Bering Sea Project, Local and Traditional Knowledge Component
Savoonga LTK Notes

Notes by Henry Huntington, George Noongwook, Chad Jay, Bruce Marcot, and Caleb Pungowiyi.

18 September 2009

Contents

Background
The Bering Sea Integrated Ecosystem Research Project (BSIERP, bsierp.nprb.org) examines the fish, seabirds, marine mammals, and people sustained by the Bering Sea. The Local and Traditional Knowledge (LTK) component adds a local human dimension to the overall project, though harvest surveys and monitoring and through interviews with hunters, fishers, and elders. The LTK work is being done in Akutan, St. Paul, Togiak, Emmonak, and Savoonga. This set of notes is from the interviews held in Savoonga in July 2009.

Interviewers and Participants
Several people were involved in the five days of group interviews, held Monday-Friday, 6-10 July 2009.

The interviewers (and days they took part) were George Noongwook (M-F), Henry Huntington (M-F), Caleb Pungowiyi (M-Th), Tom Van Pelt (M), Quinn Smith (M-W), Chad Jay (W-F), and Bruce Marcot (W-F).

The interview participants (and days they took part) were Larry Kava (M-F), Raymond Toolie (M-Th), Clarence Waghiyi (M, W-F), Chester Noongwook (M-Tu), Henry Noongwook (M), and Morris Toolie Sr. (M-Tu), all of whom are elders and experienced hunters, selected by George Noongwook and by chain referral to take part in the interviews. In addition, George Noongwook and Caleb Pungowiyi were sources of information as well as interviewers.

Methods
We used the semi-directive interview method, in which topics are discussed but without a fixed order, so that the discussions can follow the connections and links that the participants see (Huntington 1998). The basic topics were identified from the BSIERP research plan, including seabirds, walrus, sea ice and climate, and general ecosystem patterns. Much of the discussion was held in St. Lawrence Island Yupik, with summaries interpreted into English by George and Caleb in addition to notes they took during the Yupik discussions.

Interview Notes
The notes are presented below according to topic, rather than in the order in which discussions took place. Some topics were discussed at various times during the five days and the information has been compiled into one place here for ease of reading. Some topics overlapped and some parts of the discussion covered several topics. In those cases, the relevant notes have been included under more than one heading. Citations are provided where reference books were used during the interviews to clarify specific points or draw on existing material relevant to the point under discussion.

<u>Seasonal Cycle of Events in Savoonga</u>
Unataghvik (July, the moon of plant gathering) is considered the beginning of the year for St. Lawrence Islanders (Lincoln Blassi in Apassingok et al. 1985:242-5; certain rituals held in the end of June signal the end of the year) (names and translations from Apassingok et al. 1985:126-7, unless otherwise noted; Apassingok et al. write that the names were recorded by early missionaries, and there appear to be some errors in timing especially in winter and spring

months, but the names have become standard now in St. Lawrence Island usage). This is a month when a fresh cycle of events begins with new life from plants, mammals, birds, and fishes for the upcoming year. This is the month when Yupik technology is renewed with new skin boat covers and the refurbishing of tools, harpoons, and other utensils in anticipation of the coming year. It is a time to gather greens like roseroot (*nunivak*) and willow leaves (*ququngak*) and other similar plants. Fishing begins around the island for both subsistence and commercial halibut. The reindeer are herded and corralled for the annual round-up the first week of July. Egg gathering continues the same week.

Palighvik (August, the moon of withering plants) is when the plants peak in color and ripen. Berry picking begins for variety of berries. Fishing continues throughout the month especially in lagoons for trout, salmon, grayling, and whitefishes. For some people, seal hunting commences towards the end of the month, when the seals are buoyant and fat. Spotted seals and young bearded seals are preferred.

Kumlavik (September, the moon of freeze-up) is similar to *Palighvik* except the seals and fishes are more abundant throughout the coast and in the lagoons. Young birds in the seabird colonies are beginning to fly. There is a period of two to three weeks of calm weather at this time, *aang'ghunniiqaat*, during which the young birds can become strong and healthy and thus ready to survive the migration and the winter. Young cormorant are gathered along the cliffs on both sides of the island.

Naayvaghvik (October, the moon of freezing lakes) is when northerly storms begin and numerous waterfowl are migrating southwards. Setnetting for fishes is at a peak and the water is getting colder. Young ice begins to form and seal hunting is at its apex. Hunting for ducks, geese, and young cormorants continues. People collect invertebrates, including small crabs, along the beach when there is a lull in the storms.

Aqumuq (November, moon of the sun standing still; an example of possible mis-timing of month names, as "standing still" is believed to refer to the winter solstice in the following month) is when the sea ice begins to come and the ice starts to form into thicker layers. This is when marine mammals are very abundant, known as *anleghaq*. The marine mammals arrive en masse shortly ahead of the incoming sea ice and can be found very close to Savoonga. The bowhead whale is beginning to migrate and whaling may begin towards the end of the month. Walrus arrive at the same time along with other marine mammals and are hunted when the opportunity arises.

Kaneghyengesi (December, moon of the frozen dew) sees more whaling, walrus hunting, and seal hunting. The bowhead whales were first observed off Savoonga in winter in December 1990 and the whaling captains decided to make the effort to take one. A small ingutuq (young whale) was landed on December 12, 1990. Since then, Savoonga has landed about 40% of its whales in November, December, and January, depending on the timing of the arrival of sea ice. Trapping season begins in this month.

Qaluvik (January, moon of netting tomcod) is when ice fishing begins for blue cod and tomcod. Rock fishes and sculpins are fished while seal and walrus hunting continue.

Nazighaghsiq (February, moon of hair or ringed seals waiting to be born) is when most hunting is for ringed seals (*nazighaq*) while ice fishing continues.

Teghiglugsiq (March, moon of bearded seals waiting to be born) is often when the whaling captains begin to ferry their equipment to Pugughileq on the south side of the island, the spring whaling ground. Increasing daylight is welcomed and some hunters take their boats to the south side of the island to hunt bearded seals (*maklak*).

Lluughvik (April, moon of the bird sling) is the time for bowhead whaling throughout the month. Some walrus and bearded seals are also taken during this time. Reindeer herders will often keep an eye on the herd while they are calving. Newborn marine mammals are often observed around this time.

Kiigem Aghnaa (May, moon of the summer woman) is when snow begins to melt and trail conditions to Pugughileq are deteriorating, so whaling captains will bring their equipment back to Savoonga. Walrus hunting commences in earnest and bearded seals and their young are also hunted.

Pinaghvik (June, moon of the flowing rivers) is when walrus and bearded seals are still being hunted until the ice retreats to the north. The mass northward migration of marine mammals following the retreat of the sea ice is known as *qavreq*. Eggs are gathered from cliffs and rookeries throughout the second half of the month. Fishing for salmon along the coast begins.

<u>Environmental Changes Over Time</u>
Nearshore seawater is less salty in taste. Permafrost thaw and extra freshwater runoff from land makes the nearshore waters less salty. Seafood (*uupa* and *tepaq*) gathered from the beach after a northerly storm taste different.

All along the coast and in the mountains, permafrost is thawing and topsoil sinking, so the bluffs are sloughing off. ATV trails are accelerating the permafrost damage in some places. When construction crews cut into the tundra, water oozes out now that permafrost doesn’t restrict the flow of groundwater like it used to.

There are more weeds in rivers and lagoons, which is new.

Willows are getting taller, no longer lying along the ground but standing up a few feet.

Some lakes are drying up because they are draining as the permafrost thaws. One lake drained rapidly from the bottom, and the water was seen coming out of the ground farther down the hill.

Because of sea level rise, lagoons have moved inland by 20 feet (6 meters) or more, changing the abundance of fish in some traditional fishing locations (e.g., Koozata Lagoon and Egkugham Naayvaa, or Camp Collier, where former tent pitching locations are now underwater).

Traditional spotted seal haulout areas such as Uugsilghat, Nunanghighaq, and Naayvaghpak are now underwater or unused, resulting in fewer seals overall. It is not clear where the seals have gone.

Camp Tamniq is where the most coastal erosion has occurred recently, with one cabin lost and others moved farther inland. Around the island, some geodetic markers installed along the coast in the 1940s have washed away.

Many sandy beaches have been washed away by storm and wave action, leaving only boulders and rocks.

Sea ice and shorefast ice are thinning and becoming less stable. Since the 1980s, multi-year ice (*kulusik*) has not arrived in fall like it used to. *Kulusik* came south rapidly, at the rate of a person jogging, leaving a wake as it moved through the water. Ross's gulls used to be seen with the *kulusik* but are no longer seen near Savoonga.

Capelin used to spawn near Savoonga but not longer do so, perhaps because the sandy beaches have largely disappeared.

In May at Siknik Camp (south side, east end of Koozata Lagoon) it used to be "stinky" from all the herring spawn in the area.

There are many more swans and cranes around the island than there used to be.

Previous generations of St. Lawrence Islanders could distinguish marine-mammal-eating killer whales from fish-eating killer whales by their markings, but this knowledge has been lost.

Murres have increased in numbers, displacing cormorant colonies.

Some new songbirds have been seen on the island, ones that are unknown locally and that do not have Yupik names.

Walrus are the only animals that continue to use their traditional haulouts, for example at the Punuk Islands despite the recent construction of cabins there.

Nunagek or Stolbi Rocks (just east of Savoonga) has lost the eastern portion due to cliff collapse. Sulungaat has also fallen, while other cliffs and rookeries are sliding down because of undercutting by wave action.

Shorebirds are much less abundant now than 50 years ago. There used to be thousands but no longer.

<u>Bowhead Whales</u>
Gambell residents saw bowhead whales throughout the 2008-09 winter.

Some large ice floes, many miles across, are still seen. These block travel for hunters and are not

as good habitat for marine mammals, which are more abundance in broken ice. Large floes traveling past the west end of the island in spring can push bowhead whales farther from shore.

There was an early and successful 2009 spring bowhead hunt.

Sea ice changes may be affecting the timing of marine mammal migrations, but so far do not appear to be having any obvious effects on population size or health. Young bowheads may be migrating even earlier, perhaps in March, before Savoonga hunters go whaling. In recent years, whalers have generally seen larger whales at Pugughileq when they are whaling. Larger whales typically come later in the migration.

Small bowhead whales can stay underwater for over an hour.

Humpback and minke whales are seen eating near St. Lawrence Island, but not bowhead in spring or gray whales. Their feeding behavior is different. Bowhead whales feed a great deal on the north side of the island when they arrive in the fall.

Gray Whales
In spring 2009, there were many large gray whales close to shore at the Punuk Islands.

In 2008, one person saw a gray whale being born at the Punuk Islands. Large gray whales were staying near shore for hours at this time.

Gray whales also gather close to shore on the south side of the island.

Humpback and minke whales are seen eating near St. Lawrence Island, but not bowhead in spring or gray whales. Their feeding behavior is different. Bowhead whales feed a great deal on the north side of the island when they arrive in the fall.

Beluga Whales
St. Lawrence Islanders do not hunt beluga whales, even though they are abundant in the area at certain times of the year, because the maktak does not retain its taste over time.

Since the early 1980s, beluga whales have been wintering around St. Lawrence Island.

Walrus
Walrus go through population swings. Bull walrus have been known to fall to their deaths over cliffs (similar to what Savoonga residents know about walrus in Bristol Bay) and this is considered a natural part of the life cycle.

Walrus are the only animals that continue to use their traditional haulouts, for example at the Punuk Islands despite the recent construction of cabins there.

Migrations, sea ice conditions, and availability for hunting
Female walruses with calves prefer thinner ice because the ice surface is closer to the water surface, which makes it easier for calves to enter and exit the water. Thinning ice thus has not yet

posed a problem for calving females.

There were large ice floes around St. Lawrence Island in 2008-09, which moved very slowly and created less broken ice, resulting in good walrus hunting in spring.

Walruses of various colors have been observed, but the variation is probably just natural variation among individuals and not necessarily separate populations. Walruses of various colors are often seen together in a single group.

There was good hunting for walruses and seals in fall 2008, which happens once in awhile.

At haulouts on land, walruses can stampede and such events have been triggered by sudden changes in weather in addition to disturbances from aircraft, peoples, bears, and other causes. A report by Francis “Bud” Fay or John Burns apparently described such an occurrence in fall at the Punuk Islands in the 1950s or so.

The ice near the Yukon-Kuskokwim delta is thick and is often the last stronghold for walruses moving north in spring; when this ice disappears then the walruses make long and purposeful swims north.

The route of the walrus migration varies from year to year depending on conditions, but typically goes past the west end of the island between the island and the Chukotka mainland.

In winter, walrus stay near the moving ice where there will be open water for breathing. They can use breathing holes in thinner ice, in contrast to seals which can keep holes open in thick ice, too.

Male and female walruses usually migrate together, but there is sometimes some sex segregation, with females more likely to be in open water.

Male walrus can inflate air sacs in their throats and rest in open water, so are less dependent upon sea ice for resting than females and calves.

Body condition, health, and predation
Walruses were very healthy in spring 2009.

Winter and spring were warm in 1992 and walruses were skinny the same spring.

There is no obvious correlation between environmental conditions and body condition of walruses.

Generally walruses with many scars or otherwise injured are not healthy.

Unhealthy walruses sometimes have discolored meat, liver, or in tissues surrounding the organs.

Only about one walrus in 100 is unhealthy, and there appears to be no trend in this proportion.

One walrus taken in the spring of 2009 had a large cyst on its belly and was in poor condition with a discolored liver.

No condition trends discerned, although body condition can vary from year to year.

Stomachs usually contain clams and razor clams and may also have cockles, marine worms, whelks, and invertebrates such as sea peaches. No trends or changes have been observed, apart from some differences in the type of clams seen stomachs from walruses taken in different locations around the island. A few walrus taken on the east end of the island have had many small clams in their stomachs, clams that were too small for people to eat.

The area between Gambell and Savoonga is a good spring feeding area for walrus.

Clams from walrus stomachs taken on the island are larger than clams in walrus stomachs taken in Nome.

Seal-eating walruses are orphaned walruses. These walruses are sly and sneaky. They are smelly with sharp, yellowed tusks. They are also very smelly and not good eating. Their stomachs contain strips of sealskin a few inches wide. Young seal-eating walrus may not have taken on the smell and other characteristics of their kind and hunters may only discover that they are seal-eaters when they open the stomach. One participant had been advised by his father that he should not eat the meat of seal-eating walrus because he would go bald in consequence.

It was suggested that the body condition of walruses should be viewed with observations of body conditions of whales and seals to detect correlations among animal health, environmental conditions, the influence of sea ice patterns and trends, and animal migrations.

Hunters also expressed interest in having marine data available from a single access point so they can see what is known and what research is occurring.

Walrus experience occasional die-offs, like murres, crested auklets, shearwaters, and some other marine mammals.

Marine productivity seems reliable and generally consistent around St. Lawrence Island. Conditions have been good lately, with fat walrus and abundant animals.

Walrus use within the community
These days walruses are hunted mostly for food and not so much for covering boats with walrus skins. But they still cover their ceremonial drums with walrus intestinal linings. The skill of splitting walrus hides is still being taught to younger women by a few experienced women in the village.

These days the store has food in stock in the winter, so there is less incentive to hunt at that time of year. ATVs and snowmachines have also contributed to an easier life and less hardiness among hunters.

Meat is stored in freezers, which provides food when hunting is poor; meat is sometimes vacuum-packed now.

In years with poor walrus hunting, people use meat from previous years, or buy food from the store, or use other species to fill the gap.

Perceived threats to the walrus population
Cruise ships come to Savoonga occasionally, but there is currently no concern about impacts to walrus and other marine mammals or seabirds. The cruise ships contact Savoonga well in advance of a visit and only stay a few hours. Tourists come ashore and purchase handicrafts.

Savoonga residents are concerned about the situation in the Chukchi Sea, particularly the potential for impacts to marine mammals from oil and gas development and the potential for transits by oil tankers. They are also concerned about the northward movement of fishing by bottom trawlers in the Bering Sea and the general increase in marine shipping, including noise from BSIERP and other research vessels (particularly icebreakers) south of the island.

There is concern of potential increased use of shipping lanes on both sides of the island, but particularly on the west side of the island where the majority of the walrus migration and other marine mammal migrations occurs. St. Lawrence Islanders feel they need to document the scope and significance of this migratory corridor west of the island to make sure it is adequately protected.

Noise and pollution from shipping is a concern, as is the potential of ship strikes to whales.

Aircraft disturbances not as much a problem these days because there are now altitude restrictions for aircraft, but in the 1960s and 1970s airplanes used to buzz walrus hauled out on the ice.

Rocky beaches tend to trap plastic and other debris, whereas wave action on sandy beaches tends to take debris away.

Sometimes whales and birds become entangled in debris, but not walruses.

<u>Bearded Seals</u>
Bearded seals eat clams, shrimp, and small crabs. People sometimes eat clams from bearded seal stomachs if they are fresh.

<u>Ringed, Spotted, and Ribbon Seals</u>
Traditional spotted seal haulout areas such as Uugsilghat, Nunanghighaq, and Naayvaghpak are now underwater or unused, resulting in fewer seals overall. It is not clear where the seals have gone.

ATV (four-wheeler) traffic and the use of high-powered rifles have led to reduced numbers of birds and spotted seals in various locations around the island.

Large aggregations of seabirds, seals, and minke whales are often seen at sea. The Yupik word for this translates as “cooking,” as they are all feeding together, usually on sandlance or on “surf smelt” (*kegarangiiq* in Yupik; Badten et al. 2008 say the English or scientific name of this fish has not been determined. The fish are about four inches [10 cm] long, silver, and in cross-section are shaped like an inverted triangle). The animals also eat blue cod (*iqallugaq*) and capelin (*sikaaq*, which refers to capelin and smelt; capelin are also known locally as “cigarfish”). There are many small fishes in the ocean and the animals will eat them all.

Spotted, ringed, and ribbon seals remain around the island all winter, as they always have.

Polar Bears

Polar bears are usually found with thicker sea ice.

The largest polar bears do not come ashore.

Marine Mammals-General

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Seabirds and marine mammals are intertwined around food, especially concentrations of food like sandlance schools.

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Some large ice floes, many miles across, are still seen. These block travel for hunters and are not as good habitat for marine mammals, which are more abundance in broken ice. Large floes traveling past the west end of the island in spring can push bowhead whales farther from shore.

In the 2008-09 winter, there was less wind than during the previous winter and the sea ice stayed longer in spring, allowing for more marine mammal hunting. The ice came southwards in the fall of 2008, bringing the *anleghaq* (mass migration of marine mammals in fall).

Sometimes whales and birds become entangled in debris, but not walruses.

There is concern of potential increased use of shipping lanes on both sides of the island, but particularly on the west side of the island where the majority of the walrus migration and other

marine mammal migrations occurs. St. Lawrence Islanders feel they need to document the scope and significance of this migratory corridor west of the island to make sure it is adequately protected.

Noise and pollution from shipping is a concern, as is the potential of ship strikes to whales.

Cruise ships come to Savoonga occasionally, but there is currently no concern about impacts to walrus and other marine mammals or seabirds. The cruise ships contact Savoonga well in advance of a visit and only stay a few hours. Tourists come ashore and purchase handicrafts.

Savoonga residents are concerned about the situation in the Chukchi Sea, particularly the potential for impacts to marine mammals from oil and gas development and the potential for transits by oil tankers. They are also concerned about the northward movement of fishing by bottom trawlers in the Bering Sea and the general increase in marine shipping, including noise from BSIERP and other research vessels (particularly icebreakers) south of the island.

It was suggested that the body condition of walruses should be viewed with observations of body conditions of whales and seals to detect correlations among animal health, environmental conditions, the influence of sea ice patterns and trends, and animal migrations.

Sea ice changes may be affecting the timing of marine mammal migrations, but so far do not appear to be having any obvious effects on population size or health. Young bowheads may be migrating even earlier, perhaps in March, before Savoonga hunters go whaling. In recent years, whalers have generally seen larger whales at Pugughileq when they are whaling. Larger whales typically come later in the migration.

Humpback and minke whales are seen eating near St. Lawrence Island, but not bowhead in spring or gray whales. Their feeding behavior is different. Bowhead whales feed a great deal on the north side of the island when they arrive in the fall.

Aggregations of small fishes move around, so birds and marine mammals move with them. There are a few regular locations for such fishes, such as 20 miles (32 km) north of Ivgaq Point (which is 5-6 miles, or 8-10 km, west of Savoonga) and also off Stolbi Rocks (1-2 miles, 2-3 km east of Savoonga).

Auklets

At auklet colonies, foxes target crested auklets and store them for winter.

Lemmings will prey on least auklet chicks.

Crested auklets are very abundant at present.

Murres, shearwaters, and crested auklets are the three bird species that experience occasional, infrequent die-offs. There is no obvious connection between these events and ocean or environmental conditions; they just happen now and then. The last seabird die-offs were some 10-12 years ago. The three species tend to experience die-offs in separate years.

In 2009, there was plentiful food for auklets on the east side of the island, where the birds were "like clouds" as they flew to the edge of the shorefast ice.

Murres
Murres have increased in numbers, displacing cormorant colonies.

In spring, murres arrive first and then cormorants.

Murres are currently very abundant, encroaching on other species for nesting.

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There were many murres and other seabirds on the east side of the island during break-up.

Kittiwakes
In some years, the black-legged kittiwakes do not lay eggs. There is no obvious environmental reason for this. It is less frequent for kittiwakes not to lay eggs than it is for murres to experience die-offs, which themselves are not very frequent.

Kittiwakes get grass from their nests from a specific location west of Savoonga, along a trail currently used by ATVs and formerly used by dog teams. Here the grass is broken up and easy for the birds to take.

Shearwaters
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Cormorants
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In spring, murres arrive first and then cormorants.

Cranes
Cranes arrive when there is still snow on the ground.

Swans, geese, and cranes molt in July.

In the fall bird migration, emperor geese come first, then swan, cranes, and snow geese; the last of these sometimes coming when the water is already frozen.

There are many more swans and cranes around the island than there used to be.

Eiders
Spectacled eiders gather on the south side of the island during whaling (April) and then head northwards. Other eiders are there, too.

Eiders molt offshore later in summer.

Ducks travel just before the north wind, and are a good indicator of weather.

Other Birds
Gulls, long-tailed ducks (formerly known as oldsquaws), ravens, and snowy owls are among the birds that winter in the St. Lawrence Island area.

Golden eagles are seen occasionally and bald eagles on rare occasions.

Swans, geese, and cranes molt in July.

When birds migrate from the south, they are fat.

Rarely see snow geese in spring, but they migrate by the island in October every year.

In the fall bird migration, emperor geese come first, then swan, cranes, and snow geese; the last of these sometimes coming when the water is already frozen.

Murrelets are seen in pairs on the ocean in fall sometimes.

Songbirds and shorebirds migrate sound with waterfowl on the east side of the island, which is a staging area for them. Some snowbirds stay all year.

Ducks travel just before the north wind, and are a good indicator of weather.

There are many more swans and cranes around the island than there used to be.

Bird Nesting Habitat
Nunagek or Stolbi Rocks (just east of Savoonga) has lost the eastern portion due to cliff collapse. Sulungaat has also fallen, while other cliffs and rookeries are sliding down because of undercutting by wave action.

Birds-General
Cliff-dwellers arrive first in spring and then the tundra-dwellers (ducks and loons), which come when there is at least some bare ground.

Large aggregations of seabirds, seals, and minke whales are often seen at sea. The Yupik word for this translates as “cooking,” as they are all feeding together, usually on sandlance or “surf smelt” (*kegaringiq* in Yupik; Badten et al. 2008 say the English or scientific name of this fish has

not been determined. The fish are about four inches [10 cm] long, silver, and in cross-section are shaped like an inverted triangle). The animals also eat blue cod (*iqallugaq*) and capelin (*sikaaq*, which refers to capelin and smelt; capelin are also known locally as "cigarfish"). There are many small fishes in the ocean and the animals will eat them all.

Seabirds and marine mammals are intertwined around food, especially concentrations of food like sandlance schools.

Marine productivity seems reliable and generally consistent around St. Lawrence Island. Conditions have been good lately, with fat walrus and abundant animals.

Cruise ships come to Savoonga occasionally, but there is currently no concern about impacts to walrus and other marine mammals or seabirds. The cruise ships contact Savoonga well in advance of a visit and only stay a few hours. Tourists come ashore and purchase handicrafts.

Savoonga residents are concerned about the situation in the Chukchi Sea, particularly the potential for impacts to marine mammals from oil and gas development and the potential for transits by oil tankers. They are also concerned about the northward movement of fishing by bottom trawlers in the Bering Sea and the general increase in marine shipping, including noise from BSIERP and other research vessels (particularly icebreakers) south of the island.

Seabirds eat krill and copepods in addition to small fish. These invertebrates become pink in the birds' stomachs, described as "cooked" in Yupik (from *gaagh-*, to cook).

Once gulls are seen diving into the water, other birds will come feed, too.

Aggregations of small fishes move around, so birds and marine mammals move with them. There are a few regular locations for such fishes, such as 20 miles (32 km) north of Eevwak Point (which is 5-6 miles, or 8-10 km, west of Savoonga) and also off Stolbi Rocks (1-2 miles, 2-3 km east of Savoonga).

Fishes

In 2009, sandlance are abundant. Minke whales eat lots of sandlance.

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Sea Ice

Southern ice extent in winter is often a function of persistent north winds pushing ice south and not from ice formation. North winds lead to extensive ice cover but low quality ice.

A lot of northeast winds in winter creates thin ice and open water (especially large polynyas in the lee of land such as St. Lawrence Island and parts of the mainland of Alaska and Chukotka), so in spring, the ice retreats quickly. This was the case in winter/spring 2008. Hunters know that winters with sustained northeast winds will result in rapid ice retreat the following spring when a south wind blows.

In some years, an eddy south of St. Lawrence Island can trap sea ice so that it just stays there and melts rather than drifting northwards.

Typically there is more open water north of Gambell.

In more recent years, the ice is thinner than in the past and also softer so that it melts more quickly in spring. This may be a result of warmer winter weather, in which the ice does not freeze as hard and the brine is not forced out as much, leaving saltier, softer ice.

Female walruses with calves prefer thinner ice because the ice surface is closer to the water surface, which makes it easier for calves to enter and exit the water. Thinning ice thus has not yet posed a problem for calving females.

The amount of freshwater input from the coast of Alaska (e.g., Yukon River) can influence ice thickness. There is more freshwater coming from the large rivers and moving along the coast now than there used to be.

There were large ice floes around St. Lawrence Island in 2008-09, which moved very slowly and resulted in good walrus hunting in spring.

Some large ice floes, many miles across, are still seen. These block travel for hunters and are not as good habitat for marine mammals, which are more abundance in broken ice. Large floes traveling past the west end of the island in spring can push bowhead whales farther from shore.

Polar bears are usually found with thicker sea ice.

The ice near the Yukon-Kuskokwim delta is thick and is often the last stronghold for walruses moving north in spring; when this ice disappears then the walruses make long and purposeful swims north.

In winter, walrus stay near the moving ice where there will be open water for breathing. They

can use breathing holes in thinner ice, in contrast to seals which can keep holes open in thick ice, too.

Sea ice can move as fast as 7 miles per hour (11 kmh) when the wind blows. It can thus retreat very fast in spring and also come south very fast in fall. When large ice floes are being pushed south, they create a wake behind them.

In the 2008-09 winter, there was less wind than during the previous winter and the sea ice stayed longer in spring, allowing for more marine mammal hunting. The ice came southwards in the fall of 2008, bringing the *anleghaq* (mass migration of marine mammals in fall).

Male walrus can inflate air sacs in their throats and rest in open water, so are less dependent upon sea ice for resting than females and calves.

Sea ice changes may be affecting the timing of marine mammal migrations, but so far do not appear to be having any obvious effects on population size or health. Young bowheads may be migrating even earlier, perhaps in March, before Savoonga hunters go whaling. In recent years, whalers have generally seen larger whales at Pugughileq when they are whaling. Larger whales typically come later in the migration.

When the north wind blows in spring, sea ice packs in against the north side of the island, preventing Savoonga hunters from getting out in their boats.

General Ecosystem

Marine productivity seems reliable and generally consistent around St. Lawrence Island. The sea is rich and the animals are fat and tasty. Conditions have been particularly good lately, with fat walrus and abundant animals.

This spring, there were lots of small jellyfish in the water. This was the first time so many small jellyfish have been seen. Larger jellyfish are commonly seen, but such an abundance of small jellyfish was new.

Algae is usually plentiful in the seawater around the island.

Human Impacts and Observations

ATV (four-wheeler) traffic and the use of high-powered rifles have led to reduced numbers of birds and spotted seals in various locations around the island. Emperor geese no longer molt on the island but instead appear to fly to Chukotka prior to molting.

Walrus are the only animals that continue to use their traditional haulouts, for example at the Punuk Islands despite the recent construction of cabins there.

ATVs and snowmachines have also contributed to an easier life and less hardiness among hunters.

Families still eat traditional foods, but younger generations have developed a taste for rice, vegetables, and other store-bought foods.

Food preference depends on upbringing—those raised eating traditional foods continue to eat them, whereas the taste is harder to acquire later in life. Traditional foods comprise a healthy diet and their consumption should be encouraged.

Cruise ships come to Savoonga occasionally, but there is currently no concern about impacts to walrus and other marine mammals or seabirds. The cruise ships contact Savoonga well in advance of a visit and only stay a few hours. Tourists come ashore and purchase handicrafts.

Savoonga residents are concerned about the situation in the Chukchi Sea, particularly the potential for impacts to marine mammals from oil and gas development and the potential for transits by oil tankers. They are also concerned about the northward movement of fishing by bottom trawlers in the Bering Sea and the general increase in marine shipping, including noise from BSIERP and other research vessels (particularly icebreakers) south of the island.

There is concern of potential increased use of shipping lanes on both sides of the island, but particularly on the west side of the island where the majority of the walrus migration and other marine mammal migrations occurs. St. Lawrence Islanders feel they need to document the scope and significance of this migratory corridor west of the island to make sure it is adequately protected.

Noise and pollution from shipping is a concern, as is the potential of ship strikes to whales.

Aircraft disturbances not as much a problem these days because there are now altitude restrictions for aircraft, but in the 1960s and 1970s airplanes used to buzz walrus hauled out on the ice.

Rocky beaches tend to trap plastic and other debris, whereas wave action on sandy beaches tends to take debris away.

Sometimes whales and birds become entangled in debris, but not walruses.

General/Miscellaneous

At sea lion rookeries on the south side, hunters used to harpoon animals as they dived into the water from the high rocks.

An undersea freshwater spring by Stolbi Rocks produces at times a layer of drinkable freshwater on top of the ocean. Fishermen hauling crabs from the bottom have seen the crabs let go when they reach the freshwater layer.

People used to walk long distances out onto the sea ice, but no longer do so because the ice is less stable and because modern clothing is heavier and less suitable for such long walks than traditional clothing was.

A wolverine was caught on the island in the 2008-09 winter, which was the first time in a long time one had been seen.

Reindeer have been known to cross the ice from Chukotka and reach the island.

Ideas for Research and Outreach

It was suggested that the body condition of walruses should be viewed with observations of body conditions of whales and seals to detect correlations among animal health, environmental conditions, the influence of sea ice patterns and trends, and animal migrations.

Hunters also expressed interest in having marine data available from a single access point so they can see what is known and what research is occurring.

Scientists are welcome to visit Savoonga, where their in-person presentations are greatly appreciated. Through BSIERP, George Noongwook can help identify scientists whose work will be of particular interest to people in Savoonga.

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