lions were taken by hunters on St. Paul Island from 1999 to 2010, with 188 sea lions retrieved and 99 reported as struck and lost. During this time period the total annual takes of Steller sea lion has ranged from 16 to 36 sea lions with an average of 24 sea lions taken annually (see Table 2 and Figure 4).

Seasonal Takes

From 1999 to 2010, Steller sea lion hunting occurred during the spring (April - June), summer (July - September), fall (October - December), and winter (January - March) seasons. The majority of sea lion takes occurred during winter (103 takes) and fall (89 takes), followed by the spring (68 takes) and summer (27 takes) seasons (see Table 3). The number of struck and lost sea lions during this time period is highest in winter and spring (see Figure 5).

Regional Takes

Steller sea lion takes occurred at eight known regions and one unknown region on St. Paul Island from 1999 to 2010. Majority of the takes were from the Northeast Point and Reef regions, with 168 sea lions taken from Northeast Point and 80 taken from Reef (see Table 4).

Reindeer

Population Monitoring

The reindeer population decreased dramatically from 1999 to 2000. In June 2000 ECO counted approximately 370 reindeer. The herd then remained at a population level between 300 and 400 reindeer until 2004. The reindeer population then grew to a population of 700 reindeer by 2008, and then declined rapidly to 500 reindeer by 2010 (see Figure 6).

Harvest Monitoring

From 1996 to 2010 ECO issued 756 hunting permits of which 542 resulted in a successful hunt (see Table 5).

Age Class and Sex

A total of 542 reindeer were taken on St. Paul Island from 1996 to 2010, with age classes consisting of newborns, fawns, juveniles, and adults. Adult and juvenile reindeer were the preferred age classes, with 224 adult and 182 juvenile reindeer taken. Of the 542 reindeer taken 272 were male, 257 were female, and 13 were of unknown sex (see Table 6).

Seasonal Distribution

From 1996 to 2010 reindeer hunting occurred during the fall (October-December), winter (January-March), spring (April-June), and summer (July-September) seasons. Hunting occurred predominantly during the winter, summer, and fall seasons. A total of 188 reindeer were taken in the winter, 184 were taken in summer, and 149 reindeer were taken in the fall. Only 14 reindeer were taken in spring (hunting is closed for most of the spring season when reindeer are calving), and seven reindeer were taken during unknown seasons.

LOCAL AND TRADITIONAL KNOWLEDGE

Both qualitative and quantitative data were collected from the LTK interview questions. Spatial data was collected for the animals included in this survey, and maps of locations for these animals will be digitized in the future pending funding availability. Out of the 165 interview questions that provided yes or no answers, interviewees provided answers to 160 of the questions. This report summarizes the results for all 18 topics covered during the interview sessions.

Demographics

All 11 interviewees were St. Paul Island residents with the number of years living in St. Paul ranging from 15 to 63 years. Seven males and four females were interviewed, covering the age groups 13-17 years old, 18-29 years old, 40-49 years old, and 60-69 years old. Ten of the interviewees were Unangan (Aleut). Less than half (36 percent) of the interviewees were employed full-time. Most households (63 percent) had five or more people residing in the household, and the gross household income in 2009 for these households ranged from less than $20,000 (29 percent), to $40,000 to $59,000 (29 percent), to more than $100,000 (29 percent), and not applicable (14 percent). All four of the interviewees who held full-time jobs either had some college education, or an Associate's degree, or a Bachelor's degree (see Table 7).

Customary Traditional Practices

All interviewees said they consume traditional foods in the course of a year, with up to 60 percent of their overall consumption coming from traditional foods (see Figure 7). When asked the primary reasons they consume traditional foods, the predominant answer (73 percent) was that it tastes good. The interviewees who participate in traditional food activities (harvesting, hunting, and/or gathering) share their harvests with others, both on and off island. Even if they harvest or hunt themselves, more than half (64 percent) of the interviewees said they also receive subsistence food from others. Over half (55 percent) of the interviewees stated that they look at the fat, stomach contents, flesh, and skin of the animals they harvest, hunt and/or gather to assess the health status of the animal before consumption.

Commercial Fisheries

Seven of the interviewees (63 percent) were or used to be a commercial fisherman or woman. Three interviewees were currently commercial fishermen and viewed the commercial fishing opportunities around the island as either getting better (67 percent) or getting worse (33 percent). The four interviewees that used to commercial fish viewed the commercial fishing opportunities around the island as staying the same (50 percent) or getting worse (50 percent). Some of the interviewees that evaluated commercial fishing opportunities as getting worse said that the fish stocks (halibut) are declining and that fish are moving further away from island (making them inaccessible to St. Paul fishermen). When interviewees were asked to rate the current economic stability of St. Paul, 45 percent said it's stable while 36 percent said it's not stable, and the remaining interviewees did not answer the question. When asked about how the economic stability is changing over time, most thought it was staying the same or getting better (45 percent), while others thought it was getting worse (27 percent), and the rest either did not answer the question or answered not applicable (27 percent). Some of the interviewees that evaluated how the economic stability is changing over time as getting worse said that the fisheries and (everything) is starting to drop. Majority of the interviewees did not provide follow up information as to why they evaluated the above as they did.

Environmental Quality

All of the interviewees answered all of the questions pertaining to the environmental quality of St. Paul Island and surrounding waters. Environmental quality was not defined in any way. The majority of the interviewees rated the environmental quality of St. Paul Island and surrounding waters as very good (see Figure 8). Most seem to think the environmental quality is staying the same (64 percent), while others think it's getting worse (27 percent), and one person thinks it's getting better (9 percent). Seventy-three percent of interviewees participate to some degree in some type of environmental stewardship activity, such as collecting marine debris and recycling on the island. Majority of the interviewees (81 percent) believe that the well being of our community/tribe/family is linked in some way to the well being of our environment.

Seasonal Cycles

When asked if they can explain the different seasons (spring, summer, fall, and winter) on the island, most of the interviewees (64 percent) said that they could. When asked what marks changes of the seasons, the majority of the interviewees referred to wind, temperature, color of the grass, frost, and water color, while on interviewee stated that winter is good for hunting and summer is good for fishing. They were then asked if they think the seasons have stayed the same or are different from the past. Eighty-six percent think the seasons have stayed the same, and 14 percent think they are different from the past. Some responses to describe the differences include:

"Winters are colder/summer kinda getting warmer".
"Seen one winter 7-8 feet (of snow) until June, now it's unpredictable".
"Used to be colder earlier had a lot of snow, don't have snow like we used to, ice has been coming around, for four years no ice at all".
"In the winter took longer for the snow to melt, more snow".
"Seemed like had longer winters, from November to end of May".

"The temperature of the water is changing, seems it's getting colder and hotter in different seasons".

Northern Fur Seals

Note: One person did not answer any of the questions on this topic.
All (10) interviewees answered yes to having seen fur seals on land or in the water, of which 70 percent said yes to noticing differences over time in how many fur seals there are, while 20 percent said no, and 10 percent did not answer the question. The common answer for differences noticed is that fur seals are declining (71 percent reported a decline). Most of the interviewees have also seen young fur seals (90 percent), of which 78 percent said yes to noticing differences over time in how many young fur seals there are on land or in the water, while 22 percent said no. The common answer for differences noticed is that there are less young fur seals (71 percent reported a decline). Of the ten respondents who have seen fur seals, 40 percent said yes to noticing differences over time in the abundance or distribution of fur seals at sea, 40 percent said no, and 20 percent did not answer the question. Of the 40 percent who said yes, all of them think that changes in the abundance or distribution of fur seals at sea coincide with other changes they have noticed in the ocean or environmental conditions, other marine mammals, birds, or fish. Two respondents reported that changes include declines in birds and fish populations. Five respondents have seen fur seals eating or foraging, while the other five have not. Of the five who have seen fur seals eating or foraging, 80 percent said no to noticing differences over the years of what fur seals are eating, and 20 percent did not answer the question. When asked about predation of fur seals, 70 percent have observed a fur seal being killed or eaten by another animal, which in most cases was usually by killer whales. Fifty percent have noticed fur seals being disturbed by human activity, 40 percent have not, while 10 percent did not answer the question. Some interviewees expressed concern for fisheries impacting the fur seal decline. Some responses in regard to fur seals include:

"Declining not from climate, change mostly from fisheries".
"Overfishing the Bering Sea, food impact".
"They (young fur seals) are starving, having a hard time getting the fish that is in the water".

Other Marine Mammals

Note: One person did not answer any of the questions on this topic.
Most of the interviewees (90 percent) have seen other marine mammals (Steller sea lion, harbor seal, killer whale and other types of whales, sea otter, and porpoise) either on land or in the water, and 56 percent have noticed differences over time in how many other marine mammals there are. Four respondents described the differences they have noticed in the abundance of other marine mammals. Three respondents have noticed less Steller sea lions, two have noticed more killer whales while two have noticed less killer whales, and two respondents have noticed less harbor seals. When asked if they have seen other young marine mammals only 30 percent said yes, while 40 percent said no, and 30 percent did not answer the question. Most interviewees (40 percent) did not answer the question when asked if they have seen other marine mammals eating or foraging, while 40 percent said yes, and 20 percent said no. When asked about predation of other marine mammals, 30 percent have seen other marine mammals being killed or eaten by other animals (Steller sea lions and killer whales), while 40 percent have not, and 30 percent did not answer the question. For disturbance of other marine mammals by human

activity, 30 percent said yes to having observed disturbance activities, 40 percent said no, and 30 percent did not answer the question. When asked if respondents had any other information, concerns or comments to offer in regard to other marine mammals, two respondents said:

"How much is the other fisheries impacting our subsistence? The fisheries throughout the world are killing off oceans and slowly moving their way to Bering Sea, the last place with a high abundance of fish and if we don't take action we will end up like the rest of the oceans."

"Killer whales relationship with fishermen, if there are things happening to prevent them from eating the fishermen's halibut."

Black-Legged Kittiwakes

Note: Five people did not answer any of the questions on this topic.
All (6) interviewees answered yes to having seen black-legged kittiwakes on the cliffs, in flight, or in the water. Of the six respondents who have seen black-legged kittiwakes, two have noticed differences over time in how many there are, while four have not. Of the two who have noticed differences, one respondent said that there seems to be less black-legged kittiwakes because of their food, while the other said there seems to be an increase in abundance, but then later stated that *"Maybe a decline in fish is the reason for the decline in black-legged kittiwake, or decline in the food"*. When asked if they have seen black-legged kittiwakes eating or foraging, 67 percent said yes and 33 percent did not answer the question. Most of the questions pertaining to black-legged kittiwakes had a low response rate.

Thick-Billed Murres

Note: Seven people did not answer any of the questions on this topic.
Most of the interviewees (75 percent) have seen thick-billed murres on or around the island, while one person has not (and therefore did not answer the rest of the questions). Of the three respondents who have seen thick-billed murres, one has noticed differences over time in how many there are, while one has not, and one did not answer the question. The respondent who has noticed a difference said the abundance is less because there is less food. The other questions on thick-billed murres had a low response rate.

Other Birds

Note: Six people did not answer any of the questions on this topic.
All (5) interviewees answered yes to having seen other birds (albatross, puffin, northern fulmar, cormorant, least auklet, parakeet auklet, and crested auklet) on or around St. Paul Island. Of the five people who have seen other birds, three have noticed differences over time in how many other birds there are, while one person has not, and one did not answer the question. Of the three respondents who have noticed differences in abundance, one said *"seem to be less auklets when there is supposed to be more"* and one respondent said, *"decrease in cliffs"*. One respondent has observed other birds in the marine environment, and said there are less birds at sea because there is less food. The other questions had a low response rate.

Halibut

Note: Three people did not answer any of the questions on this topic.

Most interviewees (88 percent) have observed halibut in the waters around the Pribilof Islands, while one person has not (and therefore did not answer the rest of the questions). Of the seven people who have observed halibut, all of them have noticed differences over time in the abundance or distribution of halibut. The common answers for changes noticed were less halibut, smaller halibut, halibut further from island, deeper in the ocean, and harder to find and catch than in the past. Some of the reasons for these differences in halibut abundance include depletion by the local commercial fleet and outside schooners, bycatch by trawlers and the cod longline fishery, and water temperature. One respondent said that the water temperature is *"too cold or too warm, one of the two"*. Of the seven respondents who said yes, four of them think that changes in the abundance or distribution of halibut coincide with other changes they have noticed in the ocean or environmental conditions, marine mammals, birds, or other fish, while one person said no, and two did not answer the question. The four respondents said the following to describe how changes in halibut coincide with other changes in the environment:

"It makes you wonder everything is linked together".

"Seems like it's either too cold or too warm and they (halibut) are traveling north".

"Ice conditions brought more fish".

"Waters have been colder since the last few years".

When asked if they know or have observed what halibut eat or know where they forage, 38 percent said yes, 25 percent said no, and 38 percent did not answer the question. Respondents listed the following prey for halibut: snow, king, hair and hermit crabs, Pollock, flounder, sculpin, octopus, squid, cod, mussel, rock fish, shrimp, shellfish, sea urchins, and small herring. When asked if they have seen halibut being killed or eaten other than by people 63 percent said yes, 25 percent said no, and 13 percent did not answer the question. Observed halibut predation events were mostly by killer whales (reported by three respondents) and Steller sea lions (reported by two respondents). Of the five people who have seen predation of halibut, two have noticed changes over the years in predation, two have not, and one person did not answer the question. The changes noticed by both respondents are an increase in predation by killer whales, due to an increase in the killer whale population. Most of the respondents (63 percent) have noticed halibut being disturbed by human activity, while 13 percent have not, and 25 percent did not answer the question. Three respondents have observed fishing as a human disturbance, while one observed *"trawling getting at the eggs and food that the halibut feed off"*, and one observed *"fish had garbage in stomach"*. A few interviewees expressed concern about the decline in halibut around the island and one person suggested closing the local commercial fishery for a few years to let the fishing grounds replenish, and one person suggested declaring the pinnacle off of Southwest Point as a nursery.

Crab

Note: Six people did not answer any of the questions on this topic.

Forty percent of respondents have not noticed changes over time in abundance or distribution of crab, and 60 percent did not answer the question. When asked if they have observed what crab eat, nine percent said yes, 18 percent said no, and 73 percent did not answer the question. The one respondent who said yes observed crab eat "bait". When asked if they have seen crab being killed or eaten other than by people, 27 percent said yes, while 73 percent did not answer the question. All three respondents have observed crab being eaten by halibut, and one respondent also mentioned cod. One respondent has noticed changes over the years in predation of crab, saying that halibut are eating more. The other questions had a low response rate.

Other Fish

Note: Six people did not answer any of the questions on this topic.
All (5) interviewees have observed other fish (arrowtooth flounder, black sea bass, wolf eel, sleeper sharks, cod, sculpin, sea sturgeon, rock fish, octopus) in the waters surrounding the Pribilof Islands while fishing. These five respondents all are or were a fisherman or woman. Of the five people who have observed other fish, two respondents have noticed changes over time in the abundance or distribution of other fish, two have not, and one person did not answer the question. Respondents said changes noticed in abundance or distribution of other fish were, *"they are moving in closer than before, moving in the shallows – because there is nothing to prey on them"* and *"there is less – because there is less seaweed"*. The other questions had a low response rate.

Ocean Conditions

Note: Three people did not answer any of the questions on this topic.
Seventy-one percent of interviewees have noticed differences in ocean conditions over time and 29 percent did not answer the question. Responses to describe the changes in ocean conditions and the reasons for the changes include:

- *"Seem like water temp is getting colder and taking long to warm, don't see jelly fish until mid-July – just the weather, the ice coming further south".*
- *"Getting higher tides, making more erosion, not able to ride where used to – winter storms, maybe global warming".*
- *"Seems to be higher tides, rougher storms – because of the melting of the ice pack".*
- *"Towards the camp house at Northeast Point roads are getting worse".*
- *"Seems like the waters are cold in the last five years or so – maybe longer winters".*
- *"The water temperatures are getting hotter and colder in different seasons – climate change".*

Of the people who have noticed changes, 80 percent think that these coincide with other changes they have noticed in the environmental or sea ice conditions, marine mammals, birds, or fish and 20 percent do not.

Environmental-Weather Conditions

Note: Five people did not answer any of the questions on this topic.
Sixty-seven percent of interviewees have noticed differences in the environment or weather conditions over time and 33 percent did not answer the question. Responses to describe the changes in environment or weather conditions and the reasons for the changes include:

- *"The weather is changing. Winter is colder and summers seem to be a little bit warming. Dock area is eroding (Village Cove) – Global warming. Erosion just happens".*
- *"Not as much solid ice around the island, less snow cover, feels colder".*
- *"Seems to be getting hotter and colder. It not the same as per say when younger – Climate change".*

Sea Ice Conditions

Note: Two people did not answer any of the questions on this topic.

Seventy-eight percent of interviewees have observed sea ice conditions around St. Paul Island and 22 percent did not answer the question. Of the people who have observed sea ice, 71 percent have noticed changes in sea ice conditions over time and 14 percent have not, and 14 percent did not answer the question. Responses to describe changes in sea ice conditions include:

"A couple years it didn't even come and now we have been getting it every year for a longer period of time and more ice also".

"Seems to be coming earlier and staying longer".

"Coming earlier".

"Some years it comes down and some years it doesn't".

Education and Outreach

Note: One person did not answer any of the questions on this topic.

The majority of the interviewees (90 percent) are interested in seeing additional research activities conducted for the species or topics covered in this survey, and 10 percent did not answer the question. Responses to important questions and on what species or topics included:

"See what's going on with all species".

"Northern fur seal – why are they declining?".

"Surveys done about the fisheries in the Bering Sea, etc. Is there more of one, less of another, who sets the amount for individual boats? Who approved trawlers?".

"Marine mammals and birds and fish, why are they declining?".

"More studies on the Bering Sea species".

"More research on seals and why their populations are declining. On the Pribilof Islands blue king crab".

Fifty percent of interviewees have ideas on how scientists can better reach out to the community with scientific information and 20 percent do not, and 30 percent did not answer the question. Ideas include: newsletter, one island committee about topics and getting feedback on what should be done, and to use a newsletter on update with the findings. One interviewee wanted to pass on the following additional information to scientists or younger generations, *"ongoing concerns about halibut and seals well-being"* and that this information should be passed on by *"going straight to our highest state of government, make the changes better for change"*.

General Human Impacts

Note: Three people did not answer any of the questions on this topic.

All (8) of the interviewees can describe the human impacts on or around St. Paul Island. Some descriptions of human impacts observed included: northern fur seal disturbance, marine debris, drums of oil, plastics, net, not being able to recycle everything, fishing, and noise from ATVs (wildlife disturbance). Twenty-five percent think that there are human impacts we cannot control and 63 percent do not, and 13 percent did not answer the question. The two responses given for human impacts we cannot control are: fishing and sea level rise.

Table 1 - Number of northern fur seals harvested, accidentally killed, and that died from hyperthermia during the subsistence harvest on St. Paul Island, Alaska from 1999 to 2010.

Year	Subadult Males Harvested	Adult Males Killed	Females Killed	Mortality due to Hyperthermia
1999	962	2	0	0
2000	751	2	1	4
2001	598	0	2	1
2002	652	1	2	4
2003	522	0	0	0
2004	495	0	0	2
2005	467	1	0	1
2006	396	1	4	0
2007	272	0	3	2
2008	329	0	3	1
2009	341	0	0	0
2010	357	0	0	0
Total	6142	7	15	15

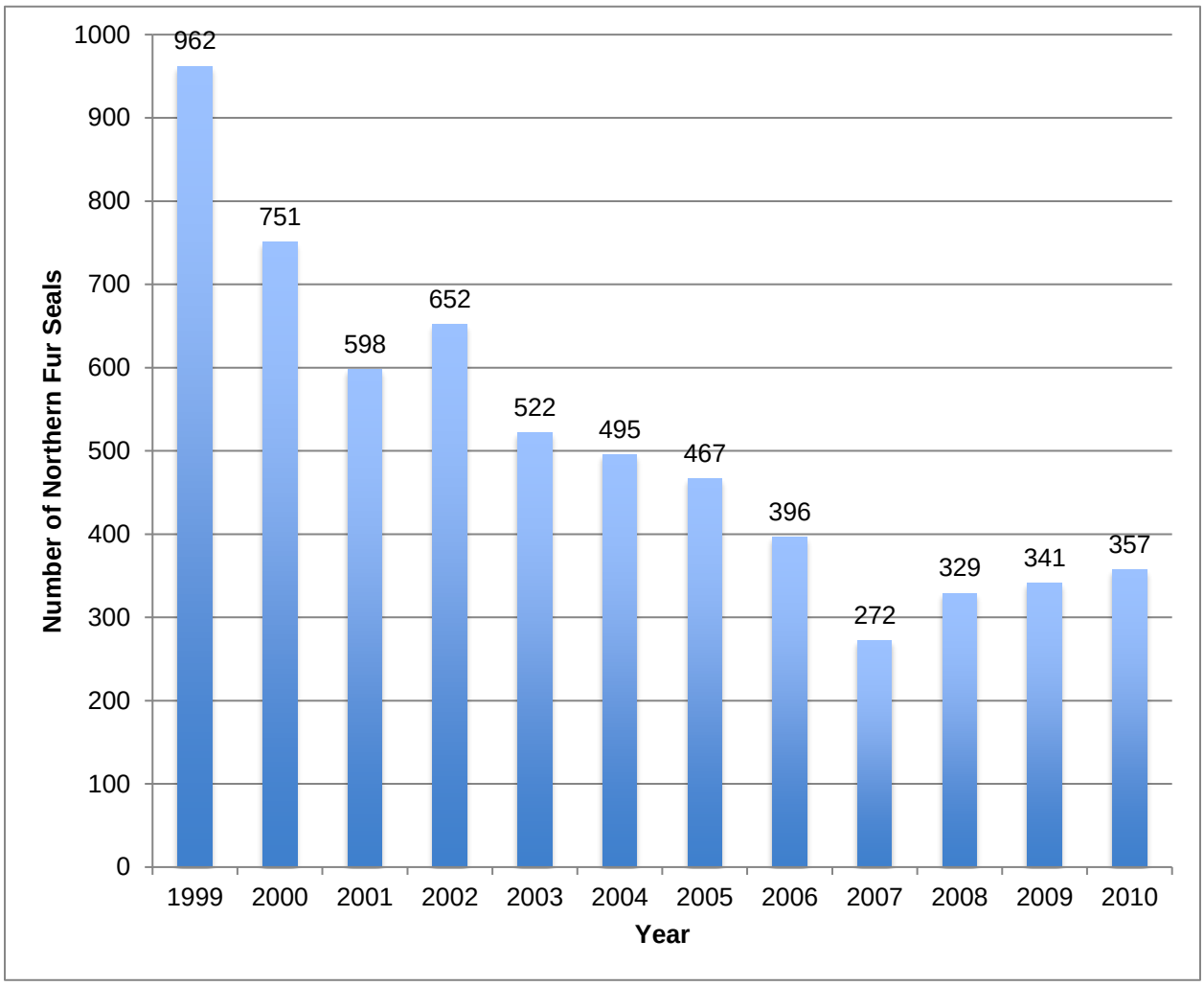

Figure 3 – Number of subadult male northern fur seals harvested by year during the annual subsistence harvest on St. Paul Island, Alaska from 1999 to 2010.

Table 2 - Number of Steller sea lions retrieved, struck and lost, and total taken by year on St. Paul Island, Alaska from 1999 to 2010.

Year	Retrieved	Struck and Lost	Total Taken
1999	10	15	25
2000	12	4	16
2001	12	12	24
2002	18	18	36
2003	13	5	18
2004	9	9	18
2005	19	3	22
2006	20	6	26
2007	22	12	34
2008	20	2	22
2009	18	8	26
2010	15	5	20
Total	188	99	287

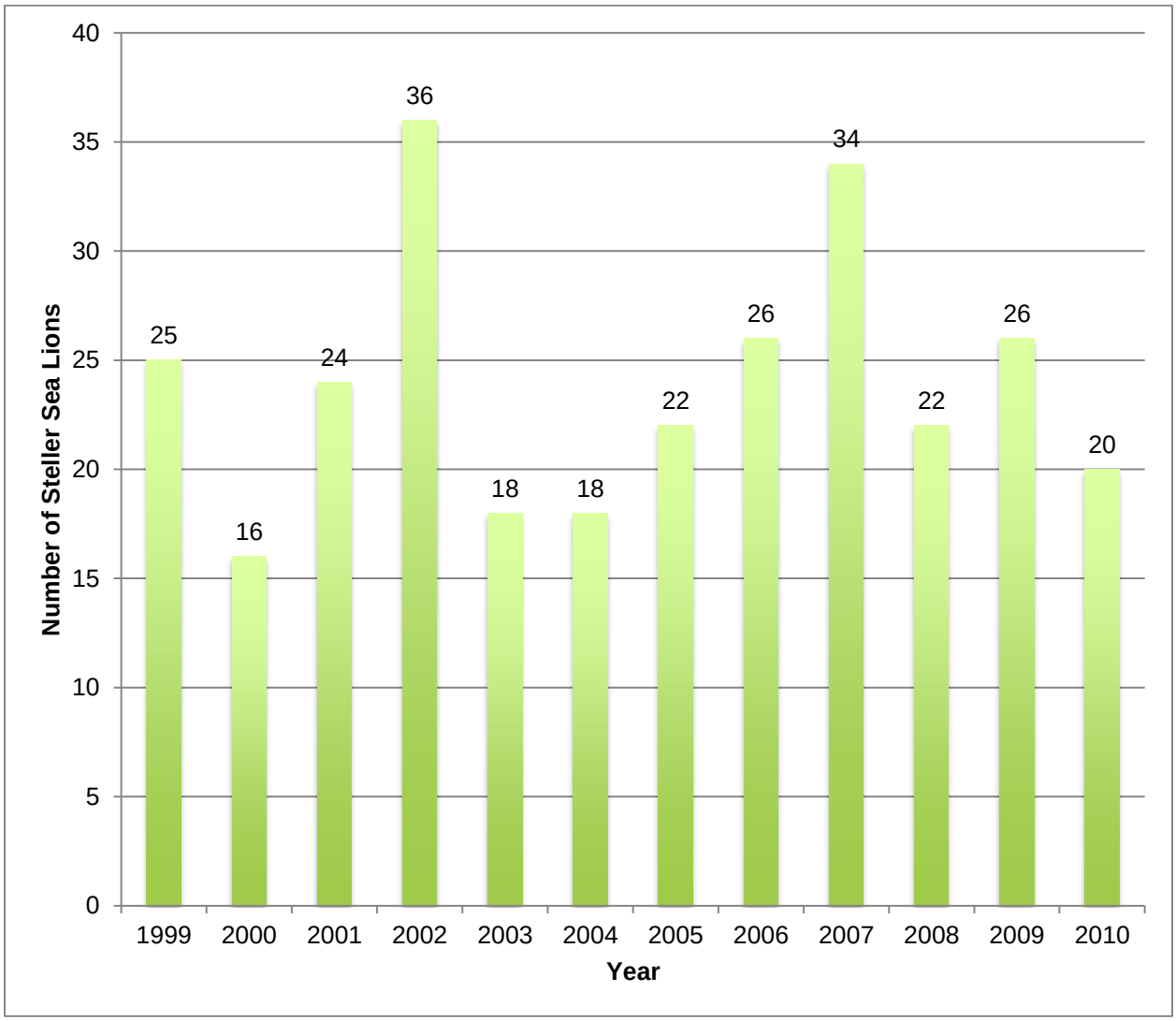

Figure 4 - Total annual takes of Steller sea lions on St. Paul Island, Alaska from 1999 to 2010.

Table 3 - Number of Steller sea lions retrieved, struck and lost, and total taken by season on St. Paul Island, Alaska from 1999 to 2010.

Season	Retrieved	Struck and Lost	Total Taken
Spring	35	33	68
Summer	22	5	27
Fall	70	19	89
Winter	61	42	103
Total	188	99	287

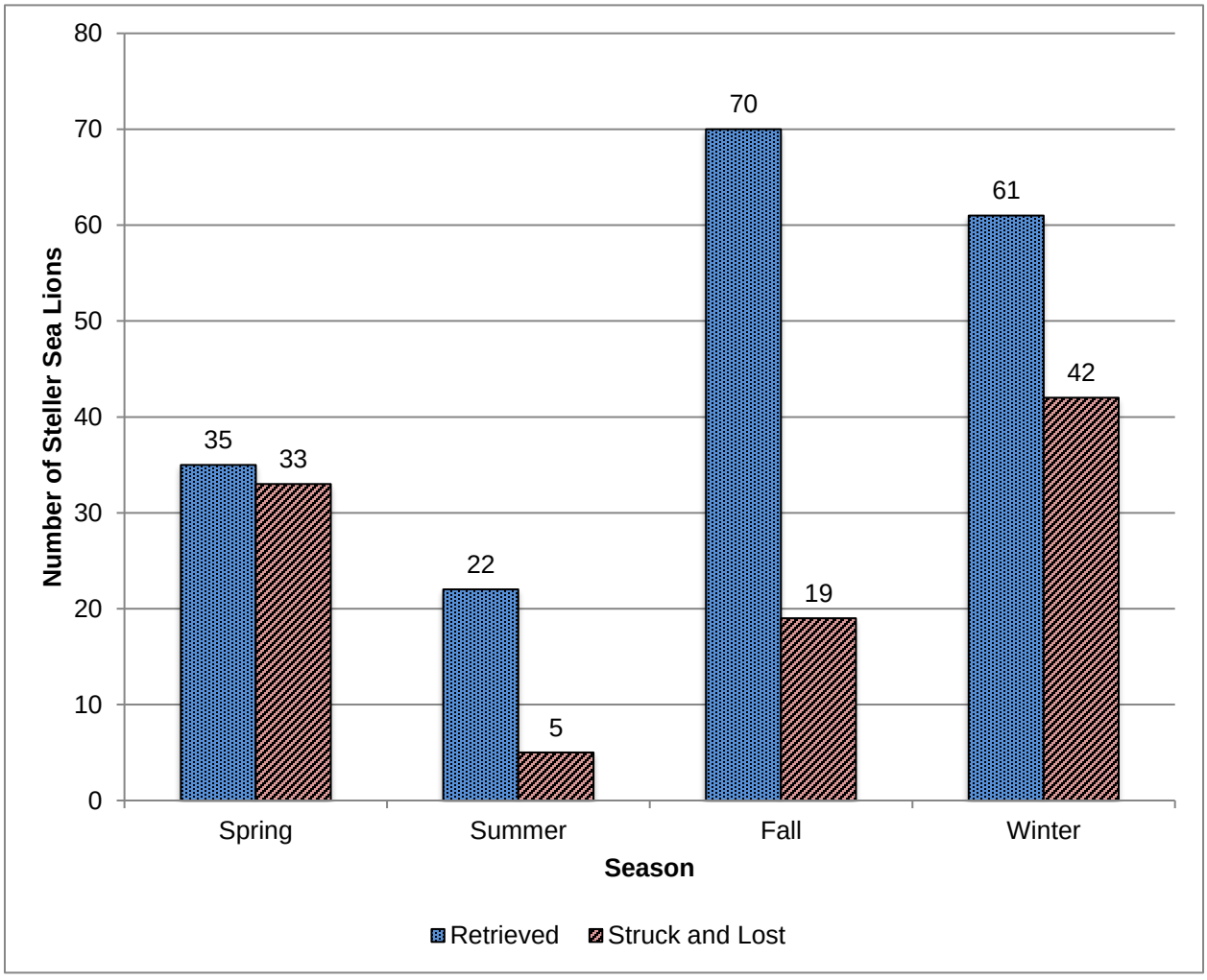

Figure 5 - Number of Steller sea lions retrieved and struck and lost by season on St. Paul Island, Alaska from 1999 to 2010.

Table 4 - Number of Steller sea lions retrieved, struck and lost, and total taken by region on St. Paul Island, Alaska from 1999 to 2010.

Region	Retrieved	Struck and Lost	Total Taken
Benson Beach	1	1	2
Lukanin/Kitovi	9	3	12
Northeast Point	108	60	168
Polovina	6	1	7
Reef	48	32	80
Southwest Point	2	0	2
Tasmania/Marunich	1	0	1
Tolstoi/Zapadni	12	2	14
Unknown	1	0	1
Total	188	99	287

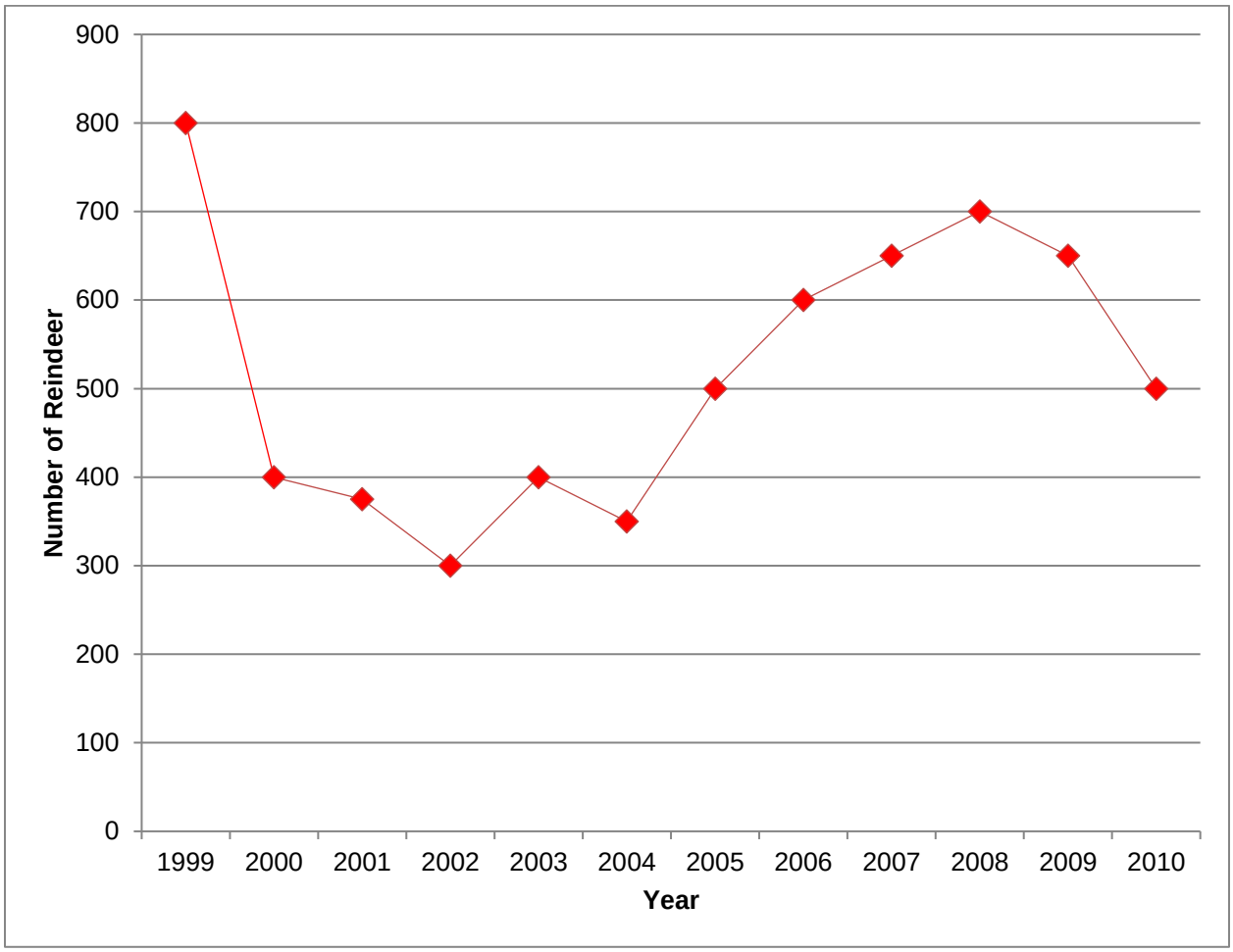

Figure 6 - Estimated number of reindeer by year on St. Paul Island, Alaska from 1999 to 2010.

Table 5 - Number of reindeer hunting permits issued and permits resulting in a successful hunt (filled) on St. Paul Island, Alaska from 1996 to 2010.

Year	Permits Issued	Permits Filled
1996	35	11
1997	15	5
1998	12	8
1999	31	19
2000	37	25
2001	65	46
2002	63	49
2003	72	53
2004	35	32
2005	20	16
2006	35	28
2007	68	46
2008	94	79
2009	35	22
2010	139	103
Total	756	542

Table 6 - Age and sex class of reindeer taken on St. Paul Island, Alaska from 1996 to 2010.

	Sex			
Age Class	Male	Female	Unknown	Total
Newborn	29	30	3	62
Fawn	20	15	0	35
Juvenile	106	75	1	182
Adult	100	124	0	224
Unknown	17	13	9	39
Total	272	257	13	542

Table 7 - Demographics of the eleven interviewees from St. Paul Island, Alaska.

ID #	Gender	Age Group (years)	Ethnicity	Currently Employed?	Number of People in Household	Highest Education Level Completed	2009 Gross Household Income
001	Male	18-29	Aleut	No; Not looking	6 or more	Some high school	Less than $20,000
002	Female	13-17	Aleut	No; Not looking	5	Some high school	n/a
003	Male	40-49	Other	No; Seasonal	6 or more	High school diploma or GED	$40,000-$59,000
004	Male	60-69	Aleut	Yes; Full-time	2	Some college	$60,000-$79,000
005	Female	18-29	Aleut	Yes; Full-time	5	Some college	Less than $20,000
006	Male	13-17	Aleut	No; Seasonal	4	Some high school	n/a
007	Female	40-49	Aleut		5	Some high school	$40,000-$59,000
008	Male	60-69	Aleut	Yes; Full-time	6 or more	Associate's degree	More than $100,000
009	Female	60-69	Aleut	No; Looking	3	Some college	$80,000-$99,000
010	Male	40-49	Aleut	Yes; Full-time	5	Bachelor degree or higher	More than $100,000
011	Male	18-29	Aleut	No; Seasonal	3	High school diploma or GED	$40,000-$59,000

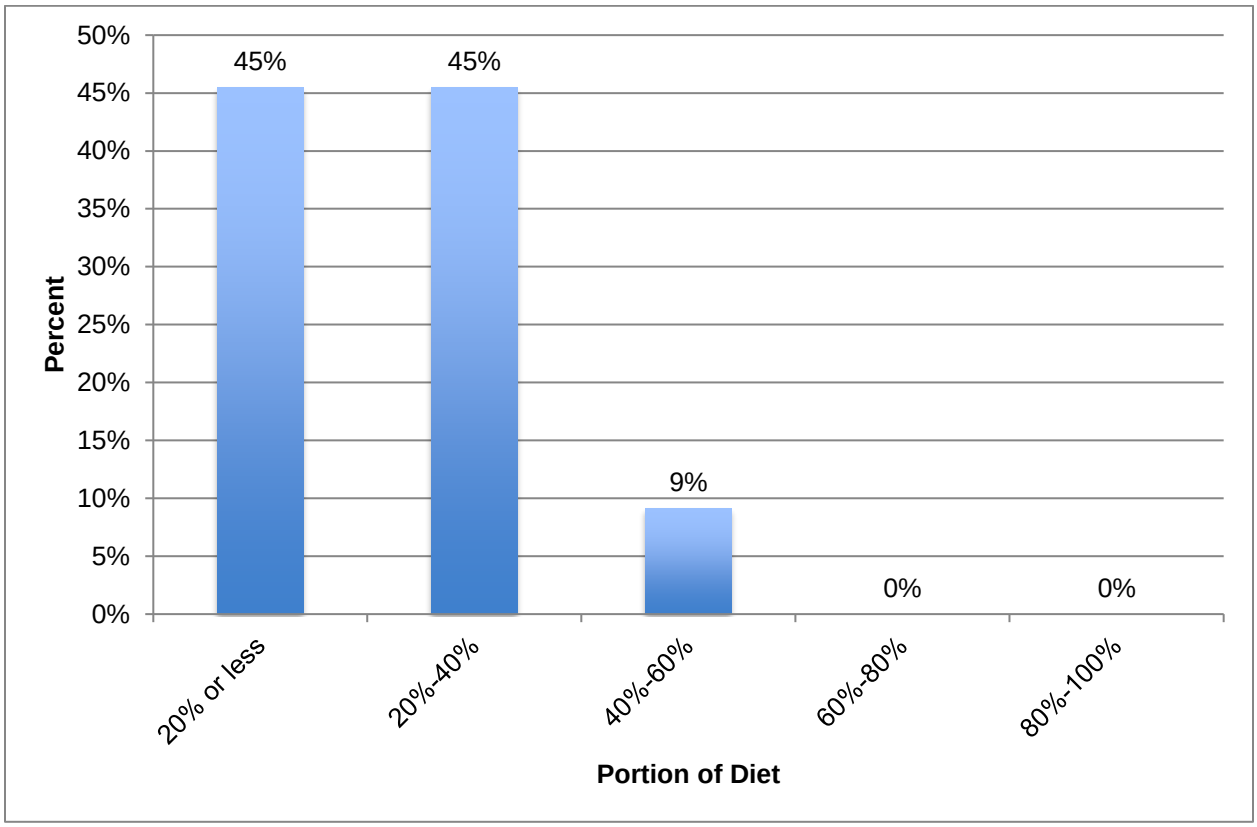

Figure 7 - Portion of diet from traditional foods for eleven people on St. Paul Island, Alaska.

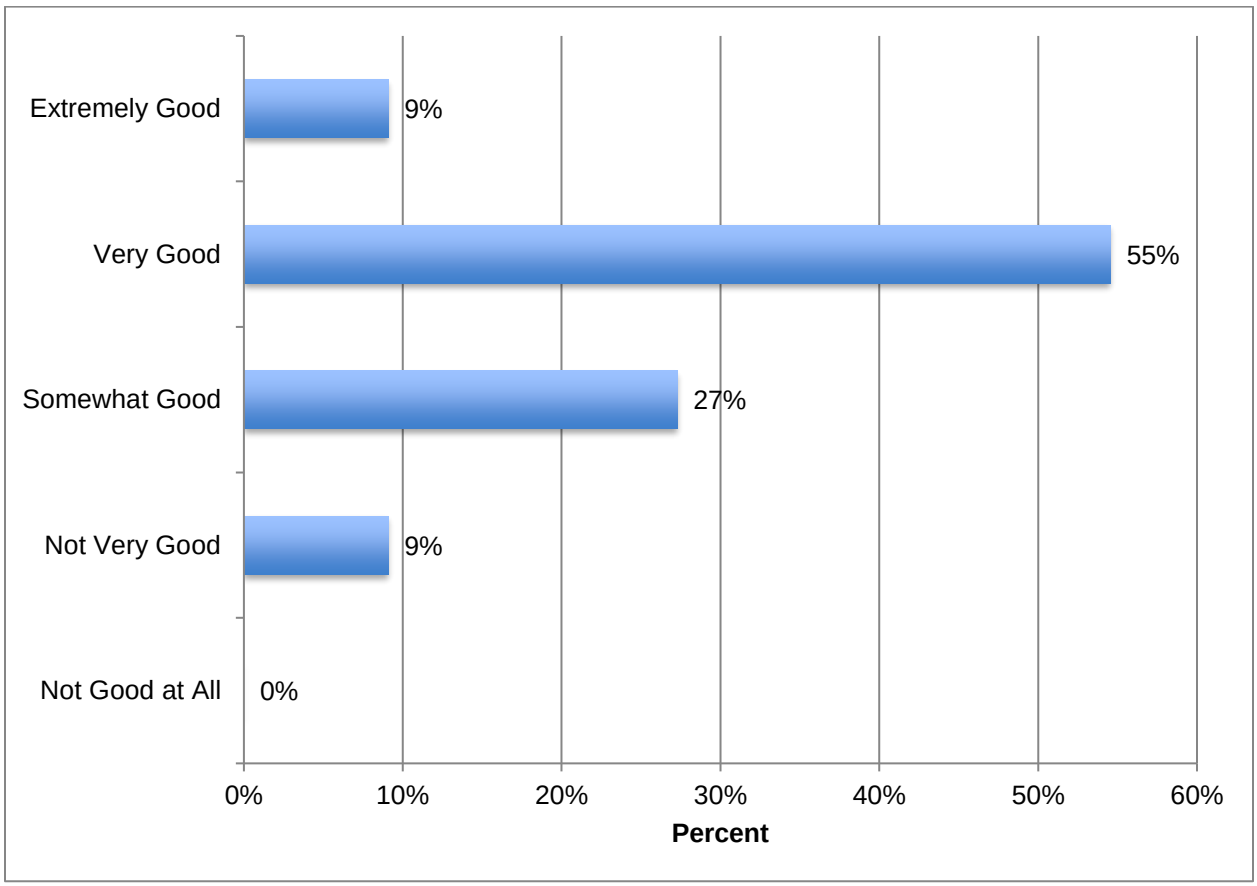

Figure 8 - Environmental quality of St. Paul Island, Alaska and the surrounding waters.

DISCUSSION AND CONCLUSION

SUBSISTENCE HARVEST MONITORING

Northern Fur Seal

The harvesting of northern fur seal has evolved from being an efficient commercial harvest for pelts to an efficient subsistence harvest for meat. Harvest activities are highly regulated and management (NOAA/NMFS and the Tribal Government of St. Paul Island) insures that killing of subadult male fur seals is humane and does not occur in a wasteful manner. Seal meat is taken for consumption while other parts of the animal are either taken for crafts, scientific research, or discarded back into the ocean. There has been a steady decline in the number of fur seals harvested for subsistence, which suggests that the demand for seal meat is less than in the past. The harvest is usually driven by a few factors: the order for meat by the community, the harvest foreman, number of volunteers, fishing, and weather. In the past, harvests usually only occurred on non-fishing days because the harvest foreman and most of the volunteers (sealers) were commercial halibut fisherman. In recent years, the Tribal Government has implemented a harvest schedule and an order limit per harvest. Harvests are now scheduled to occur every Friday morning during the subsistence season, and each household is allowed to order five seals per person per harvest. This schedule was put into place to encourage community members to plan ahead and order their seal meat throughout the season instead of waiting to fill their freezers with meat on the last day of the harvest. Regulating the order number also helps to keep the harvest at a manageable and humane level. Lower harvest numbers makes monitoring fur seals easier and helps to prevent unnecessary mortality due to heat stroke or mistakenly clubbing females or adult males. It will be interesting to see if this established harvest schedule will keep the harvest takes at a consistent level in future years. Certain households consistently order seal meat from almost every harvest, while other individuals may find it difficult to plan around the harvest schedule.

Steller Sea Lion

Sea lion hunting is restricted to spring, fall and winter due to the hauling out patterns of sea lions and the rookery closures to hunting during the summer months. The highest concentrations of sea lions are found at two locations on St. Paul Island: Northeast Point and Reef (see Figure 2). Sea Lion Rock off of Reef point also has high concentrations of animals all year round, but is accessible only by boat. From 1999 to 2010 the total percent of Steller sea lions harvested was 66 percent and the total percent struck and lost was 34 percent. Struck and lost sea lions are usually the result of a hunter shooting a sea lion that's swimming offshore. Hunting sea lion in the water occurs predominantly in spring and winter. Hunting sea lion that are in the water from land-based vantage points requires intimate knowledge of a number of behavioral characteristics of the sea lion and its habitat to evaluate whether the sea lion was struck and how it can be recovered. These signs may include observing and understanding the tidal interaction with the near shore and shoreline geography, erratic behavior in the water such as splashing or surfacing in an abnormal way, blood on the water, an immobile sea lion floating on the water, a sea lion that sinks and does not surface within the area, or a sea lion coming immediately ashore. In order to retrieve a sea lion that is struck in the water, a hunter will carry and use a qayuˣ, sea dog, to bring the struck sea lion ashore. A qayuˣ consists of a grappling or throwing hook attached to

a length of line that is thrown from shore and used to snag and retrieve a wounded or dead sea lion.

If a struck sea lion is not retrieved immediately, a hunter will attempt to track the struck sea lion for up to three days. After the third day, even in the cold Bering Sea waters the meat will begin to decay. Over the three-day period the hunter will monitor shoreline areas where the struck sea lion may wash ashore during daylight hours at both high and low tide. Even if the sea lion sinks when it is struck, the hunter will still track the sea lion for that three-day period, because the sea lion can and often does wash ashore. A hunter that struck a sea lion but did not retrieve it will notify other hunters in the community to increase the odds of detecting the wounded sea lion or carcass onshore. This community level interaction and communication among sea lion hunters provides the foundation for the successful implementation of real-time harvest monitoring on St. Paul Island. The ECO will continue to actively remind hunters to report takes (harvested and struck and lost) in future years.

Reindeer

The ECO has determined this population decrease has been caused by lack of available forage. Available forage has decreased over the years due to overgrazing by a densely populated herd and large quantities of snow coverage in the winters of 1999 and 2000.

Reindeer hunting predominantly occurs during the summer, fall and winter seasons. Total takes during fall may be lower because breeding occurs between mid-September until the end of November. Hunting is closed during spring when reindeer are being born, although some takes do occur. It is unclear if hunters target male reindeer, as both males and females are taken almost equally. It may be difficult for hunters to target males in a herd, especially since both sexes bear antlers. The successful harvest monitoring of reindeer depends on the reporting of takes by hunters to the ECO office. ECO will continue to actively remind hunters to get permits and report takes in future years.

LOCAL AND TRADITIONAL KNOWLEDGE

The people that were interviewed covered almost all age groups and different levels of education and/or experience. All interviewees stated that they consume traditional foods throughout the year, with the majority consuming these foods occasionally or frequently. Response rates varied by topic; the highest response rates, besides the initial questions up until seasonal cycles, were for northern fur seals, other marine mammals, halibut, sea ice conditions, education and outreach, and general human impacts. Interviews took around two hours to conduct in one sitting and this discouraged most people from participating in these interviews. The lower response rate to the other topics in the middle of the survey is most likely due to individual levels of knowledge of these topics, but could also be a factor of loss of interest in the middle of a two-hour interview session. The concerns that interviewees expressed about these topics were mostly centered on the local halibut fishery and other commercial fisheries in the Bering Sea, and the decline of marine mammals, birds, and fish on and around the Pribilof Islands. Interviewees have noticed a change in the seasons and the fishermen believe that changes in ocean conditions are affecting the local halibut fishery and other fish the marine mammals and birds depend on for

food. Most interviewees are concerned about the changes they are noticing in the environment and want to see additional research on the topics covered in the survey.

ACKNOWLEDGEMENTS

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APPENDIX I – BSIERP-LTK INTERVIEW QUESTIONS

Interviewee ID #
Interview Location
How long have you lived on St. Paul Island?
Have you ever lived elsewhere?
What is your gender?
Please check the box that corresponds with your age.
What is your race or ethnic background? (Check all that apply)
Are you currently employed?
Occupation
Including yourself how many people reside in your household?
What is the highest level of schooling you completed?
In your household, how many individuals earn money that contributes to your family's income?
What was your 2009 household income before taxes?
Given the choice, what type of work would you most like to do? Why?
How often do you consume traditional foods over the course of a year?
What portion of your overall consumption would you estimate comes from traditional foods?
What are the primary reasons you consume traditional foods?
What are the primary reasons you do not consume traditional foods?
If you are a traditional harvester/hunter/gatherer, how often do you participate in these activities?
If you are a traditional harvester/hunter/gatherer, how often do you share your harvest/hunt with others?
If you share, to whom is it given?
Which of the following factors make you less likely to participate in customary traditional harvesting/hunting/gathering?
If you are not a customary traditional harvester/hunter/gatherer, do you receive subsistence food from others?
If yes, please tell us their relationship to you.
Describe any differences and/or similarities over time you have observed in traditional foods that you consume.
Do you look at the fat, stomach contents, flesh, skin of the animals you harvest/hunt/gather?

Are you or were you a commercial fisherman/woman?
If no, is your current employment directly or indirectly linked to the commercial fishing industry?
If yes, how many years have you worked as a fisherman/woman on St. Paul Island or elsewhere?
How are commercial fishing opportunities near around St. Paul Island changing over time?
How would you rate the current economic stability of St. Paul Island?
How is the economic stability of St. Paul Island changing over time?
How would you rate the environmental quality of St. Paul Island and surrounding waters?
How is the environmental quality of our island and surrounding waters changing over time?
Do you participate in environmental stewardship activities? (For example, collecting marine debris, recycling, etc.)
In your opinion, how linked is the well being of our community/tribe/family to the well being our environment?
Can you tell me about the different seasons here on St. Paul Island?
If yes, do you think the seasons have stayed the same or are different from the past?
Have you seen fur seals, on haulouts, on rookeries, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many fur seals are at the haulouts, rookeries, in the water, etc.?
Have you seen young fur seals on haulouts, on rookeries, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many young fur seals are at the haulouts, rookeries, in the water, etc.?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of fur seals at sea?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, other marine mammal, birds, or fish?
Have you seen fur seals eating/foraging?
If yes, have you noticed differences and/or similarities over the years of what fur seals are eating?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, other marine mammal, birds, or fish?
Have you seen fur seals being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of fur seals?

If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, other marine mammal, birds, or fish?
Have you noticed fur seals being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of fur seals?
Do you have any other information/concerns/comments to offer in regard to fur seals?
Have you seen other marine mammals, on haulouts, on rookeries, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many other marine mammals are at the haulouts, rookeries, in the water, etc.?
Have you seen other young marine mammals on haulouts, on rookeries, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many other young marine mammals are at the haulouts, rookeries, in the water, etc.?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of other marine mammals at sea?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, various marine mammal, birds, or fish?
Have you seen other marine mammals eating/foraging?
If yes, have you noticed differences and/or similarities over the years of what other marine mammals are eating?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, various marine mammal, birds, or fish?
Have you seen other marine mammals being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of other marine mammals?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, various marine mammal, birds, or fish?
Have you noticed other marine mammals being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of other marine mammals?
Do you have any other information/concerns/comments to offer in regard to other marine mammals?

Have you seen black-legged kittiwakes, on the cliffs, in flight, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many black-legged kittiwakes are on the cliffs, in flight, in the water, etc.?
Have you seen young black-legged kittiwakes on the cliffs, in flight, in the water, etc.?
If yes, have you noticed differences and/or similarities over time in how many young black-legged kittiwakes are on the cliffs, in flight, in the water, etc.?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of black-legged kittiwakes at sea?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, other birds, or fish?
Have you seen black-legged kittiwakes eating/foraging?
If yes, have you noticed differences and/or similarities over the years of what black-legged kittiwakes are eating?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, other birds, or fish?
Have you seen black-legged kittiwakes being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of black-legged kittiwakes?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, other birds, or fish?
Have you noticed black-legged kittiwakes being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of black-legged kittiwakes?
Do you have any other information/concerns/comments to offer in regard to black-legged kittiwakes?
Have you seen thick-billed murres on the cliffs, in flight, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many thick-billed murres are on the cliffs, in flight, in the water, etc.?
Have you seen young thick-billed murres on the cliffs, in flight, in the water, etc.?
If yes, have you noticed differences and/or similarities over time in how many young thick-billed murres are on the cliffs, in flight, in the water, etc.?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of thick-billed murres at sea?

If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, other birds, or fish?
Have you seen thick-billed murres eating/foraging?
If yes, have you noticed differences and/or similarities over the years of what thick-billed murres are eating?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, other birds, or fish?
Have you seen thick-billed murres being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of thick-billed murres?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, other birds, or fish?
Have you noticed thick-billed murres being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of thick-billed murres?
Do you have any other information/concerns/comments to offer in regard to thick-billed murres?
Have you seen other birds on the cliffs, in flight, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many other birds are on the cliffs, in flight, in water, etc.?
Have you seen other young birds on haulouts, on rookeries, in water, etc.?
If yes, have you noticed differences and/or similarities over time in how many other young birds are on the cliffs, in flight, in water, etc.?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of other birds at sea?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, various birds, or fish?
Have you seen other birds eating/foraging?
If yes, have you noticed differences and/or similarities over the years of what other birds are eating?

If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, various birds, or fish?
Have you seen other birds being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of other birds?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammal, various birds, or fish?
Have you noticed other birds being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of other birds?
Do you have any other information/concerns/comments to offer in regard to other birds?
Have you observed halibut in the waters around the Pribilof Islands?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of halibut?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammals, birds or other fish?
Do you know have your observed what halibut eat or know where they forage?
If yes, have you noticed differences and/or similarities over the years of what halibut are eating?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammals, birds or other fish?
Have you seen halibut being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of halibut?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammals, birds or or fish?
Have you noticed halibut being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of halibut?
Do you have any other information/concerns/comments to offer in regard to halibut?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of crab, which species?

If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or other marine mammals, birds or fish?
Have you observed what crab eat?
If yes, have you noticed differences and/or similarities over the years of what crab are eating?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean, marine mammals, birds or fish?
Have you seen crab being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of crab?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or other marine mammals, birds or fish?
Have you noticed crab being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of crab?
Do you have any other information/concerns/comments to offer in regard to crab?
Have you observed other fish in the waters around the Pribilof Islands?
If yes, have you noticed differences and/or similarities over time in abundance or distribution of other fish?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammals, birds or other fish?
Have you observed what other fish eat or know where they forage?
If yes, have you noticed differences and/or similarities over the years of what other fish are eating?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammals, birds or other fish?
Have you seen other fish being killed or eaten other than by people?
If yes, have you noticed differences and/or similarities over the years in predation of other fish?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or environmental conditions, marine mammals, birds or fish?
Have you noticed other fish being disturbed by human activity (fishing, tourism, entanglements, research, hunting, recreation, etc.)?
If yes, do these differences and/or similarities coincide with any of the above observations you have noticed in the distribution or abundance of other fish?

Do you have any other information/concerns/comments to offer in regard to other fish?
If yes, have you noticed differences and/or similarities over time in the ocean conditions?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the environmental or sea ice conditions, marine mammals, birds, or fish?
Do you have any other information/concerns/comments to offer in regard to ocean conditions?
Have you noticed differences and/or similarities over time in the environmental/weather conditions?
If yes, do these differences and/or similarities coincide with any other differences and/or similarities you have noticed in the ocean or sea ice conditions, marine mammals, birds, or fish?
Do you have any other information/concerns/comments to offer in regard to environmental/weather conditions?
Have you observed sea ice conditions around St. Paul Island?
If yes, have you noticed differences and/or similarities over time in the sea ice conditions?
If yes, what do you think are the reasons for any differences and/or similarities you have seen?
Do you have any other information/concerns/comments to offer in regard to sea ice conditions?
Are you interested in seeing any or additional research activities conducted for any of the species or topics covered in the survey?
Do you have ideas on how any ideas on how scientists can better reach out to our community with scientific information regarding specific species and topics covered in this survey?
Do you have information additional information on any of the species or topics covered in this survey you would like to pass on to scientists or younger generations?
Can you tell me about the human impacts on or around St. Paul Island?
Are there any human impacts we cannot control?