B. Importance of Subsistence Harvest

Subsistence harvests are an important traditional and community food resource for the respondents. When asked, "What was your last harvest used for?" the overwhelmingly response was that it was used for traditional or personal use (see Figure 9). Sharing with friends and family also stand out as a predominant use in most communities. Supporting other community members through food sharing was a commonly discussed theme in open-ended responses for all communities.

- "Да, хватало рыбы. Взаимосвязь стариков и молодежи всегда. Старики смотрели, где сколько всего нужно. Передавали опыт молодым постоянно. Если много рыбы, раздавали."
- "Yes, there was enough fish. There was always interconnection between elders and youth. Elders were watching where what is needed. They transferred their knowledge to the younger ones all the time. If there were a lot of fish they gave them away."
- "Как всегда. Раздаем всем, кто пришел на пирс встречать бот."
- "Like always. We share with all those who came to the pier to meet the boat."
- "(The catch was used) to eat and for others that can't go fishing- sick and elders at home."

In Gambell, approximately 26% reported using their catch for 'generating cash or bartering' and 7% reported using it for 'commercial or business activity'. Two respondents elaborated saying this was done by carving and selling ivory.

In Sand Point, harvests are frequently used for generating cash, which is probably a result of the commercial fishing activity in the area. Harvests were used for generating cash or bartering by 16%, and another 37% report using the catches for commercial or business activity.

In Nikolskoye, very little of the harvest is used for generating cash or commercial activity. This could be due to the permit system in place there, which in open-ended responses 12% reported difficulties with (mostly in terms of the small size of the limit).

- "Но лимит очень маленький, продавать нечего"

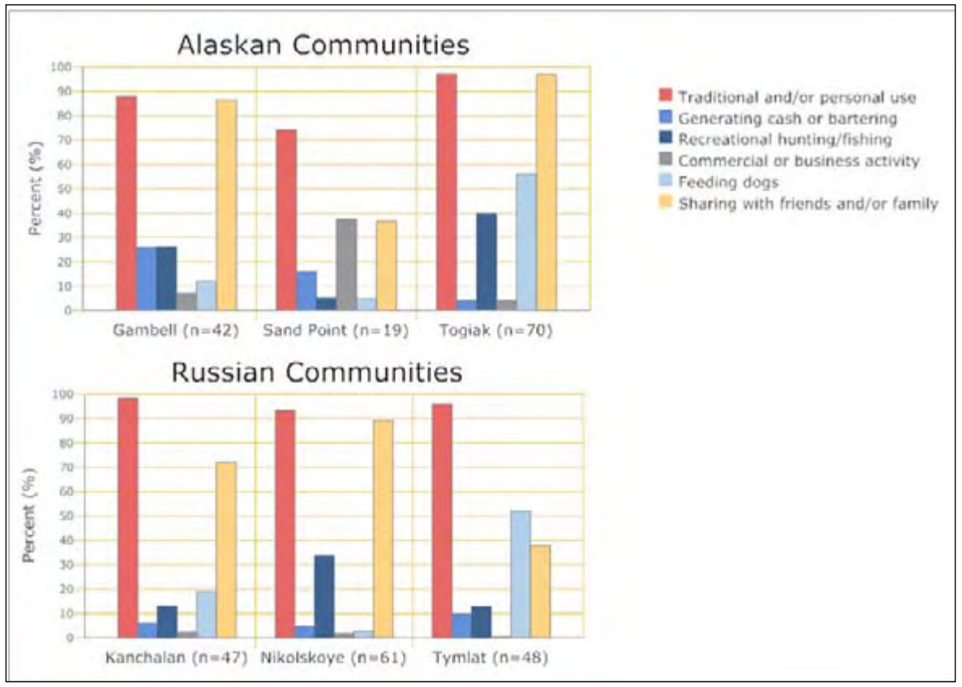
"The limit is really small. There's nothing [left over] to sell."

In both Togiak and Tymlat, many respondents agreed that at least a portion of the harvest was used for feeding dogs.

Recreational hunting/fishing were important in Togiak and Nikolskoye, with many open-ended responses discussing the importance of subsistence to ones well being and as a connection culture.

- "Вполне, без рыбы не сидели. С детства и вообще из поколения в поколение привычны рыбой питаться."
- "Entirely, we have never been without fish. From childhood and generally from generation to generation fish is the customary food."
- " Близко находится море, забываются бытовые проблемы, внутренне отдыхаешь."
- "The sea is nearby. Our everyday petty troubles are forgotten, and we can rest."

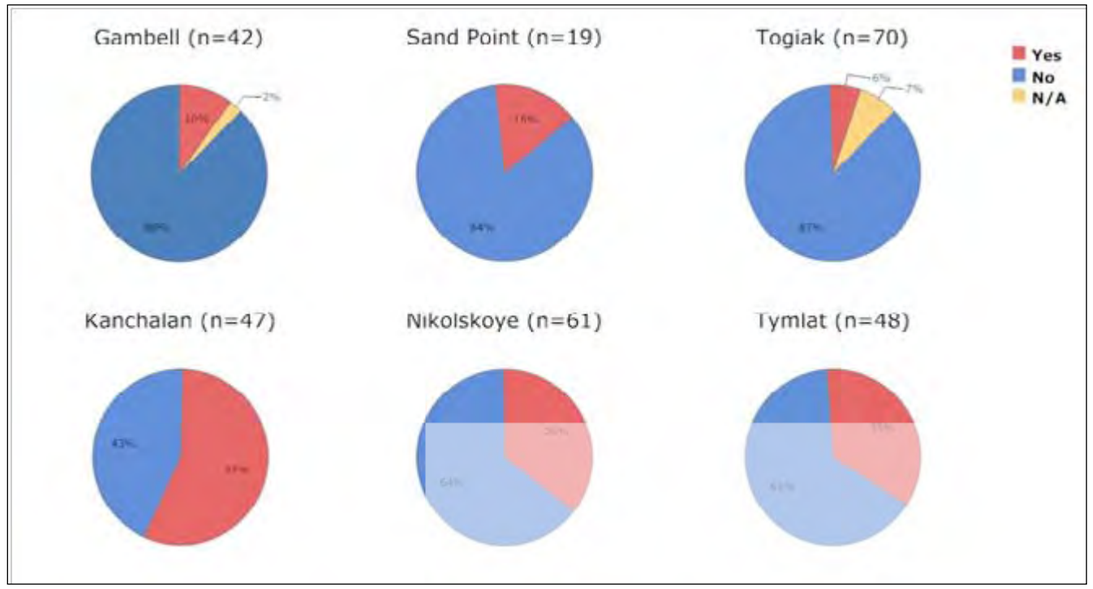
Figure 9. Responses to the question 'What was your last harvest used for? Mark all that apply for all communities.



When asked about the reasons for the timing of the next harvest many replied that it was driven by the family's need for food. In all communities but Sand Point the family's need for food was the most frequently mentioned reason for the timing of the next trip. This is likely due to the influence of commercial fishing in Sand Point. Respondents are likely to combine subsistence activities with commercial fishing. Weather was also a significant factor determining the timing of the next trip, which is interesting because of the frequent reports of increasing storms with greater intensity.

The legal season opening was not a major factor in Gambell because only the whale hunt is confined by seasonal regulations. Subsistence in Togiak is not subject to regulated seasons, while in other villages a regulated season for at least one species harvested is in place.

Figure 10. Whether or not the last harvest contained any fish or animal with visible disease.



C. Disease in all communities

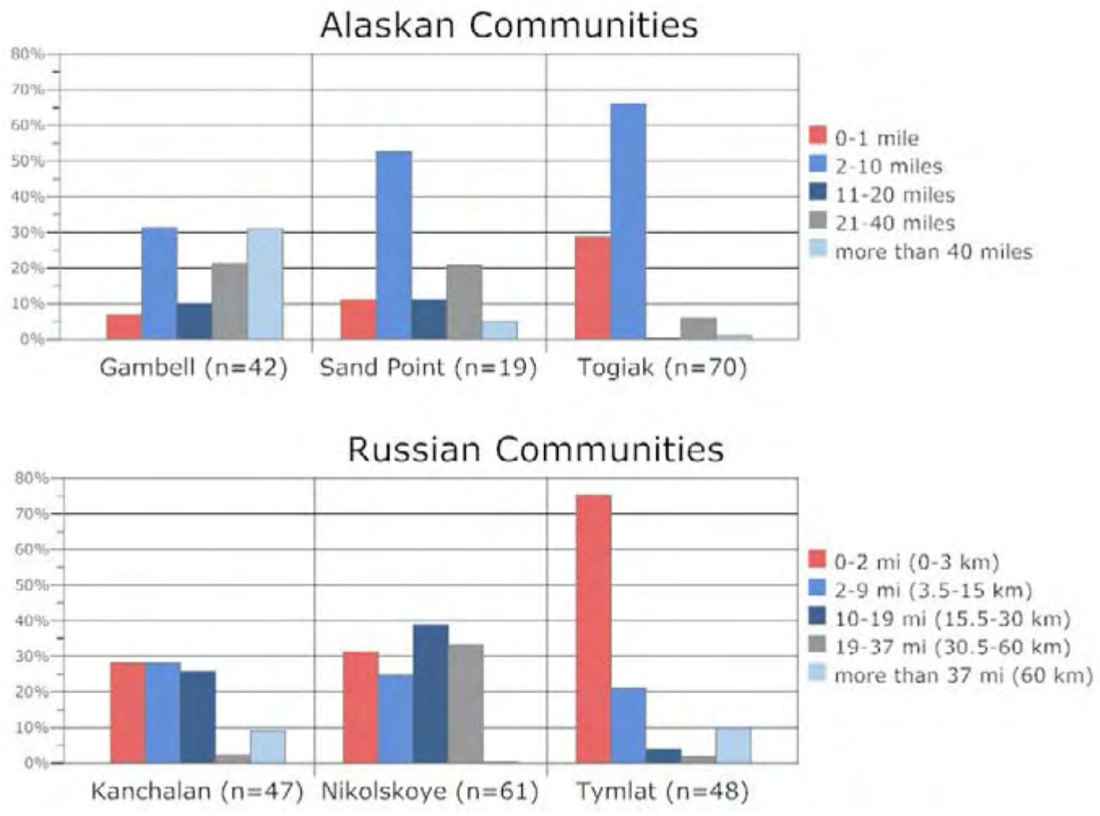
When asked, 'During your last hunting/fishing trip, did you catch any (species harvested) with visible disease?' Russian communities stand out as more likely to report catching at least one fish/animal with visible disease (see Figure 10). The most significant observations point to a high rate of disease in red salmon and pacific cod in Nikolskoye, whitefish and chum salmon in Kanchalan, and pink salmon in Tymlat. Reasons for this need further investigation, but participants frequently cited pollutants associated with mining and military activity as the cause.

D. Access to harvest location

Access to hunting and fishing locations probably affects the ability of harvesters to secure food for themselves and others. Thus it is important to examine distances traveled to harvest locations and any difficulties encountered during travel, especially as changing environmental conditions may affect travel routes.

3 to 15 kilometers (2 to 10 miles) was the most frequently cited distance traveled in all Alaskan communities (see Figure 11). Gambell stands out in that respondents traveled farther, with 31% traveling over 65 kilometers (40 miles). In Russia, people tended to stay closer to home, with the exception being Nikolskoye where 15 to 30 kilometers (10 to 20 miles) was the most frequently cited distance traveled. There are some issues with interpretation here because Russian respondents were given multiple choice answers in kilometers and in Alaska they were given in miles, and they don't translate directly (3 km = 1.9 mi), thus these trends need further examination.

Figure 11. Distances traveled to the previous harvest location for all BSSN communities



In Gambell, when asked if it was easier, more difficult or about the same to get to the location of the previous harvest trip, 47% replied it was about the same, while equal percentages (26%) reported it was either more difficult or easier to get to the location. Of those reporting that it was more difficult to get to the location 77% attributed the difficulty to poor environmental conditions (ice, bad weather). The second most frequently cited reason was economic (62%) including high gas prices and equipment.

In Sand Point 0% reported that the location was more difficult to get to than in other years; 6% reported it was easier, while 94% said it was about the same as usual.

Travel to the harvest location was reported as more difficult than usual by 7% of Togiak respondents. Poor environmental conditions were most frequently cited as the reason for the difficulty. Poor road conditions followed by economics were also mentioned.

In Kanchalan, difficulties getting to the location were reported by 33% of the respondents. Of those reporting difficulty, the most common reasons cited were economics (including fuel and equipment), followed equally by poor road conditions and poor environmental conditions.

Difficulties getting to the location of the previous trip were reported by 15% in Nikolskoye. Of those reporting difficulties a majority (77%) blamed poor road conditions. Lack of transportation followed with 33% citing this as a problem.

In Tymlat 24% encountered difficulties getting to the location of their previous harvest. Economics was the most frequently cited reason, followed by poor environmental conditions.

- “То вездеход на ремонте, то топлива на него нет, дорого. То погода плохая. Весной половодье, реки становятся - большие, глубокие.”
- “Sometimes the all-terrain vehicle needs repair, sometimes there is no fuel for it. It is expensive. Sometimes the weather is bad. In spring there are floods, rivers become big, deep.”

The most frequent hardship cited for travel to the harvest location for Alaskan villages was environmental conditions, while in Russia it was economic followed by poor road conditions.

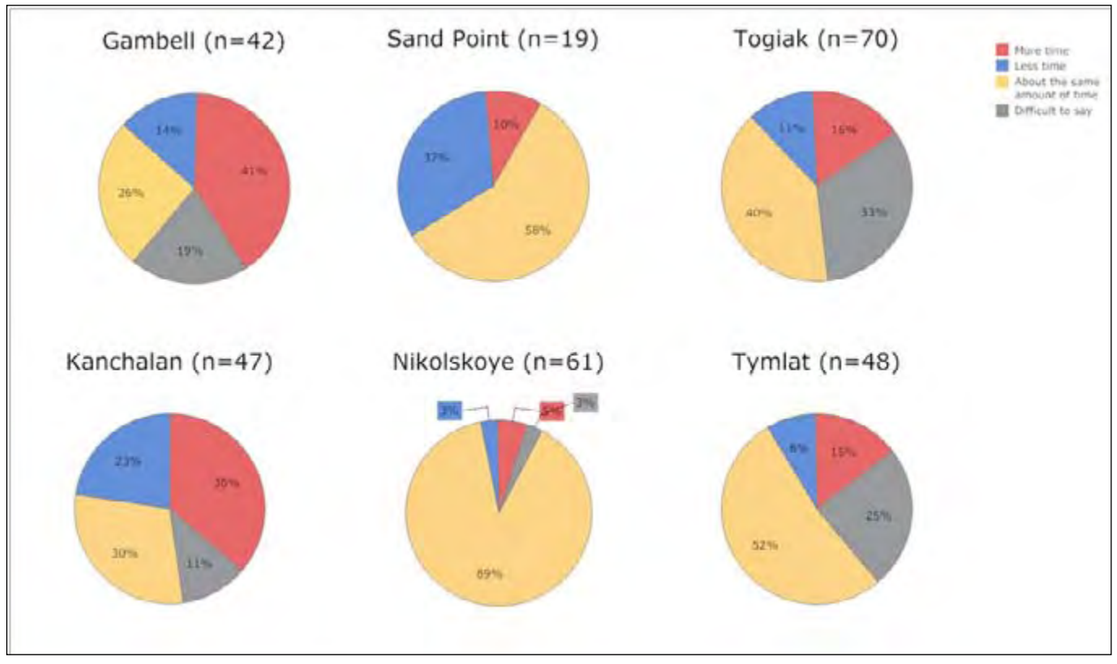
D. Time spent to harvest

The amount of time spent to harvest compared to previous years may indicate change in environmental conditions, animal populations and dynamics.
Gambell and Kanchalan stand out as communities where the time spent to harvest may be increasing (see Figure 12).

Of the respondents in Gambell, 41% reported that more time was spent in harvesting. According to harvesters, the size of the harvest, the amount of time it took to catch and their resulting level of satisfaction were often affected by the amount of available game and changes in animals’ migration patterns.

- “Some game is going farther out because of the sound of snow machines – Honda. And probably the light affects [them too]. They go farther out.”
- “Iknowthatsome[game]areoffseason–leftbehinddue t o

Figure 12. Time spent to harvest compared to the previous 5-10 years for all BSSN communities



E. Needs Satisfaction and Expectations

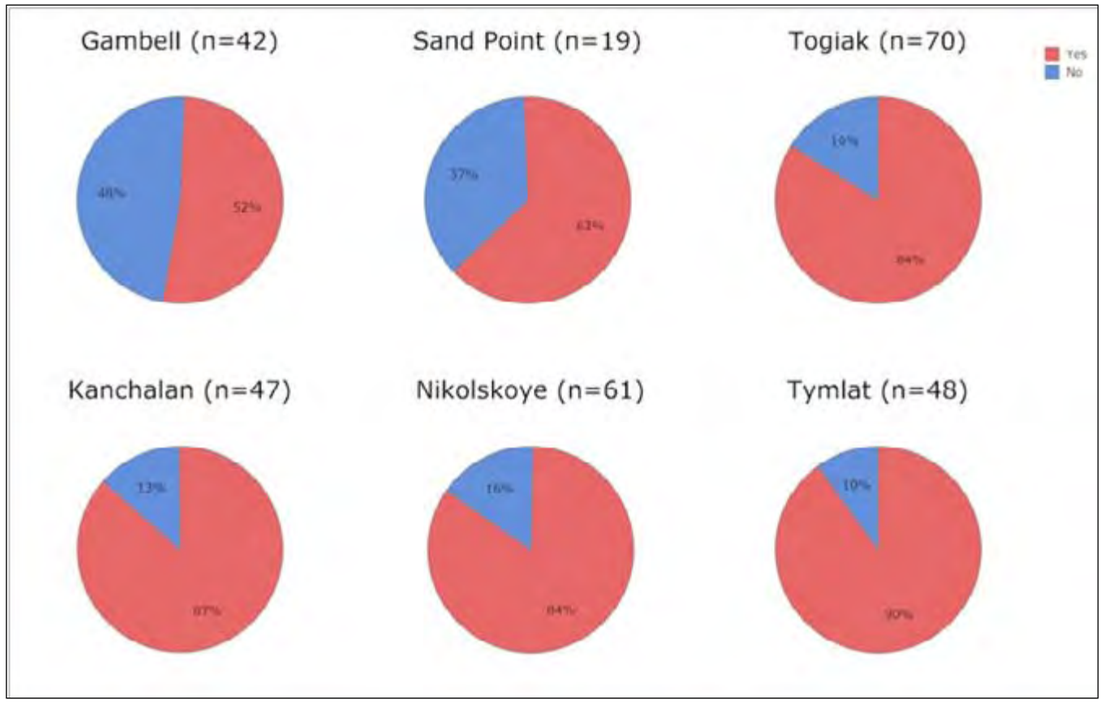
When discussing the previous harvest the survey inquires, “On your last hunting/fishing trip, did you catch enough to satisfy all your needs?”

Gambell, the community that observed the most environmental changes, stands out as the community where needs are least likely to be met (48%) (see Figure 13). This may be due to greater variability in hunting success for marine mammals than fish. Sand Point, a fishing community, follows as the second most likely place where needs were not met. The participants in Gambell harvest the greatest proportion of marine mammals (71%) compared to the other community in which marine mammals are harvested (Togiak 5%).

In response to open-ended questions Gambell residents discussed what needs were not meet. They included:

- “Need more meat. Not enough walrus around. Seal was primary catch.”
- “Didn’t catch enough to feed my family for a year.”
- “Because I could of used more for the family.”

Figure 13. On your last hunting/fishing trip, did you catch enough to satisfy all your needs?



What an experienced subsistence harvester hopes to harvest in a trip and how that compares with the actual outcome of the trip is likely to tell us a little about how harvests now compare to harvests in the past. This can also tell us about some of the challenges facing subsistence users in the Bering Sea.

In Gambell respondents were more likely to report they harvested less than they had hoped for (48%) (see Figure 14). Sand Point follows with 32% of respondents reporting less then they had hoped for. Togiak residents are particularly satisfied, with 24% harvesting more than they had hoped for. In Nikolskoye and Tymlat, expectations and actual outcomes matched up better than the other communities.

Fishing near Sand Point, Alaska

F. Note on Natural Variability

Natural variability in the environment was frequently brought up by respondents. An attempt was made to focus participants on long term changes by inquiring about changes in environmental conditions in the previous 10 to 25 years, but many seemed to accept changes as natural. In Tymlat, responses included 33 references to the idea of a 'fish year' where fish are abundant, and a 'non-fish year' where fish are scarce. The variability in fish runs from year to year seems to be a common understanding. There were many other references to natural variability.

- "But this year is a non-fish year. There are few fish. There's no run. Next year there will be."
- "This year is not a fish year. Fish years vary." "Этот год нерыбный. Год рыбный, по -разному идет."
- "(There is) different weather every year."
- "Everything changes, even land…as our land is very old."
- "Weather is always changing, no matter which way the wind is blowing, we go fishing."
- "The river didn't freeze right away, but every year is different with weather."
- "The weather is always different each year."

Based on this acceptance of change in the environment it can be difficult to define 'the norm'. What are normal environmental conditions in an environment that is always changing? This is likely to add an element of personal variability in what is considered 'unusual', or changing.

The natural variability present in the system has shaped past generations and residents into adaptable people. For generations people in these areas have adapted to changing conditions. This acceptance of change and strong community ties in these communities are evidence of great adaptive capacity.

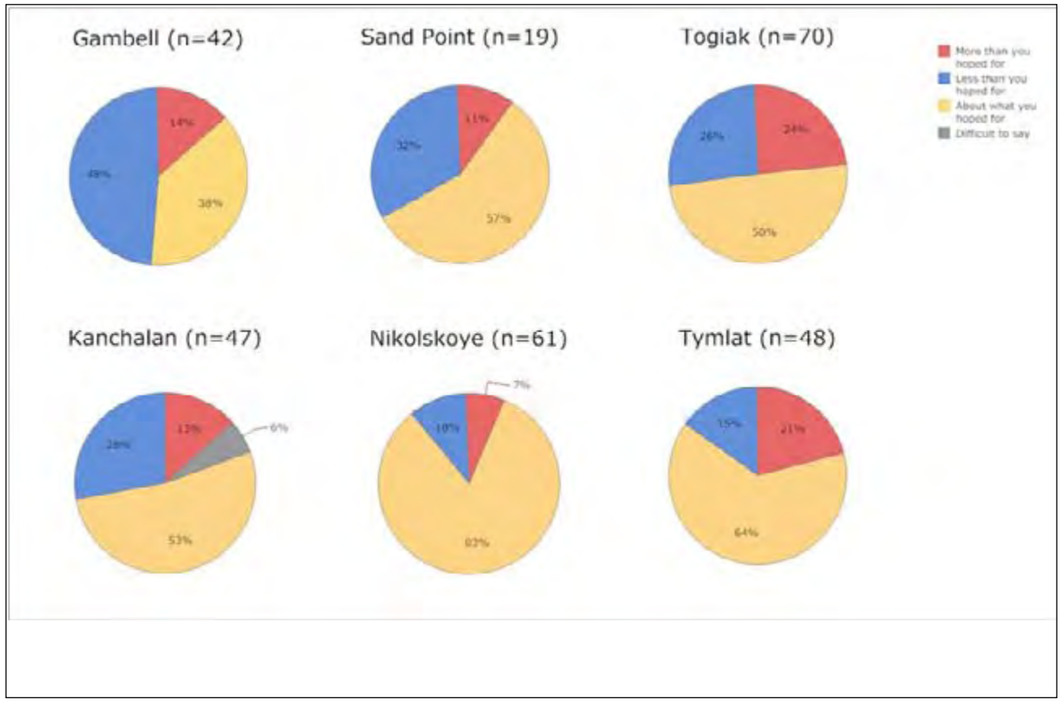
6.3 Survey Results Summary by Village

6.3.1 Gambell

A. Gambell Sample Profile (n=49)

In Gambell, interviews were conducted from July 2008 to February 2009. The sample was primarily comprised of males (see Table 3), 62% of which were between the ages of 36 and 55 (see Table 2). The respondents were generally long-time residents that possessed many years of harvesting experience. A majority (77%) have lived in the area for more than 30 years (see Table 5) and 76% have hunted or fished in the area for more than 21 years (see Table 6). When asked to describe how

Figure 14. Expectations/hopes for harvest compared to actual outcome



frequently they visited the location 74% reported going to the location 'often' or 'very often'. Of the respondents, 84% reported they were not employed at the time.

Table 5. Years of residence in the community (n=49)

Length of Time	Frequency	Percent
11-20 years	4	8%
21-30 years	7	14%
more than 30	38	77%
Total	49	

Table 6. Years hunted/fished in the area (n=49)

Length of Time	Frequency	Percent
0-5 years	2	4%
6-10 years	1	2%
11-20 years	9	18%
21-30 years	13	27%
More than 30 years	24	49%
Total	49	

Walrus meat drying, Gambell Alaska

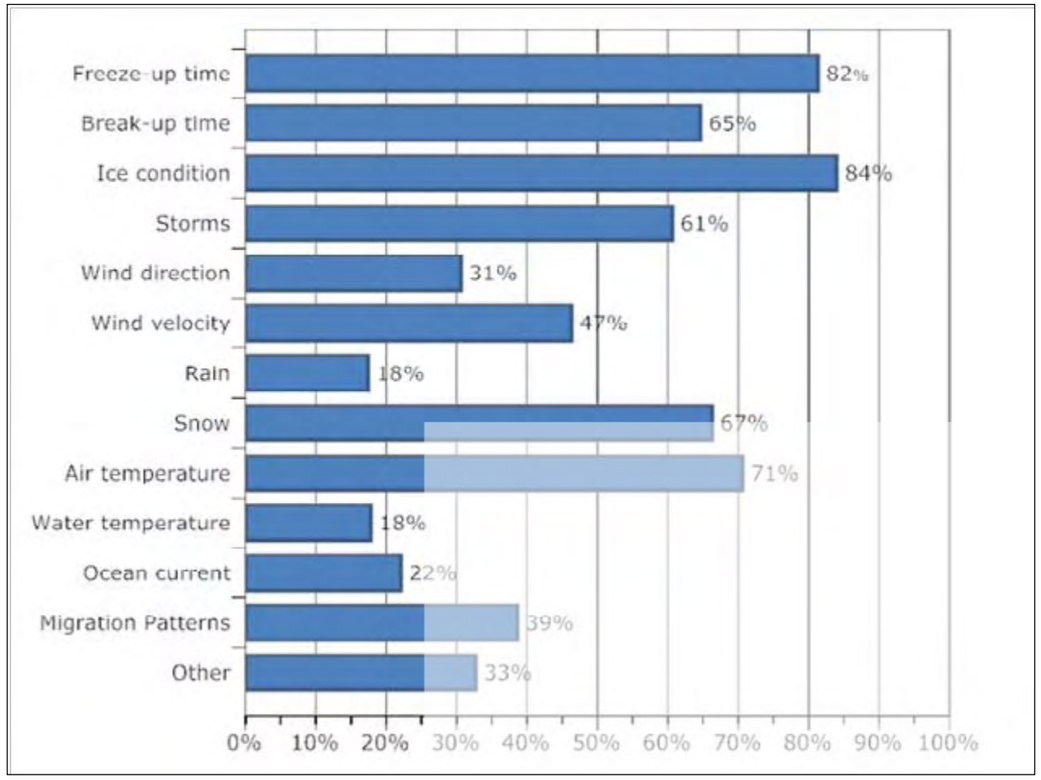
B. Observed Changes in Environmental Conditions (n=49)

Observed changes in environmental conditions in the Gambell area were numerous and varied. Respondents were first asked if they had observed anything 'unusual or rare in the environment' at the location of their previous hunting/fishing trip. Then they were asked if they had noticed changes in specific categories of environmental conditions in the previous 10-25 years and to describe those changes in an open-ended format.

Of the respondents, 41% agreed that they had observed something 'unusual or rare' in the environment in the past 5 to 10 years at the specific location of their previous hunting/fishing trip.

In Gambell, many respondents had observed specific environmental changes in the previous 10-25 years. From most frequently mentioned to least, 84% noticed a change in ice conditions, 82% noticed a change in the timing of freeze-up, 71% noticed a change in air temperate, 67% noticed a change in snow, 65% noticed a change in the timing of break-up, and 61% noticed a change in storms (see Figure 15).

Figure 15. Percent of Gambell respondents who have observed some change in environmental conditions within the previous 10 to 25 years (n=49)



Specific observed changes in each category of environmental conditions varied somewhat, but some trends were apparent. The largest percentage of observed change was in ice conditions (84%). Gambell is ice-locked during the winter months. Hunting for marine mammals, including whale, is affected by ice conditions, so it is not surprising that many respondents detected a change in ice conditions.

The following percentages are responses to open-ended questions, which state, 'How has it (the environmental condition) changed?' They are percentages of the whole sample (n=49) and because a person may note more than one change in an environmental condition (thin ice and less shore fast ice) the percentages don't total the whole portion of observers of a given change.

Much detail was given about specific changes in ice condition. Of the respondents 49% reported less ice, 33% reported thinner ice, 16% reported unreliable or dangerous ice, and 12% reported change in shore fast ice. Other observations included rotten ice, an increasing predominance of young ice, unpredictable ice flows, and scattering of ice into smaller sheets.

- "There's less ice each year and it is getting thinner. It comes very late in the fall and goes out real early in the spring. Weather conditions have changed too. We used to have northerly winds. Now, in that season, we get more southerly wind. The wind is stronger and changes all the time. I've never seen this before in my life."

In Gambell a majority (76%) reported freeze-up was later than usual, while 65% reported break-up as earlier. Many reported a change in air temperature with 76% describing it as warmer, while 8% noted greater fluctuation in air temperature.

Observations of snow conditions included less snow (47%), and 12% noted that there was less snow on the ground because it is blowing away.
Of the respondents 16% noticed an increase in storm frequency, while 14% noticed an increase in the strength of storms.

Many respondents (33%) reported other changes that were not specifically addressed in the survey. These changes included erosion, melting permafrost, generally

erratic and unpredictable weather, changes in the timing of seasons, early growing and dying of greens, fewer berries and changes in the magnetic north pole.

- "There's beach erosion. About 0 to 50 feet or more. The permafrost is melting. I've noticed this from the early '90s to the present."

C. Abundance and Quality of Subsistence Resource (n=42)

In Gambell, a majority of respondents (69%) harvested seal and/or walrus (see Table 7). Salmon, bowhead whale, crab, tom cod, emperor geese and sheefish were also harvested by the respondents.

Table 7. Species of Fish/Marine Mammal Harvested (n=42)

Species	Frequency	Percent
Salmon	1	2%
Walrus, Seals	29	69%
Bowhead Whale	1	2%
Crab	2	5%
Tom cod	1	2%
Emperor geese	1	2%
Multiple species	6	14%
Sheefish	1	2%
Total	42	

Answers to open-ended questions revealed that many respondents (30%) believe there are fewer walrus and/or seals in the area.

- "There are less game every year"
- "There are less seals. From time to time marine mammals change their habitats depending on food source, noise pollution."
- "There were more seals ten years ago"

Many (26%) also noted the animals were farther out and/or harder to get to.

- "The hunt has arrived later and left earlier, so we have less time to hunt."
- "There are big changes. It's warmer. Next month should be real cold. The seals are leaving early because the ice goes out early. They're going up north. Used to be able to hunt till June."
- "The walrus [migration pattern has changed]. They're getting farther and farther away. They hang out on the ice pack."
-

The harvests overwhelmingly yielded healthy looking animals/fish. When asked if the previous harvest trip yielded any animals/fish with visible disease 88% replied that it did not. The reports of diseased animals included:

- Walrus catch:
- "Green color under the skin, looked sick."
- Walrus/seal catch
- "Some animals are skinny"
- "Rotten teeth. Some had less weight."
- Seal catch:
- "Bump on the seal's back"

In Gambell, locations of the previous harvest trip were described as reliable by 86% of respondents. The reliability of these locations is reflected in responses to a question about future harvest events. Of the respondents, 76% reported that they would return to the same location to harvest the same species on future trips, although 98% reported that they had no idea how much they may catch.

6.3.2 Kanchalan

A. Kanchalan Sample Profile (n=43)

In Kanchalan, interviews occurred between July 2008 and September 2009. The sample was predominately male (72%), and the majority fell between the ages of 36 and 55 years old (see Table 2). The majority (77%) have lived in the community for more than 30 years (see Table 8). The sample represents many years of hunting and fishing experience with 82% having 11 years or more experience harvesting in the area (see Table 9). At the time of the interview, 26% reported they were unemployed.

Table 8. Years of residence in the community (n=43)

Length of Time	Frequency	Percent
0-5 years	1	2%
11-20 years	2	5%
21-30 years	7	16%
Total	43	

Camp near Kanchalan, Russian Federation

Figure 16. Percent of Kanchalan respondents who have observed some change in environmental condistions within the previous 10 to 25 years (n=43)

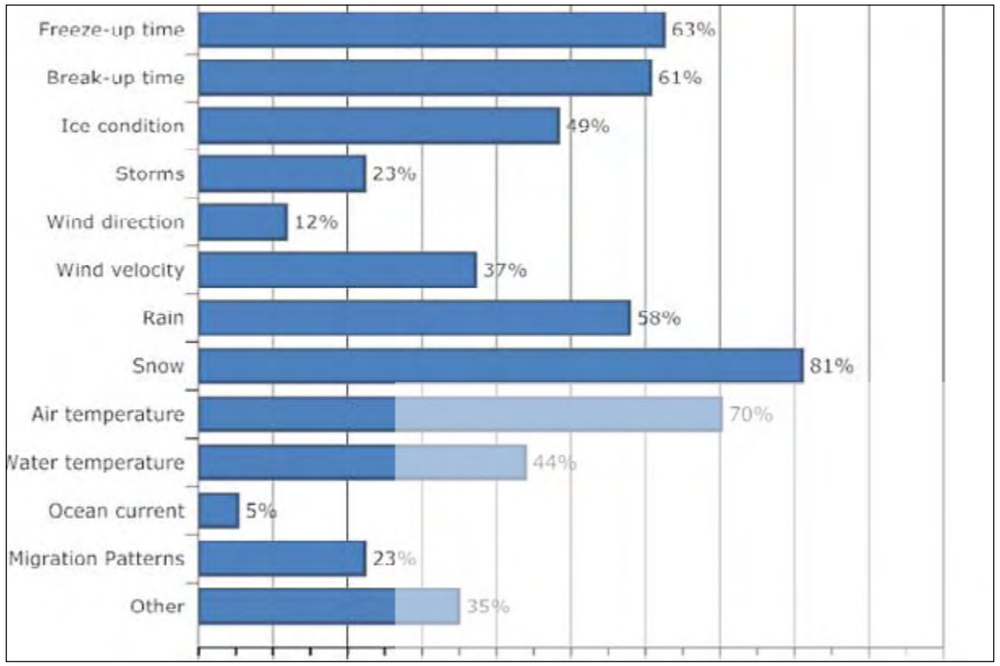
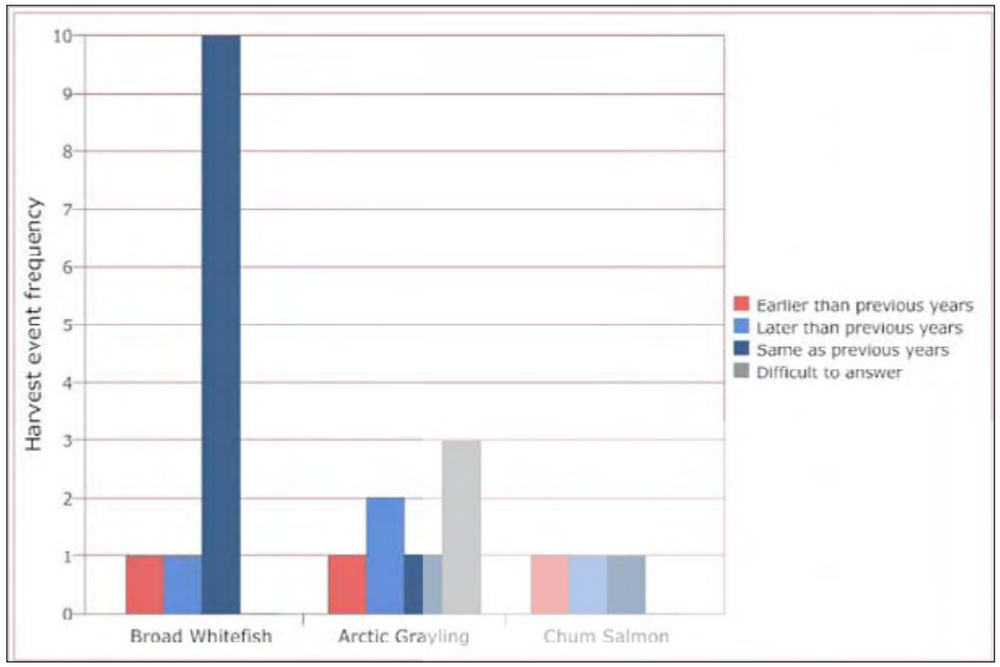


Figure 17. Timing of fish runs in Kanchalan compared to previous 5-10 years by species (n=22*)



* Those harvested species that had begun their seasonal migration at the time of the interview

Length of Time	Frequency	Percent
More than 30 years	33	77%
Total	43	

Table 9. Years hunted/fished in the area (n=43)

Length of Time	Frequency	Percent
0-5 years	3	7%
6-10 years	5	12%
11-20 years	11	26%
21-30 years	8	19%
More than 30 years	16	37%
Total	43	

B. Observed Changes in Environmental Conditions (n=43)

Kanchalan respondents noticed many changes in environmental conditions. When asked if they had noticed anything 'unusual or rare' in the environment at the specific location of the previous fishing trip in the past 5 to 10 years, a majority (56%) agreed they had.

When asked in a 'yes or no' format whether they had noticed a change in specific environmental conditions within the last 10 to 25 years, many replied that they had. Of the environmental changes 81% noticed a change in snow condition, 70% noticed a change in air temperature, 63% noticed a change in the timing of freeze-up, and 61% noticed a change in the timing of break-up (see Figure 16).

By examining the open-ended responses addressing what changes were observed for each environmental condition some trends were revealed. The most frequently observed change is in snow conditions (81%). There appeared to be a near consensus that there was less snow (79%). Only one respondent noticed more snow. The change in snow conditions was thought to have an effect on the reindeer herds by some respondents.

- "Снежный покров стал тоньше: за зиму вымерзла пушица – самый ранний корм оленей."
- "The snow cover has gotten thinner. The cotton grass – the earliest food for the reindeer -- froze through over the course of the winter."

Although many observed a change in air temperature (70%) there was a lack of consensus as to how it was changing. Some believed it was becoming warmer (44%), while others believed it was getting cooler (35%).

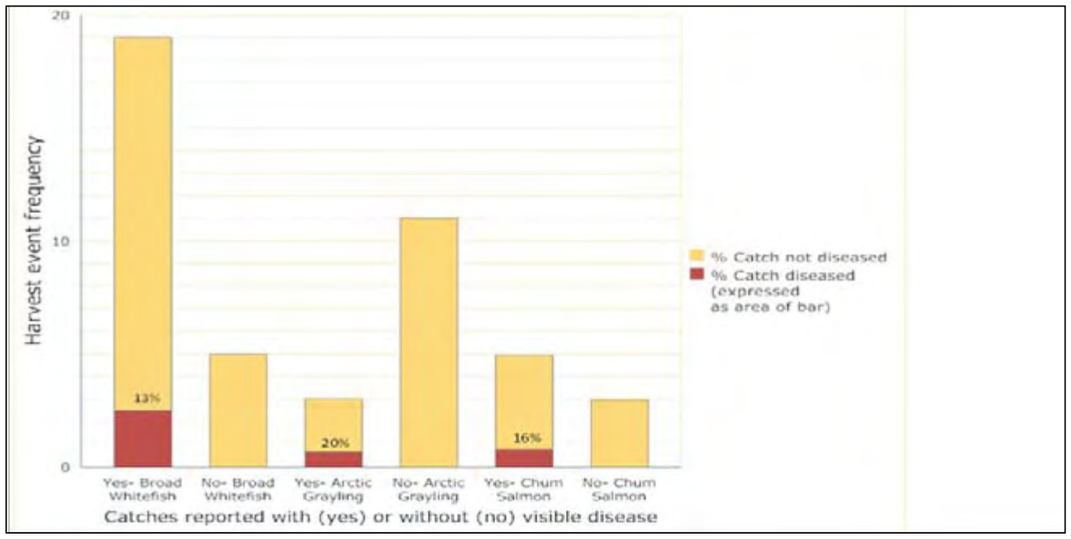
Many agreed that freeze-up time was late (56%), and a few believed it to be early (7%).

- "Раньше в начале сентября уже был прочный лед на лужах, на реке – забереги. Сейчас конец сентября, льда нигде нет."
- "Before there was already thick ice on the puddles on the river. It was up to the banks by the beginning of September, but now there's no ice anywhere by the end of the September."

The timing of break-up was believed to be earlier by 30% of respondents, while 26% believed it was later. Rain was considered to be less frequent by 40% of respondents.

Other environmental changes found in open-ended responses included lower water levels in the rivers (30%) and an increase in underwater vegetation (14%). Unusual observations included the appearance of beluga whales at the fishing location and the increase of willow and alder, resulting in the appearance of sparrows and ravens.

Figure 18. Frequency of respondents in Kanchalan reporting their harvest included fish with visible signs of disease and average percentages of the catch reported to be diseased (n-46)



- "Несмотря на то, что идут дожди, воды в реке не прибавляется, река мельчает."
- "Despite the fact that it rains, the water in the river doesn't increase. The river gets shallower."
- "В поселке появились воробьи, в тундре много воронов, все зарастает ольхой и ивой."
- "Sparrows have appeared in the village. On the tundra there are a lot of ravens. Everything is overgrowing with willows and alders."
-

When asked about the timing of the fish runs that had begun at the time of the interview, reports were split as to whether the fish runs were early or late (see Figure 17). Although a majority of those harvesting broad whitefish (83%) agreed that the timing of the seasonal migration was the same as previous years.

C. Abundance and quality of subsistence resource (n=47)

The harvest events in the sample included broad whitefish (53%), arctic grayling (30%) and chum salmon (17%).

In responses to open-ended questions, 37% of the sample referred to declining fish stock in some manner. Broad whitefish were said to be decreasing by 19% of respondents, and arctic grayling were also reported as decreasing (14%); 12% reported more pike in the area. Reasons cited for declining fish populations included decreased water levels, increases underwater vegetation and nearby mining activity.

- "В местах обитания чира появилась водная растительность, стало больше щук, уровень воды понизился, чира стало меньше."
- "Underwater vegetation has appeared in the Broad whitefish's habitat. There are more pike. The water level has gone down. There are less Broad whitefish."
- "Летом в реках стало меньше воды, рыба уходит вниз по реке. Гибнет много мальков из-за пересыхания проток."
- "This summer there was less water in the river. The fish went downstream. A lot of fry are dying due to the drying up of the channels."
- "Муть в реке из-за работы мелиораторов или прииска Валунистого может помешать рыбе добраться до мест нереста."
- "Dregs in the water from the land-reclamation work, or maybe it's the Valnutsky mine, interferes with the fish getting to the spawning ground."

Reports of diseased fish were fairly common in the sample. A majority (57%) of harvest events yielded at least one fish with visible disease (see Figure 18). Catches of broad whitefish were more frequently reported with visible disease (76%). Sores, ulcers, spots, and/or pimples were the most common forms of disease reported in broad whitefish.

- " Красные пятна на спине и боках рыбы."
- "Red spots are on the spines and sides of the fish."
- "На голове и спине рыб были язвы."
- "There were ulcers on the head and spine of the fish."
- "Пятна на теле в области головы, иногда с плесенью."
- "There are spots on the body in the area of the head, sometimes with mold,"
- "Капсулы в мягких тканях и глазах, язвы на боках."
- "There are capsules in the soft tissue and eyes, [along with] lesions on the side."
- "Кишки с шишечками."
- "Guts are with bumps."
- "Особи с белыми точками на печени и на желудке."
- "Some fish are with white spots on the liver and the stomach."
- "Язвочки на теле у брюшных плавников."
- "Sores are on the body of the abdominal fins."

Reported disease of chum salmon included:

- "Попадались рыбы, зараженные плоскими червями (мякоть спинной части)."
- "Some caught fish were infected with flat worms in the spinal tissue."
- "Рыбы-уродцы с искривлением позвоночника, с непропорционально крупной головой; пиявки на коже, рядом с жабрами."
- "Freak-fish with crooked spines, disproportionately large heads, and leeches on the skin nearby the gills"
- "Рыбы, внутри которых были личинки."
- "Fish that were infested with maggots."
- "На спине рыб были белые пятна (шишки)."
- "There were white spots (bumps) on the fish spine."

The location of the previous fishing trip was described as reliable by 89% of the respondents, which is reflected in the fact that 86% planned to return to the same place on their next fishing trip for the same species. For those going to a different location, most intended to stay, again, within a 15 kilometer range. Harvesters seemed generally confident that they could predict the size of their next catches, and 62% said they had an idea of what their next catches would be.

6.3.3 Nikolskoye

A. Nikolskoye Sample Profile (n=29)

In Nikolskoye, interviews were conducted from May 2008 to August 2008. The sample was predominantly male (79%) and comprised of varied age groups (see Table 2). The majority are long-time residents (see Table 10) with 66% having lived in the area for more than 30 years. Individuals with more than two decades worth of experience harvesting in and around Nikolskoye made up 80% of respondents (see Table 11). In Nikolskoye, 55% described visiting the location of their last harvest either often or very often.

Figure 19. Percent of Nikolskoye respondents who have observed some change in environmental conditions within the previous 10 to 25 years (n=29)

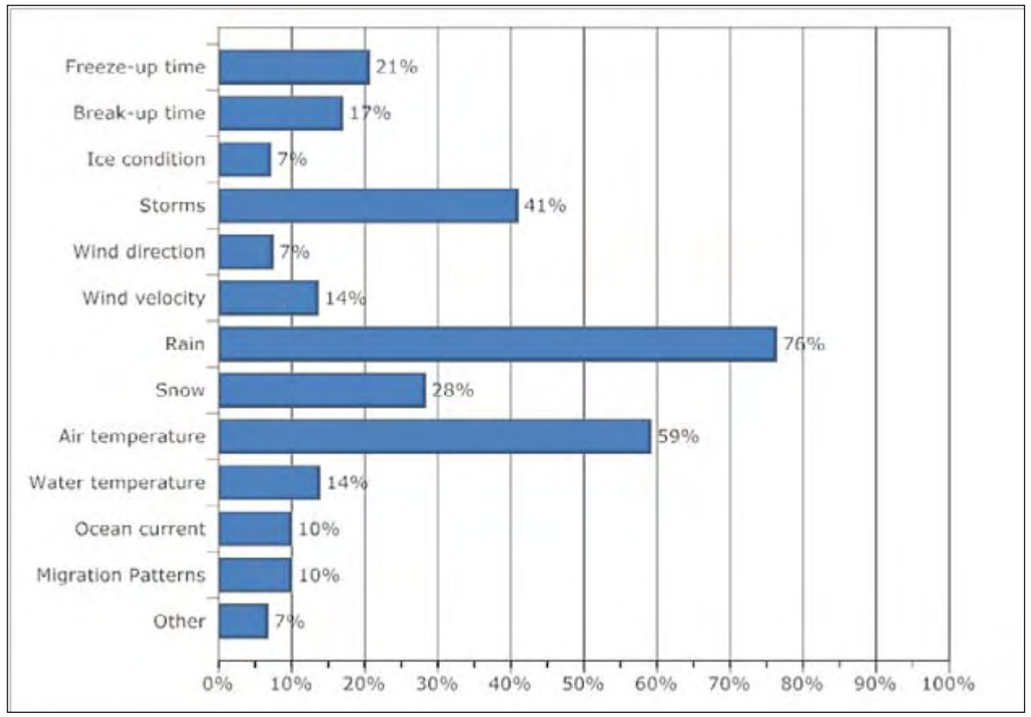
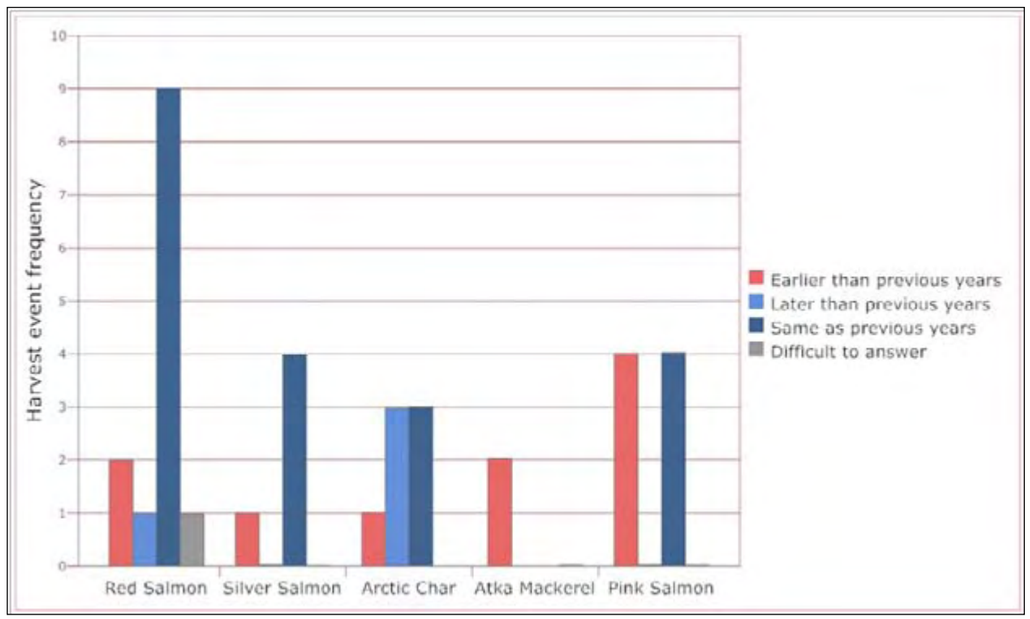


Figure 20. Timing of fish runs in Nikolskoye compared to previous 5-10 years by species (n=35*)



*Those harvesting species which had begun their seasonal migration at the time of the interview

Table 10. Years of residence in the community (n=29)

Length of Time	Frequency	Percent
0-5 years	2	7%
11-20 years	3	10%
21-30 years	5	17%
More than 30 years	19	66%
Total	29	

Table 11. Years hunted or fished in the area (n=29)

Length of Time	Frequency	Percent
0-5 years	1	3%
6-10 years	2	7%
11-20 years	3	10%
21-30 years	8	28%
More than 30 years	15	52%
Total	29	

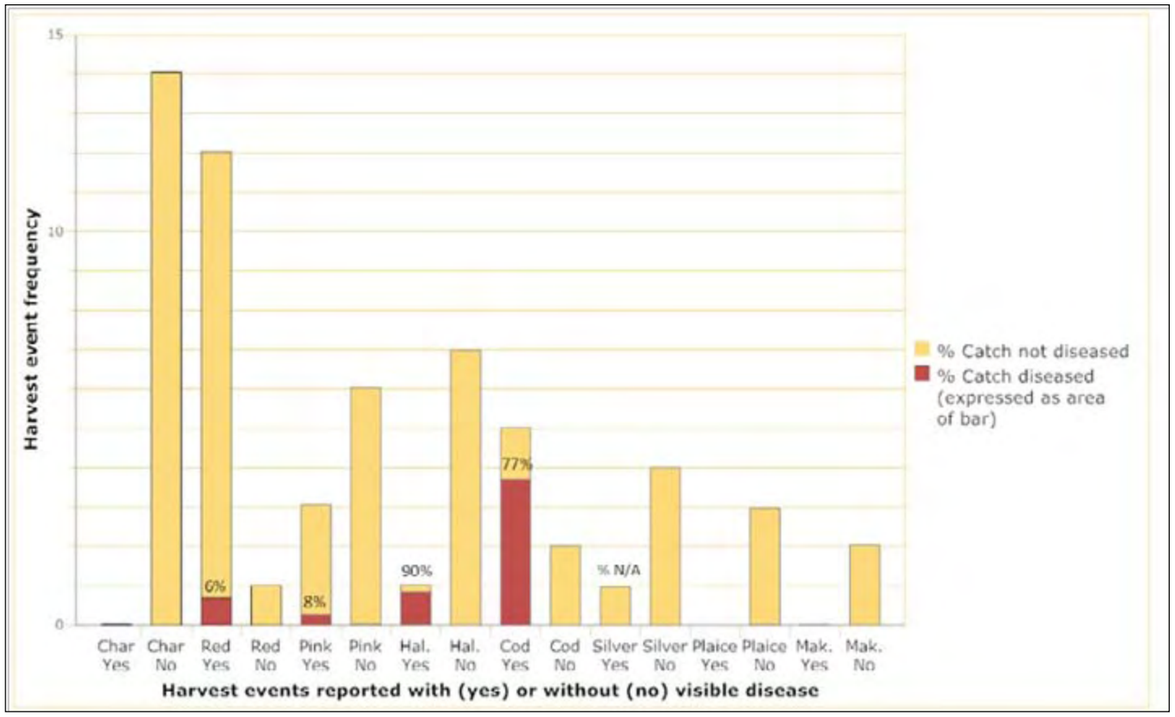
B. Observed Changes in Environmental Conditions

Observed environmental changes in Nikolskoye were noted at the location of the previous harvest and in responses about specific environmental conditions.

Location specific changes were noted by 66% of respondents at the location of the previous harvest. The most frequently mentioned location-specific change was in the river banks, channels, and underwater vegetation (45%). Other changes included pollution, fewer fish, and more organic matter in the water.

- “Помельчали речки, зарастают понемногу травой.”
- “The streams have gotten smaller, gradually getting overgrown with grass.”
- “Сравнивая с днями моего детства и молодости, обмелела речка, замыло песком старое русло, исчезла береговая растительность вдоль берега в холмах.”
- “Comparing with the days of my childhood and youth, the river has gotten shallower; the old riverbed washed out with sand, bank vegetation disappeared along the banks in hills.”
- “Теперь это грязное место: текло горючее, каустик, канализация. И просто шторма меняют берег – все меняется.”
- “Now, this place is dirty; there’s pollution, caustic soda, sewage. And the storms are affecting the shores. Everything is changing.”
- “Изменился состав водорослей, возможно,

Figure 21. Number of harvest events yielding diseased fish and average percentage of catch reported as diseased in Nikolskoye (n=61)



Fishing near Nikolskoye, Russian Federation

поднялся океанический уровень воды (опустился берег), стала накапливаться черная гниющая органика, рыба измельчала."

- "The composition of underwater vegetation has changed. Perhaps, the ocean water levels increased (sinking the banks). Black organic material has started to accumulate. Organic matter is accumulating."

When asked about changes in specific environmental conditions observed in the past 10 to 25 years, rain, air temperature and storms were most frequently mentioned (see Figure 19). A change in rain was observed by 76% of respondents, all of which reported there to be less rain. Air temperature was also observed to be changing by 59% of respondents, although there was lack of consensus as to how it was changing. From the open-ended portion of the survey, 54% believed is was warmer, while 21% believed it to be cooler. Storm conditions were observed to be changing by 41% of respondents, but again there was lack of consensus as to how they were changing. Decreased frequency and/or intensity of storms was observed by 17%, while 10% believed they were increasing in frequency and 7% believed them to be increasing in intensity.

The timing of migrating fish was also examined for those runs that had begun at the time of the interview. This included 35 harvest events in which at least one type of migrating fish (red salmon, silver salmon, pink salmon, arctic char, atka mackerel) was harvested. When asked about the timing of the seasonal migration 29% reported earlier seasonal runs, 11% reported later seasonal runs, 57% reported that the run was the same as previous years and 3% had difficulty answering the question (see Figure 20).

C. Abundance and Quality of Subsistence Resource (n=61)

In Nikolskoye, the participants harvested (from most frequently harvested to least) arctic char, red salmon, pink salmon, halibut, pacific cod, silver salmon, plaice, and atka mackerel (see Table 12).

In answers to opened-ended questions,17% of respondents reported that there were fewer fish.

- "Стало меньше рыбы, обмелела речка, меняется русло, меняются старицы"
- "There are fewer fish, the river got shallow, the riverbed is changing, the old riverbed is changing."

When asked if they had caught any fish with visible disease on the previous trip, 36% reported they had. Of those harvesting red salmon (13 respondents), 92% reported that their catch included at least one fish with visible disease. Of those that harvested pacific cod (7 respondents), 71% reported that their harvest included at least one diseased fish. On average, a large portion (77%) of the pacific cod catch was reported with some type of disease (see Figure 21).

Eight out of the 12 that reported a catch of red salmon with disease discussed the condition as bites from marine mammals, which is not unusual. In pink salmon, one harvester noticed an unusually small fish (30cm) with fully developed reproductive organs. Pacific cod diseases included worm infestations and ulcerations. Other reports of disease included flesh/skin infestations (6 harvesters observed this), sores and ulcers (6 harvesters observed this), and one case of a fish with underdeveloped sperm sacks.

Table 12. Species harvested by respondents (n=61)

Species	Frequency	Percent
Halibut	8	13%
Red salmon	13	21%
Silver salmon	5	8%
Arctic char	14	23%
Atka mackerel	2	3%
Pink salmon	9	15%
Plaice	3	5%
Pacific cod	7	12%
Total	61	

A majority (93%) describe the locations of the previous trip as reliable. An indentical percentage (93%) planned to return to the same location for the same species on the following trip. A majority (84%) reported having an idea of how much they would catch on their next trip while 16% reported having no idea.

6.3.4 Sand Point

A. Sand Point Sample Profile (n=18)

In Sand Point, interviews occurred between May 2008 and October 2008. The sample was slightly younger with 56% between the ages of 18 and 35 (see Table 2). Again, the sample was predominately male (61%). Participants who have spent more than two decades in the community comprised a majority of the sample (84%) (see Table 13) and most have harvested in the area for more 11 or more years (78%), (see Table 14). At the time of the interview 37% report being unemployed.

Figure 22. Percent of Sand Point respondents who have observed some change in environmental conditions within the previous 10 to 25 years (n=18)

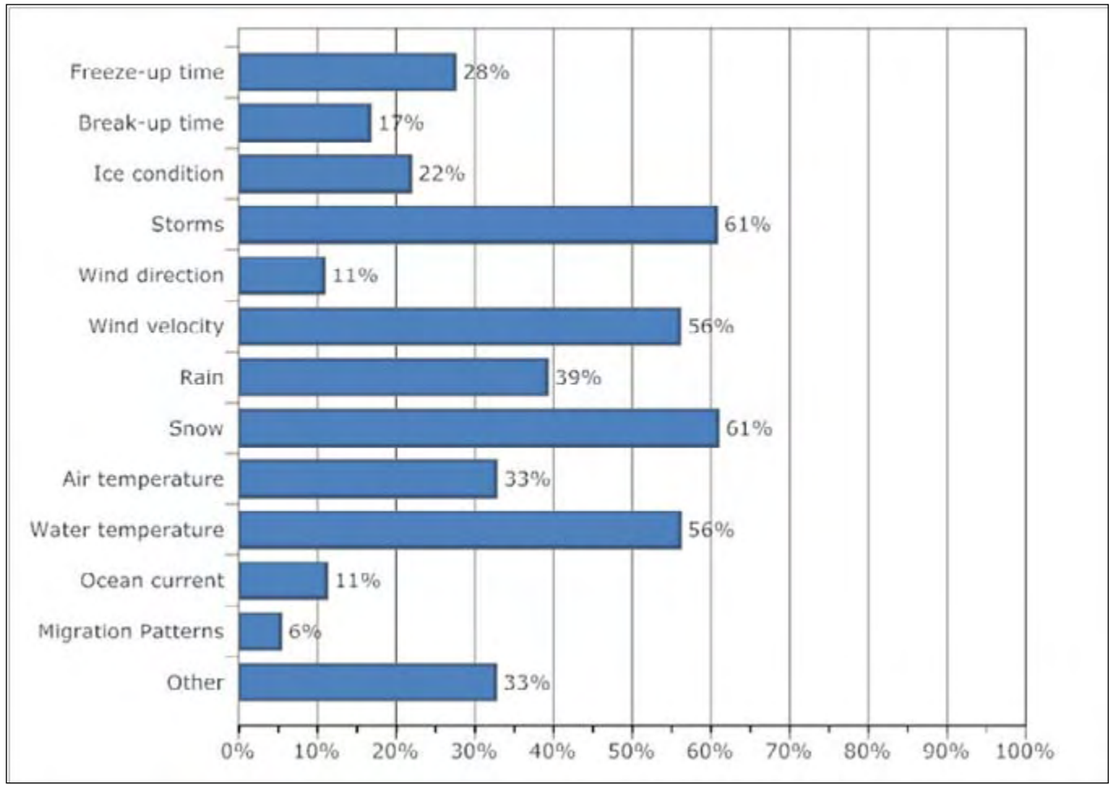
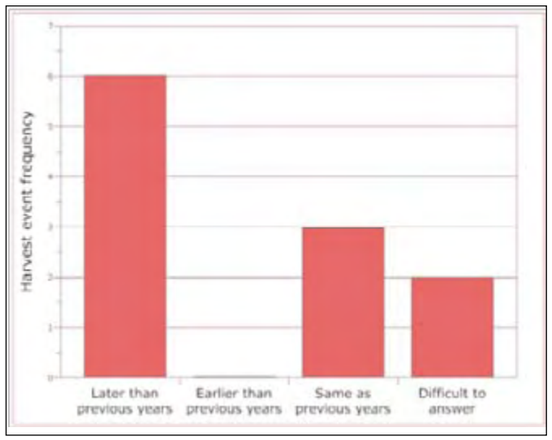


Figure 23. Timing of fish runs in Sand Point compared to previous 5-10 years (n=11*)



*Salmon harvesters

Table 13. Years of residence in the community (n=18)

Length of Time	Frequency	Percent
6-10 years	3	17%
21-30 years	5	28%
More than 30 years	10	56%
Total	18	

*due to rounding

Table 14. Years hunted/fished in the area (n=18)

Length of Time	Frequency	Percent
0-5 years	1	6%
6-10 years	3	17%
11-20 years	7	39%
21-30 years	1	6%
More than 30 years	6	33%
Total	18	

*due to rounding

The Cumberlidge Family fishing near Sand Point, Alaska

B. Observed Changes in Environmental Conditions (n=18)

When respondents were asked specifically about any changes observed at the location of the previous hunting/fishing trip 33% indicated that they had observed some type of change within the previous 5 to 10 years.

The survey also queried about changes in specific environmental conditions during the previous 10 to 25 years. Changes in storms and snow conditions were most frequently noticed (61%), followed closely by observed changes in water temperature (56%) and wind velocity (56%) (see Figure 22).

Observed changes in storms included increased frequency (33%) and increased strength (22%).

- "Storms are warmed and more intense over a span of years."
- "Storms are worse in the past 5 years."
- "[During storms] there's more wind. It seems like it blows hard for longer periods of time."
- "More storms towards the end of the season this year. Summer was late this year."
- "More rain and more storms these last couple of years, it seems like."

Snowfall was reported to be occurring earlier in the year (33%). More snow was reported by 28%, while 11% believed there was less snow.

There was lack of consensus as to how water temperature was changing with 11% saying it is warmer and 33% saying it had become colder.

A majority (89%) of those who noted a change in wind velocity believed that it had increased in strength.

- "There's more wind. It blows harder for longer periods of time, it seems like."
- "There are higher winds for longer times."

Other unusual sightings included more alder, less seals, more krill (and whales associated with the krill) and humpback whales staying in the area longer than usual and even mating there (this usually occurs in warmer waters to the south).

- "Greater abundance of krill and whales than in previous years. Noticed this happening around the turn of the century (21st century). Whales are sticking around longer and not leaving for the winter."
- "Humpbacked whales mating. Never heard of that happening at these locations before. I even asked 'old timers', and none of them had heard of it either, if that tells you something. There are way more whales than when I was a kid. And some aren't even leaving for the winter."
- "There are less seals out there now. You used to be able to take 2 shells (shotgun shells) with you and get 2 seals, and now you have to take a whole box of shells and you're lucky to get 2 seals. They seem to be a lot more skittish. You can't get close to them anymore."

For those harvesting salmon (n=11), a majority (6) believed the run was later than usual, while 3 respondents believed it was the same as in previous years; 2 had difficulty answering the question (see Figure 23).

C. Abundance and Quality of Subsistence Resource (n=19)

In Sand Point, all participants harvested fish, and a majority (58%) harvested salmon (see Table 15).

Table 15. Distribution of species harvested (n=19)

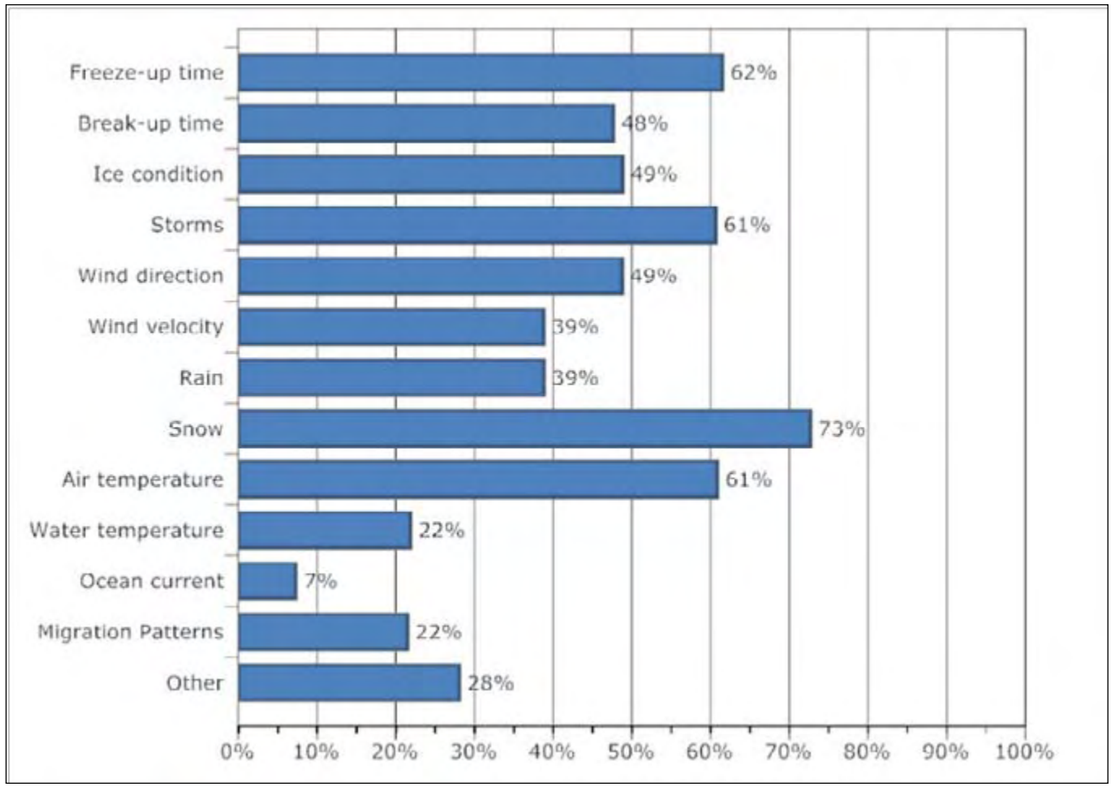
Species	Frequency	Percent
Salmon	6	32%
Halibut	5	26%
Red salmon	5	26%
Cod	2	11%
Clams	1	5%
Total	19	

In responses to open-ended questions, 27% of those harvesting salmon reported there were less salmon and 20% reported there were less halibut available. Two participants reported more pink salmon (a lower commercial value salmon). One participant elaborated discussing how the ratio of red salmon to pink salmon had changed.

- "More pinks in the last 2-3 years. Never used to catch so many pinks here. The reds haven't changed, just the pinks. It is a 60-70% pink ratio now. It used to be a steady 40% pink ratio."

There were three reports (16%) of catches that included at least one fish with visible disease. In all cases the percentage reported of the catch with visible disease was very small (<1%) or not quantifiable.

Figure 24. Percent of Togiak respondents who have observed some change in environmental conditions within the previous 10 to 25 years (n=69)



Locations of the previous harvest were described as reliable by 90% of participants and 68% planned on returning to the same location on the next trip to harvest for the same species. However, the reliability of these locations seems to be limited in that 95% reported that they could not estimate how much they would catch on their next trip.

6.3.5 Togiak

A. Togiak Sample Profile

In Togiak interviews were conducted from December 2008 to March 2009. The sample consisted of 57% males, with a relatively even spread across age groups (see Table 2). A majority were long-time residents, with 73% having lived in the area for more than 30 years (see Table 16). Many years of harvesting experience were represented (see Table 17). A majority (77%) had over two decades of experience harvesting in the area. At the time of the interview 78% reported being unemployed.

Table 16. Years of residence in the community (n=69)

Length of Time	Frequency	Percent
0-10 years	6	8%
11-20 years	4	6%
21-30 years	9	13%
More than 30 years	50	73%
Total	69	

Table 17. Years hunted/fished in the area (n=69)

Length of Time	Frequency	Percent
0-10 years	8	12%
11-20 years	8	12%
21-30 years	17	25%
More than 30 years	36	52%
Total	69	

*due to rounding

B. Observed Changes in Environmental Conditions (n=69)

When asked about the location of the previous harvest

trip, 32% reported changes at that location. Figure 24 displays answers to more specific questions about changes in environmental conditions. Frequently observed changes included a change in snow condition (73%), freeze-up time (62%), air temperature (61%), and storms (61%).

Observed changes in snow conditions included less snow (38%) and more snow (12%). Although there is lack of consensus as to how snow conditions are changing, half of those who observed more snow made it clear that they were talking about this year in comparison to prior years. Thus, they might agree with the more common observation of less snow as a general trend. The late arrival of snowfall was observed by 7%.

- "Long ago there was lots of snow, and when it got cold it stayed cold. We used to dig up doors below. Our homes used to be covered and it was good insulation for our home. Now winters come late."
- "Long time ago there used to be lots of snow and blizzards."

Many agreed that freeze-up time was later (25%), while only 7% reported it was earlier. Greater variation in the timing of freeze-up was observed by 16% of respondents.

- "Freeze up of the bay and river took longer than expected. And it has even rained in December, making it harder to travel with snow machine."
- "Freezes-up very early some years, very late the next year. Freeze up is not constant anymore."

Observed changes in air temperature included unusual fluctuation in air temperature (35%), warmer air temperature (33%), and a few reported that the air temperature was cooler (15%).

- "Our weather will be zero one day and then we'll wake up to rain the next."

Observed changes in storm patterns included increased strength and longer storms (22%), while 13% noticed an increase in the frequency of storms.

- "60 mile-65 mile per hour winds during storms. This is recent – within the last 10 years."
- "Big storms with high winds. This is very different for January."

Other observed changes included lower water levels in the Togiak River (9%), fish changing locations (7%), erosion and water pollution. Four respondents said that the Earth appears to have tilted, based on an unusual position of the stars or unexpected location of sunrise/sunset. Two individuals reported catching unusual fish.

- "Second Creek changed; lots of mud, the ocean shores are flat and shallow. When I stayed down by the ocean line (beach) the land is sinking down."
- "The water is dirty because of the Togiak River Lodge – tourism. We have to travel further up for cleaner water."
- "I think it has to do with global warming. Different fish caught like white fish closer by the mouth of the river."

Data related to the timing of the fish run in Togiak was not used because of confusion about the meaning of the term 'run', perhaps due to the misunderstanding of the English word.

C. Abundance and Quality of Subsistence Resource (n=70)

A majority (88%) of harvest events consisted of trout and smelt (see Table 18). Seals, pike, salmon and common eider were also harvested by respondents. In responses to open-ended questions, 10% believed there were less fish or animals than there used to be.

- "There isn't much fish anymore. It's not like it was a long time ago. Now some people even catch baby trout."
- "We're not catching as much smelt"

Table 18. Species of fish/marine mammal harvested (n=70)

Species	Frequency	Percent
Salmon	2	2%
Trout	38	54%
Smelt	24	34%
Pike	2	3%
Seals	3	4%
Total	70	

Togiak CRA Olia Sutton shows off her bounty

Figure 25. Percent of Tymlat respondents who have observed some change in environmental conditions within the previous 10 to 25 years (n=38)

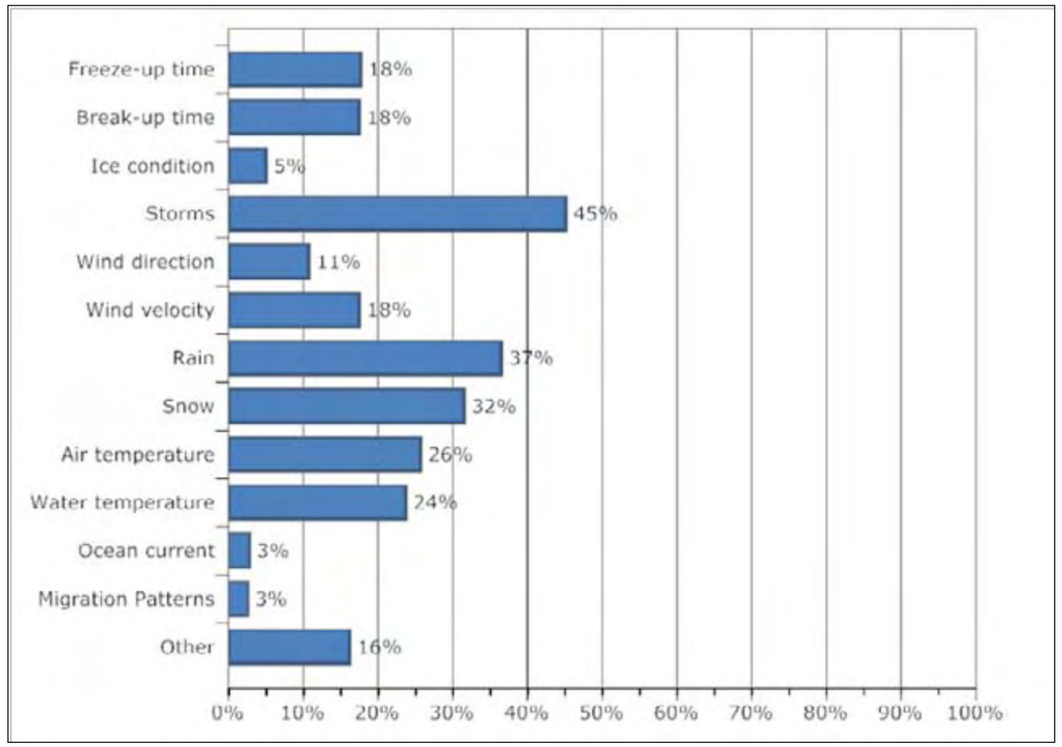
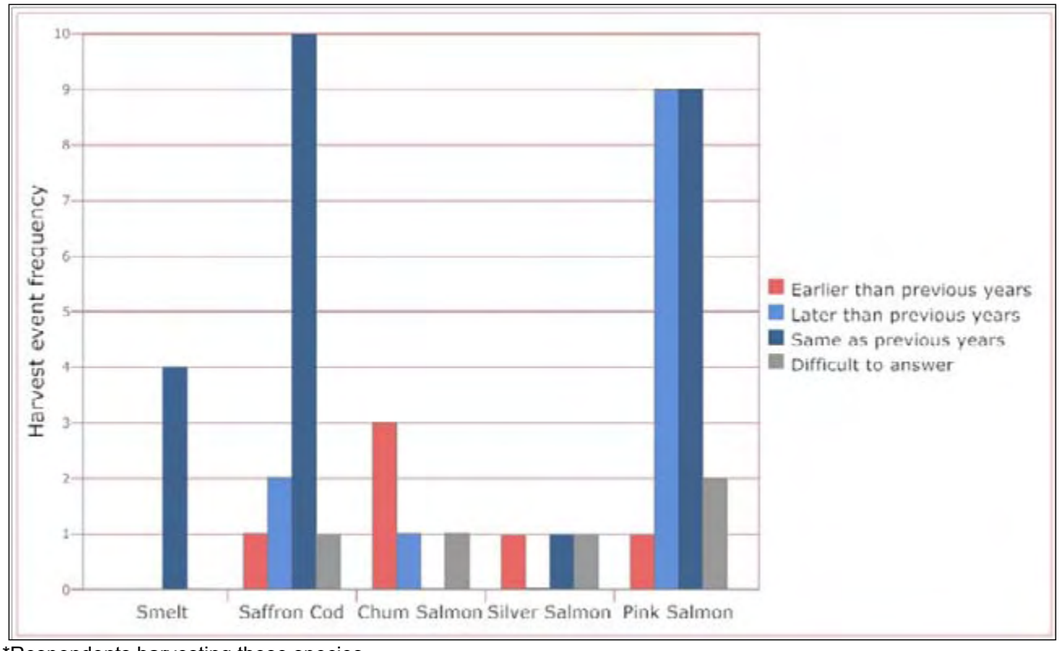


Figure 26. Timing of fish runs in Tymlat compared to previous 5-10 years by species (n=47*)



*Respondents harvesting these species

Species	Frequency	Percent
Seals and Common eider	1	1%
Total	70	

*Due to rounding

Only 6% of harvests yielded animals with visible signs of disease. The four cases in which harvesters reported ill fish included: smelt with “lumps” and other deformities, including a “crooked mouth”, a trout with “green colored meat”, and bites from marine mammals. White spots were found, in singular instances, on a trout and a Silver salmon.

Locations of the previous harvest were described as reliable by 99% of respondents, although 89% report having no idea of what the next harvest might yield.

6.3.6 Tymlat

A. Tymlat Sample Profile (n=38)

In Tymlat, interviews occurred between December 2008 and March 2009. The average age of the sample was 45 (see Table 2), and nearly equal portions of men and women were represented (see Table 3). Long-time residents comprised the majority of the sample with 74% having lived in Tymlat for over 30 years (see Table 19), and 80% have harvested in the community for 11 years or more (see Table 20). At the time of the interview, 68% reported they were unemployed.

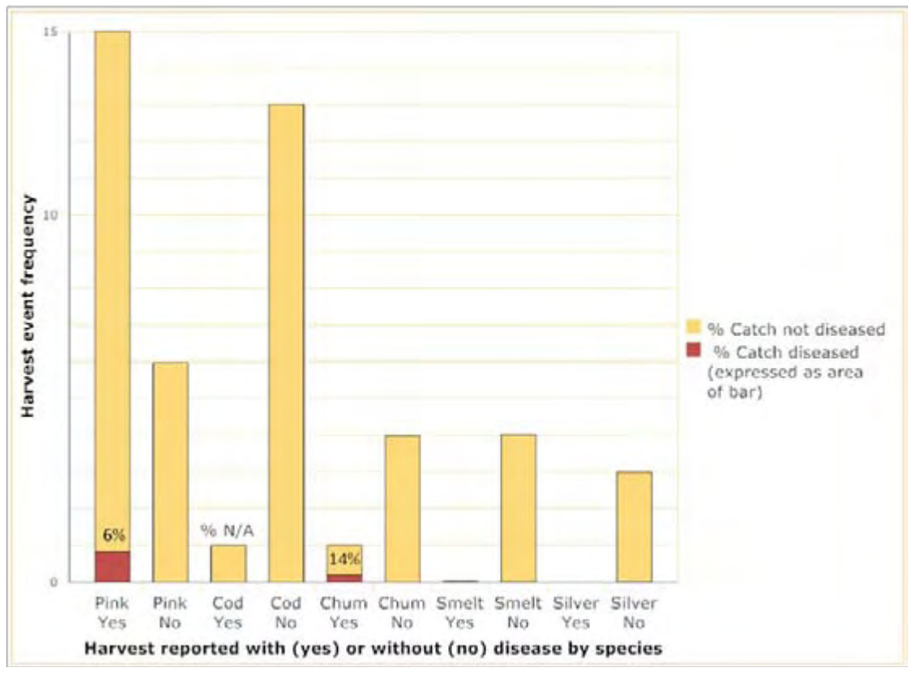
Table 19. Years of residence in community (n=38)

Length of Time	Frequency	Percent
0-5 years	0	0%
6-10 years	2	5%
11-20 years	1	3%
21-30 years	7	18%
More than 30 years	28	74%
Total	38	

Table 20. Years harvested in community (n=38)

Length of Time	Frequency	Percent
0-5 years	1	3%
6-10 years	7	18%
11-20 years	12	32%
21-30 years	6	16%
More than 30 years	12	32%
Total	38	

Figure 27. Number of harvest events yielding diseased fish and average percentage of catch reported as diseased in Tymlat (n=48)



Due to rounding

B. Observed Changes in Environmental Conditions

Respondents in Tymlat noticed fewer changes in environmental conditions than residents in other communities. Very few (5%) noticed a change at the location of the previous fishing trip. Figure 25 displays observed changes in specific environmental conditions over the past 10 to 25 years. Storms were the most frequently cited change (45%), followed by changes in rain (37%), snow (32%) and air temperature (26%).

A substantial portion noticed changes in storms. Many (26%) reported an increased frequency of storms. Increasing strength was also frequently mentioned by 13%. Hail in association with storms was cited as occurring more frequently by 18%.

- “С 2005 года уже началось больше штормов. И с каждым годом сильнее и больше. И ветра и дожди.”
- “Since 2005 there’s started to be more storms. And they are stronger and bigger with every year, and there are winds and rains.”
- “В этом году штормов очень много было. Чуть ли не неделями сидели дома. Раньше такого не было. Летом стало холодно.”
- ”This year there were a lot of storms. We stayed at home for weeks. There was nothing like this before. Summers have gotten colder.”
- “Стало в этом году больше гроз, даже град шел. Раньше, года два назад, такого не было.”
- “There are more thunderstorms this year, we even had hail. Two years back we did not have such things.”

In responses to open-ended questions, 45% observed more rain than in the past. There was not a single report of less rain. Flooding was discussed in association with the increase in rain.

- “Дождь почти все лето лил, даже в декабре был дождь со снегом ночью. Днем мороз и гололед. Раньше такого не было.”
- “The rain poured almost the whole summer, even in December there was rain mixed with snow at night. In the day time, frost and glazed frost. There was no such thing before.”
- “В 2001 году осенью был сильный шторм, большие накаты. Затопило рыбозавод, унесло с завода пластмассовую посуду. От шторма навага валялась на берегу. Мы ее собирали собакам.”
- “In 2001 in the fall, there was a big storm, big waves. It flooded the fish-processing plant; it took plastic kitchenware from the plant. After the storm, there were cod along the shore. We collected them for the dogs.”

A change in air temperature was observed by 26%. Responses to open-ended questions revealed that


Photo: D. Utkin

Fishing on Bering Island, Russian Federation

34% believe the air temperature is becoming colder in the summer and fall, while 13% reported warmer winters.

The most frequent observation that fell into the 'other' category was an increase in pollution (11%). Observations included fuel wastes from gold mining, impacts from explosions associated with mining activity, oil spills in the ocean and dirty ice.

- "Еще помню, что в верховьях реки, что -то взрывали (люди говорили). Река стала рыжая и рыба дохлая попадалась, мы как раз в это время на устьях рыбачили. Говорят, что это золотодобытчики в верховьях что-то делали."
- "I remember that in the upstream of the river something blew up (people were saying). The river became rusty and dead fish were being caught, we were fishing in the delta at that time. They say the gold miners upstream were doing something."
- "[Лёд] изменился из-за выбросов горючих отходов в небо, раньше лед употребляли для питья, чай пили. А сейчас его ни за что нельзя употребить. Его растопишь, а вода сверху грязная."
- "[Ice conditions] have changed because of the fuel emissions [possible black carbon] into the sky. We used to use ice for drinking, made tea. And now there is no way you can use it for anything. When you melt it, the water on top is dirty."

Changes were also reported in the timing of fish runs. Of those harvesting chum salmon, 60% reported that the harvest seemed earlier, while 43% of those harvesting pink salmon reported that the run seemed later (see Figure 26).

C. Abundance and Quality of Subsistence Resource

A variety of fish were harvested on the previous trip by respondents (see Table 21) with pink salmon being the most frequently harvested.

Table 21. Species harvested

Species	Frequency	Percent
Smelt	4	8%
Saffron Cod	14	29%
Chum salmon	5	10%
Silver salmon	3	6%
Multiple species	1	2%
Pink salmon	21	44%
Total	48	

*Due to rounding

A majority of harvests yielded healthy appearing fish, however 35% of the harvest events yielded at least one fish with visible disease (see Figure 27). The quantity of the catch reported with disease was relatively small.

Pink salmon were most frequently reported with disease. Diseases included boiled-like fish, deformities and growths, strange coating on the skin, soars, ulcers, and spots. Five individuals attributed the diseases in the fish they caught to various kinds of industrial pollution, including oil and diesel spills in the ocean and rivers, radiation from rocket testing, and the dumping of radioactive waste into the sea by the US government. Interestingly, many reported they would not eat these fish.

- "Иногда в коже глисты. Внутренности, кишки чистые. Но бывают с желтым налетом, типа слизи. Мы считали их больными. Бывало попадали одноглазые.(т.е.), у второго, с другой стороны, не было даже разреза глаз. Уродливые. Мы все ее разглядывали. Одна попалась. Больные мы не брали, закапывали. Еще попадались пузырчатые (мякоть была белого цвета и прозрачные пузырьки в мякоти). Я даже их трогала, лопала, но они крепкие. Содержимое не брызгалось, а растекалось по руке. Попадались очень редко. У старика спрашивала, что это? А он не знает. Я думаю они зараженные от топлива, испытаний. А муж ппппп- ппп пппп, г ппп ппп пппп."
- "Sometimes there are sores in the skin. Inside, the intestines are clean. But some are with yellowish mucus. We consider them to be sick. Sometimes we caught one-eyed ones, without even a slit for an eye on the other side. Ugly ones. We all looked at it. We got one like that. We did not take the sick ones, we buried them. And also we got some with bubbles in the meat – the flesh was white and transparent bubbles in it. I even touched them, tried to burst them but they were firm. The contents did not splash but flowed out. These were caught very rarely. I asked my old man – what is it? He does not know. I think they were contaminated from fuel [diesel] [spills], from military tests. My husband was saying – the sea is sick and the fish are sick too."
- "Рыба как будто в плесени. Такую рыбу мы выкидываем. Даже собакам не давали."
- "It is like fish is covered with mold. Such fish we throw out. We don't even give it to the dogs."

Harvest location were described as reliable by 94%, and 65% reported that their next trip for the same species would occur in the same location. When asked if they had any idea how much they would catch on their next trip, only 19% reported that they did.

7. Acknowledgements

The Aleut International Association would like to acknowledge the commitment and involvement of the following people, agencies and organizations during the preparation of this project, as well as express its appreciation for the additional financial and in-kind support that it has received.

U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affaires
Environment Canada
UAF, International Arctic Research Center
Alaska Conservation Foundation
Bristol Bay Native Association, Alaska, U.S.
Native Village of Gambell, Alaska, U.S.
The City of Togiak, Alaska, U.S.
Kamchatka Region Union of Tribal Fishermen, Kamchatka, Russia
Chukotka Regional Association of Indigenous peoples of the North, Chukotka, Russia
Administration of the village of Tymlat, Kamchatka Region, Russia
Administration of the village of Kanchalan, Chukotka, Russia
Red Cross Chukotka
Tymlat Fish Processing Plant, Chukotka
The Government of Chukotka Region
The Government of Kamchatka Region
U.S. Fish and Wildlife Service, Alaska, U.S.
Conservation of Arctic Flora and Fauna Working group of the Arctic Council
UNEP/GRID-Arendal
U.S. Arctic Research Commission
David Atkinson
Helen Chythlook
Molly Chythlook
Hanna Eklund
Mike Gill
Ann Gordon
Julie Gourley
Moses Kritz
Special thanks to Igor Krupnick for his thoughtful review and helpful comments.

Wolf Jackson and Dick Jacobsen Fishing near Sand Point, Alaska

Appendix 1: BSSN Workshops

An International Workshop on the Development of a Community-Based Research Network in Bering Sea Coastal Communities
US Arctic Research Commission, 420 L Street, Suite 315, Anchorage, Alaska
October 5, 2005

The Aleut International Association conducted an initial workshop in October 2005 to discuss the creation of a network with regional representatives. The purpose of the meeting was to learn about current and past community-based research projects, to discuss common interests and concerns, and to explore potential funding opportunities.

The most important outcome of this workshop was the decision as to what observations the BSSN survey should capture. It came as no surprise that the availability and abundance of fish and marine mammals emerged as the most pressing issue for communities.

Learning and sharing experience from other relevant projects was another important outcome of the 2005 workshop. The list of reviewed projects included:

IGAP (Indian General Assistance Program) of U.S. EPA
Native Village of Belkofski Environmental Office
Snowchange
Alaska-Chukotka Development Program
Chukotka Native Information Center
Commander Islands
Pribilof Islands Stewardship Program
Aleutian Pribilof Traditional Food Safety Program

What emerged from the discussion of this event were the common concerns of Alaskan and Russian Bering Sea villages: the availability and safety of traditional foods, local capacity building for monitoring projects' implementation, and the existence of an intricate connection between biological resources and the continuity of cultures. The outcome of this meeting was of significance for the work of BSSN, as it established the fact that the state of biological resources in the Bering Sea is important for evaluating the well-being of coastal communities.

Meeting Agenda

October 5, 2005
9:00 AM – 12:00 PM
- Introductions
- Statement of the workshop goals and expected results
- Review of the existing and past models of community-based research projects focusing on the following points:
- Goals
- Organizational structure (Who, how and why initiated the project and how it is/was managed and funded)
- Methodology (interviews, journals, targeted data collection, etc)
- Quality assurance
- Data management (digital format, access, property rights)

Possible projects for discussion (This list is not exclusive):

Title	Geographic area	Contact/Expert
ABC	Canada - Alaska	Joan Eamer/Gary Kofinas (presented by VG)
Polar Bears Commission projects	Alaska - Russia	Charlie Johnson
Whaling/walrus	Alaska - Russia	
Snowchange	Scandinavia- Russia	Tero Mustonen
Traditional Food Safety	Alaska	APIA

1:00 PM – 3:00 PM
- Current funding opportunities with NSF, NPRB, CAFF CBM, DEPA (Danish Environmental Protection Agency), IPY and projects under development (Presented by VG) (Facilitated discussion)
- What are common research needs of the Bering Sea communities and how they correlate with science needs?
- What are available capacities in the communities?
- What are the needs in capacities in the communities?

3:00 PM – 3:15 PM Break
3:15 PM – 5:00 PM
- Collaboration for proposal(s)
- Commitment from organizations to:
- Endorse (a formal recognition of importance of the project)
- Support (an offer for some in-kind participation, such as sharing office facilities, helping with coordination using own staff etc.)
- Participate (the funding for participation is in the project budget)
- Partner (co-proposer on the project)
- Summary of the meeting, decisions and planning for the next step

5:00 PM Adjourn

Participant List

Name	Organization
George Pletnikoff	Unalaska Native Fisherman's Association
Larry Merculieff	Alaska Native Science Commission
Karen Pletnikoff	Aleutian Pribilof Island Association
Olga Gogoleva	Alaska Chukotka Development Program
Vera Tymneraskova	Chukotuo Native Information Center
Karin Holser	Pribilof Islands Stewardship Program
Ivan Vozhikov	ASARKO/AIA Russia
Gennady Yakovlev	ASARKO Russia
Santina Gay	United States Environmental Protection Agency
Tatiana Samuelson	Native Village of Belkofski (E.P. Dept)
Tero Mustonen	Snowchange
Victoria Gofman	Aleut International Association

Left to Right: Victoria Gofman, Karen Pletnikoff, Karin Holser, Annelise Tschanen, Gennady Yakovlev, Ivan Vozhikov

Bering Sea Sub-Network Implementation Workshop
Hotel Captain Cook, "Adventure Room", Anchorage, Alaska
November 26, 2006

In 2006, the International Polar Year (IPY) Joint Committee endorsed the concept of the Bering Sea Sub-Network. The cumulative result of the efforts of all participants was a successful proposal submitted to the National Science Foundation (NSF) in May 2006 under the title: Bering Sea Sub-Network, International Community-Based Observation Alliance for Arctic Observing Network (BSSN).

In October 2006, with the generous support of the U.S. State Department and Environment Canada, the second international scoping workshop was convened to obtain recommendations for a pilot project and develop an implementation plan including objectives for the pilot project, the number of villages, and criteria for participating communities.

The objectives of the BSSN pilot were proposed as:

- Establishing the BSSN infrastructure and policies
- Designing and implementing a pilot project to collect data on selected key variables and indicators across the network
- Establishing collaboration with SEARCH (Study of Environmental Arctic Change) and other International Polar Year (IPY) science projects on community-based research components
- Developing a mentorship program for younger people
- Planning for a final workshop to discuss optimal practices, lessons learned, the strengths of the project, and areas of improvement
- Publishing a paper on the pilot results

Representatives from Alaska and Russia agreed to limit the number of BSSN villages for the pilot project to six: three in the Russian Federation and three in the United States. The management and ownership of data was discussed in great detail. The participants wanted assurance that villages would have a say in how the data would be used and that sensitive data would be safeguarded. It was decided that a Steering Committee consisting of representatives from all BSSN villages would be formed to address data ownership.

2006 BSSN Implementation Workshop

Villages were to be selected by respective local organizations and governments based on the following selection criteria developed at the 2005 Workshop:

- Geographic location — Village locations would cover North, Central, South Bering Sea ecosystem. Important factors to consider: sea ice, migration routes, breeding colonies/grounds.
- Capacities — A community would have the technological infrastructure and individuals qualified to work on the project.
- Community interest — A community would be able to engage interested individuals in the village to participate in the project.
- Needs — A community may have immediate ecological concerns regarding subsistence species.
- Previous experience — A community, where possible, would build on existing experience, knowledge, capacity and activities already ongoing in the community.
- Potential project contribution to the community — The project would benefit the community's existing programs and enhance indigenous knowledge.

Following workshop recommendations, AIA proceeded and the project officially commenced on June 1, 2007.

Meeting Agenda

8:00-8:30 AM Registration
8:30 AM Opening Ceremony by a local Indigenous representative
8:45 AM Introductions of the BSSN participants
10:15 - 10:30 AM Coffee break
10:30 AM BSSN: presentation of the proposed program
- History, overview, main elements (Victoria Gofman)
- Science plan (Dr. Lillian Alessa)
- Circumpolar Biodiversity Monitoring Programme as a vehicle for circum-Arctic collaboration (Mike Gill)

11:30 AM Comments and questions
12:00 – 1:00 PM Lunch
1:30 PM Presenters' answers and comments
2:30 – 3:30 PM Coffee break
3:30 PM Developing recommendations for BSSN set up and implementation (A moderated discussion)
4:30 – 4:45 PM Break (A small drafting group edits recommendations and develops a draft)
4:45 PM Presentation of the draft for final editing and approval
5:00 PM Meeting Adjourn

Participant List

Name	Organization
Lillian Alessa	University of Alaska-Anchorage
David Atkinson	International Arctic Research Center, University of Alaska – Fairbanks
Alexy Drozdov	Tribal organization "Kam-Avva", Kamchatka
Rose Fosdick	Kawerak, Inc.
Andy Kliskey	University of Alaska-Anchorage
Mike Gill	Environment Canada
Victoria Gofman	Aleut International Association
Maria Gunnarsdottir	CAFF, Executive Secretary
Ivan Gutorov	Kamchatka regional Association of the tribes of the Indigenous Peoples, Chair
Karin Holser	St. George Island Stewardship Program
Naomi Kashevarof	St. George Island Traditional Council, IGAP Coordinator
Clara Martin	

Name	Organization
Larry Merculieff	Seven Generations Consulting, meeting facilitator, Alaska Native Science Commission, Deputy Director
Kaisu Mustonen	Snowchange
Peggy Osterback	Aleut Marine Mammal Commission, Executive Director
Tatiana Vlasova	Russian Academy of Science
Bruce Wright	Aleutian Pribilof Islands Association/AIA, Science Advisor
Eduard Zdor	Chukotka Association of Marine Hunters, Executive Director
Gennady Zelensky	Chukotka Science Support Group, Executive Director

Bering Sea Sub-Network Pilot Phase Implementation Workshop
Aleut International Association
333 W. 4th Ave, 3rd Floor, Anchorage, Alaska
October 15 – 19, 2007

This workshop has launched the BSSN survey process.
The meeting successfully accomplished its stated goals: the formation of a steering committee, the approval of procedural guidelines, and the decision on governance to provide the necessary structure for BSSN to function effectively. Issues for steering committee consideration were defined and include data management, communications, and other program issues as they arise. The steering committee is also tasked with cultivating and maintaining network connections. Overall, this organizational structure will allow for the extension of the BSSN program and for future expansion of the network.

A great deal of time and energy was devoted to the development of the first draft of the survey instrument. This collaborative effort between community representatives and scientists resulted in a draft instrument that reflects and addresses members' concerns.

The information garnered by this survey can be used by member communities as they seek better resource management to preserve and continue a traditional way of life.

This contributes to the long term goals of BSSN in that it will assist communities in their attempts to improve sustainability of resources. It may empower communities in their resource management endeavors and it will encourage cultural connections and communication between groups of people who share similar concerns.

Meeting Agenda

Monday October 15, 2007
10:00 AM – 1:00 PM Plenary (Moderator: Andy Kliskey)
- Welcoming remarks
- Participants introductions
- 5-10 min. community presentations
- BSSN review

1:00 AM - 2:00 PM Lunch
2:00 PM - 3:00 PM Discussion: What kind of a network do we want to form? (Moderator: Lillian Alessa)
- Long-term goals
- Structure
- Opportunities and challenges
- Governance

3:00 PM - 3:20 PM Break
3:20 PM – 5:00 PM Discussion: What do we need to accomplish this week? (Moderator: Andy Kliskey)
- To formalize the network
- For the pilot research

5:00 PM – 5:30 PM Closing remarks:
(Moderator: Victoria Gofman)
- What are our goals for the week?
- Commentary from each participant about goals

5:30 PM Meeting Adjourn

Tuesday October 16, 2007
9:00 AM – 10:00 PM Discussion: Organizational structure of BSSN (Moderator: Patricia Cochran)
10:00 AM – 12:00 PM Presentations and Discussion: Proposed survey process and data management (A. Kiskey, V. Gofman)
- What are the communities' concerns about the proposed process?
- Is the proposed plan realistic for your community process?
- What can be done to improve it?

12:00 PM – 1:30 PM Lunch
1:30 PM – 4:00 PM Break out session- Russian speakers and English speakers (Moderators: P. Cochran, V. Gofman)
- What issues were identified in the morning session?
- What are recommendations to address those issues?

4:00 PM – 6:00 PM Groups present their findings
6:00 PM Meeting Adjourn
Wednesday October 17, 2007
Draft questionnaire and survey procedures development
9:30 AM – 11:00 PM Discussion: (Moderator: Marty Waters)
Discuss promotional items
11:00 AM – 12:00 Review of draft questionnaire (Moderator: L. Alessa)
12:00 PM – 1:30 PM Lunch
1:30 PM – 2:00 PM Discussion: The use of language in the survey
2:00 PM – 5:30 PM Review of draft questionnaire- break out session- Russian speakers and English speakers (Moderators: L. Alessa, V. Gofman)
Review of questions
5:30 PM Meeting Adjourn

Front Row L to R: Victoria Gofman, Ludmila Kultchiskya, Arlene Gundersen, Molly Chythlook, Helen Chythlook
Back Row L to R: Moses Kritz, Iver Campbell, Marty Waters, Ivan Vozhikov, Natalia Tatarenkova, Svetlana Petrosyan, Jim Gamble

Thursday October 18, 2007

9:00 AM – 12:00 PM Discussion: Review of draft questionnaire
- Types of questions
- Open-ended
- Multiple choice
- Comparison of Russian and English versions
- Discussion: survey title

12:00 PM – 1:30 PM Lunch
1:30 PM – 5:00 PM Survey development (V. Gofman, N.Tatarenkova, A. Kliskey)
1:30 PM – 5:00 PM Discussion: Development of policies and procedures for BSSN (Moderator: Jim Gamble)
5:00 PM – 5:30 PM Distribution of questionnaire 1st draft for review

5:30 PM Meeting Adjourn

Friday October 19, 2007
9:00 AM – 12:00 PM Discussion: Discussion about questionnaire 1st draft (Moderator: V. Gofman)
- How best to introduce surveys in communities
- Survey title
- Translation into local languages
- Survey questions

12:00 PM – 1:30 PM Lunch
1:30 PM – 4:00 PM Discussion: Finalize BSSN policies and procedures (Moderator: P. Cochran)
- Procedural guidelines
- Education and outreach
- Conflict resolution
- Data management
- Internal communication
- Website
- Membership

4:00 PM Workshop adjourned

Participant List:

Name/Organization	Location
Lillian Alessa, PhD,Associate Professor of Biology, UAA, BSSN Co-PI	Anchorage, Alaska
Iver Campbell, Native Village of Gambell Council Member	Gambell, Alaska
Helen Chythlook, Marine Mammal Coordinator, Bristol Bay Native Assoc.	Dillingham, Alaska
Molly Chythlook, Natural Resources Dept. Director, Bristol Bay Native Assoc.	Dillingham, Alaska
Patricia Cochran, Executive Director, AK Native Science Com., BSSN Co-PI	Anchorage, Alaska
Jim Gamble, AIA Assistant Director	Anchorage, Alaska
Victoria Gofman, AIA Executive Director, BSSN PI	Anchorage, Alaska
Arlene Gundersen, Pauloff Harbor Tribe, Tribal Administrator	Sand Point, Alaska
Andy Kliskey, PhD, Associate Professor of Biology, UAA, BSSN Senior Researcher	Anchorage, Alaska
Moses Kritz, President of Togiak Tribal Council	Togiak, Alaska
Lyudmila Kulchitskaya, Kanchalan Administration	Kanchalan, Chukotka
Svetlana Petrosyan, Deputy Head,Tymlat Administration	Tymlat, Kamchatka
Natalya Tatarenkova, PhD Student, Biologist	Nikolskoye, Kamchatka
Ivan Vozhikov, Fisherman and hunter, AIA Board Member	Nikolskoye, Kamchatka
Janice Walton, AIA Project Assistant	Anchorage, Alaska

Bering Sea Sub-Network Pilot Phase Conclusion Workshop
Aleut International Association
333 W. 3rd Ave., 3rd Floor, Anchorage, Alaska
August 3-5, 2009

The goal of the workshop was to conclude the pilot phase of BSSN and to launch the continuation of the project with BSSN 2. Participants shared their experience in the pilot phase addressing challenges and accomplishments. The meeting was also a great opportunity for the project team to reconnect and meet with new members. The workshop included a training session for the Community Research Assistants (CRAs). On the first day of the workshop, CRAs were recognized for their special contribution and all received Certificates of Appreciation. The workshop was filmed by a videographer for a future film about BSSN.

Main outcomes:

- Participants expressed an overwhelming support for the project and saw it as beneficial to their community and to them personally.
- Challenges of the pilot phase survey design were discussed at length and a list of recommendations was developed.
- Special attention was paid to the training of CRAs.

Main recommendations:

- Questionnaires should be shorter and should be less complicated, so it would be easier to train CRAs. Questionnaires should be printed and sent to villages. A suite of three questionnaires targeting species harvest, harvest locations, and environmental observations was recommended.
- Russian project managers should be trained in all phases of survey administration so that they can provide training and trouble shouting in the Russian villages. Alaskan CRAs should be trained in the villages, so more travel by project staff to the village sis necessary.
- Respondent lists should be created with the assistance of local village or tribal administrations and approved by BSSN project management. Local staff should strictly adhere to the approved list.
- Participants expressed their appreciation for the opportunity to have a face-to-face meeting and stressed the importance of such interactions for all participants.

Meeting Agenda

Monday, August 3, 2009 BSSN Pilot Conclusion Plenary Session
9.00 Introductions
9.30 BSSN Global Outlook
Patricia Cochran, Alaska Native Science Commission, BSSN Co-PI
10.00 Pilot project overview
Victoria Gofman, Executive Director, AIA, BSSN PI
10.30 Break
10.45 Preliminary results
Survey process in the villages – What did we do?
Presentations by village research assistants:
10.50 Esther Fayer and Olia Sutton, Togiak
11.05 Iver Campbell and Antonia Penayah, Gambell
11.20 Olga Gerasimova, Kanchalan
11.35 Svetlana Petrosyan , Tymlat
11.50 Olga Chernenko, Nikolskoye/Kamchatka

12.05 Q & A Facilitator: Andy Kliskey, RAM Group, UAA
12.30 Lunch
13.30 Preliminary results
Data summary – What did we learn?
Andrea Grant-Friedman, BSSN Survey Manager
Interpretation – What does it mean?
Lillian Alessa, RAM Group, UAA, BSSN Co-PI

15.00 Break
15.30 Q & A (Questions to the research team)
17.00 Adjourn for the day
17.30 Evening reception
BSSN Awards
Refreshments
19.30 Reception adjourns

Tuesday, August 4, 2009 BSSN Villages' Day (Round table)

9.00 Goals and objectives for the day
9.15 Presentations from BSSN communities
Personal accounts of project experiences (30 minutes per presentation)
Svetlana Petrosyan and Olga Chernenko, Tymlat and Nikolskoye
Esther Fayer and Olia Sutton, Togiak
Arlene Gundersen, Sand point
12.00 Lunch
13.00 Presentations from BSSN communities – Continued
Olga Gerasimova, Kanchalan
Iver Campbell and Antonia Penayah, Gambell
14.30 Discussion on recommendations for BSSN II
Break
15.30 How can communities utilize the results of scientific research?
Patricia Cochran
Andy Kliskey
17.00 Adjourn for the day

Wednesday, August 5, 2009 BSSN II (Round Table)
9.00 BSSN II Overview
Victoria Gofman
Lillian Alessa
10.00 Summary of recommendations from Day 2
Break
10.45 Discussion
Facilitator: Jim Gamble, Assistant Director, AIA
11.30 Finalize recommendations for BSSN II and for the pilot project results report
12.30 Lunch
13.30 Training session for village project staff
Interviewing methods and techniques
Break
14.30 Training session for village project staff
Interviewing methods and techniques continued
17.00 Adjourns for the day

Thursday and Friday are reserved for training Russian staff

Participant List

Name	Location
Lillian Alessa Ram Group, UAA	Anchorage, Alaska
Alexandr Blinov	Moscow, Russia
Iver Campbell, IRA Council Member	Gambell, Alaska
Olga Chernenko Center for Civic Initatives	Petropvlovsk-Kamchatsky, Russia
Patricia Cochran, Alaska Native Science Commission	Anchorage, Alaska
Hanna Eklund, BSSN Project Assistant	Anchorage, Alaska
Kelly Eningowuk Inuit Circumpolar Council (ICC)	Anchorage, Alaska
James Fall Alaska Department of Fish & Game, Division of Subsistence	Anchorage, Alaska

Name	Location
Esther Fayer BSSN Community Research Assistant	Togiak, Alaska
Jim Gamble AIA Assistant Director	Anchorage, Alaska
Olga Gerasimova Community Research Assistant	Kanchalan, Russia
Victoria Gofman AIA Executive Director	Anchorage, Alaska
Arlene Gundersen Pauloff Harbor Tribe	Sand Point, Alaska
Andrew Kliskey RAM Group, UAA	Anchorage, Alaska
Antonia Penayah Community Research Assistant	Gambell, Alaska
Svetlana Petrosyan Community Research Assistant	Tymlat, Russia
Olia Sutton Community Research Assistant	Togiak, Alaska

Left to Right: Olga Gerasimova, Andy Kliskey, Olga Chernenko, Arlene Gundersen, Antonia Penayah, Svetlana Petrosyan, Esther Fayer, Patricia Cochran, Olia Sutton, Iver Campbell, Victoria Gofman

Appendix 2: Selected Projects in the Bering Sea Region

Gambell:

Alessa, L (2009). Municipal Water Systems and the Resilience of Arctic Communities (University of Alaska, Anchorage, Department of Biological Sciences)

Yoshikawa, K (2010). Current Climate Changes over Eastern Siberia and Interior Alaska and their Impact on Permafrost Landscapes, Ecosystem Dynamics, and Hydrological Regime (University of Alaska, Fairbanks, Water and Environmental Research Center

Ahmasuk, A; Trigg, E (2008). Bering Strait Region Local and Traditional Knowledge Pilot Project: A Comprehensive Subsistence Use Study of the Bering Strait Region (Kawerak, Inc.)

Harritt, R (1999). Whale Hunting Societies of the Western Arctic: A Regional Integration (Archaeology and Sociocultural Components) (University of Alaska, Anchorage, Environment and Natural Resources Institute)

Georgette, S; Coffing, M; Scott, C; and Utermohle, C (1998). The subsistence Harvest of Seals and Sea Lions by Alaska Natives in the Norton Sound – Bering Strait Region, Alaska, 1996-97 (Alaska Department of Fish and Game, Division of Subsistence) Technical Paper No. 242

Kanchalan:

Howe, E. (2009). Salmon Harvests in Arctic Communities: Local Institutions, Risk, and Resilience (University of Alaska, Anchorage, Department of Economics/ISER)

Nikolskoye:

Berge, A (2007). Aleut Linguistics, Language Teaching, and Program Development (University of Alaska, Fairbanks)

Gofman, V; Wright, B; and RaLonde, R. (2009). Response and Intervention System for Climate Change Induced Paralytic Shellfish Poisoning in Aleut Communities (Aleut International Association)

Crawford, M (2001). Collaborative Research: Origins of Aleut Populations: Molecular Perspectives (University of Kansas, Department of Anthropology)

Sand Point:

Downs, M and Hartley, M (2008). Comprehensive Baseline Commercial Fishing Community Engagement Profiles: Adak, St. George, St. Paul, and Sand Point, Alaska (EDAW, Inc.)

Fall, J; Andersen, D; Brown, L; Coffing, M; Jennings, G; Mishler, C; Paige, A; Utermohle, C; and Vanek, V (1993). Noncommercial Harvest and Uses of Wild Resources in Sand Point, Alaska 1992 (Alaska Department of Fish and Game, Division of Subsistence) Technical Paper No. 226

Togiak:

Hoffecker, J (2009). Human Response to Climate Change at Cape Espenberg AD 800-1400 (University of Colorado, Boulder, Institute of Arctic and Alpine Research)

Huntington, H; Andrews, E; Fall, J; Hunn, E; Noongwook, G; Scholz, A; Sepez, J; and Zavadil, P (2008) Subsistence Harvest, Users, and Local & Traditional Knowledge (LTK) Ecosystem Perspective (Huntington Consulting)

Kreig, T; Fall, J; Chythlook, M; La Vine, R; and Koster, D (2007). Sharing, Bartering and Cash Trade of Subsistence Resources in the Bristol Bay Area, Southwest Alaska (Alaska Department of Fish and Game, Division of Subsistence) Technical Paper No. 326

Coiley-Kenner, P; Kreig, T; Chythlook, M; and Jennings, G (2003). Wild Resource Harvests and Uses by Residents of Manokotak, Togiak, and Twin Hills (Alaska Department of Fish and Game, Division of Subsistence) Technical Paper No. 275

Fall, J; Chythlook, M; Schichnes, J; and Sinnott, R (1991). Walrus Hunting at Togiak, Bristol Bay, Southwest, Alaska (Alaska Department of Fish and Game, Divisio of Subsistence) Technical Paper No. 212

Table of Figures

Bering Sea Sub-Network

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