

Yaqulget Quillun Pilartat (What the Birds Do): Yup'ik Eskimo Understanding of Geese and Those Who Study Them

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ABSTRACT. Traditional knowledge of the effects of storm surges and changing coastal ecology on the breeding habits of geese (specifically black brant) in the coastal wetlands of southwestern Alaska was documented in a project initiated by non-Native biologists and an anthropologist. The project was both implemented and controlled by the local nonprofit regional corporation, which employed village researchers to interview elders and record their understandings of goose biology and habitat as related to storm surges. Although local and scientific understandings of brant behaviour generally agree on what is occurring (i.e., foraging habits, effects of past floods and coastal storm surges, and changes in nesting grounds), they do not always agree on why these changes are taking place. At the request of village researchers, interviews also documented Native residents' perception of non-Native research and regulation in the coastal wetlands. Elders articulated a fundamental conflict between the Yup'ik view of geese as nonhuman persons and the non-Native view of geese as manageable wildlife, and they expressed deep resentment toward the nonlocal control that researchers and wildlife managers represent. Many feel that local control of their land and their lives is more in jeopardy than the geese. Moreover, respect for elders is as important as respect for animals in affecting management processes at the community level, creating potential conflict which younger Yup'ik men and women with training in biology find difficult to resolve. Along with articulating resistance to control, elders' testimony presents possible solutions to this contentious issue, solutions founded on personal relations between community members and scientists. Villagers' statements reflect their view that how non-Natives work in the area is as important as what is accomplished. Cooperative management of research projects like this one appears to be as important as any specific research policy or results.

Key words: brant, coastal habitat, cooperative management, ecology, flooding, geese, storm surge, traditional knowledge, wetlands, Yup'ik ideology

RÉSUMÉ. Un projet lancé par des biologistes allochtones et un anthropologue a permis de documenter le savoir traditionnel sur les effets des ondes de tempête et des changements dans l'écologie côtière des moeurs reproductrices de l'oie (en particulier de la bernache noire) dans les habitats côtiers marécageux du Sud-Ouest alaskien. Ce projet a été à la fois mis en oeuvre et supervisé par la corporation régionale locale à but non lucratif, qui a fait appel aux chercheurs du village pour interviewer les aînés et transcrire leurs connaissances de la biologie et de l'habitat de l'oie en relation avec les ondes de tempête. Bien que les connaissances locales et scientifiques sur le comportement de la bernache s'accordent en général sur les phénomènes qui se produisent (c.-à-d. moeurs alimentaires, effets des inondations et des ondes de tempêtes qui ont eu lieu sur le littoral dans le passé et changements dans les sites de nidification), ces connaissances ne s'accordent pas toujours sur les raisons de ces changements. À la demande des chercheurs du village, les interviews ont aussi fait état de la perception qu'avaient les résidents autochtones de la recherche et de la réglementation allochtone dans les habitats côtiers marécageux. Les aînés ont clairement exprimé qu'il existe un conflit entre la façon yupik de voir en l'oie une personne non humaine et la vision allochtone de l'oie comme une ressource que l'on peut gérer. Ils ont de plus exprimé une profonde rancœur envers le contrôle non local que représentent les chercheurs et les gestionnaires de la faune. Un grand nombre pensent que le contrôle local de leur territoire et de leurs vies est plus en danger que l'oie elle-même. De plus, le respect envers les aînés est aussi important que le respect envers les animaux dans ce qui affecte les procédés de gestion au niveau communautaire, ce qui crée un conflit potentiel que les jeunes Yupik des deux sexes ayant suivi une formation en biologie trouvent difficile à résoudre. Parallèlement à cette expression de la résistance au contrôle, le témoignage des aînés présente des solutions possibles à cette question litigieuse, solutions qui se basent sur les relations personnelles entre les membres de la communauté et les scientifiques. Au dire des villageois, la façon dont les allochtones travaillent dans la région est aussi importante que ce qu'ils accomplissent. La gestion coopérative des projets de recherche tels que celui-ci apparaît aussi importante que tout résultat ou politique de recherche spécifique.

Mots clés: bernache noire, habitat côtier, gestion coopérative, écologie, inondation, oie, onde de tempête, savoir traditionnel, marais, idéologie yupik

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ETHNOGRAPHIC PERSPECTIVES IN BIOLOGICAL RESEARCH

Ecologists have long recognized that landscape patterns along the Bering Sea coast have developed from an interplay of factors, including plant succession, competition, resource limitations, foraging patterns, predator-prey interactions, and disturbance regimes (J. Sedinger, pers. comm. 1992; Sedinger et al., 1995b; ARCUS, 1998). Yup'ik observers have direct experience with the same phenomena. Although far from the "original ecologists" that some Euro-Americans believe them to be (Fienup-Riordan, 1990:167–191), many Yup'ik people have a detailed, empirical knowledge of coastal flora and fauna. Yet few researchers have tapped this knowledge. Cultural differences in general, and the language barrier in particular, have been major factors limiting non-Native access to and understanding of Yup'ik indigenous knowledge.

In an effort to fill this gap, this paper describes and discusses the results of a project that documented coastal ecology from the Yup'ik point of view. The project was based largely on interviews with knowledgeable Yup'ik men and women who have both hunted geese and harvested eggs for decades in the lowlands along the Bering Sea coast. It was initiated by biologists, whose primary goal was to produce a detailed description of goose biology and habitat as related to storm surges along the Bering Sea coast. The interviews also elicited Yup'ik recollections of past storms and reflected their understanding of the relationship between storm surges, coastal flooding, and plant and animal life.

A second goal, which arose from locally felt need during the project, was to empower Yup'ik collaborators as donors of empirical information on an equal footing with the scientists who conduct research in their homeland each summer. Such empowerment is the focus of the paper's concluding sections. It is hoped that allowing elders' voices to be heard will encourage continuing dialogue between biologists and Yup'ik community members. This perspective can be expanded to the examination of a range of natural phenomena of equal interest to the Yup'ik and scientific communities.

PROJECT HISTORY

In fall 1992, University of Alaska Fairbanks (UAF) biologist Jim Sedinger asked me to carry out ethnographic research documenting the Yup'ik understanding of the effects of storm surges and changing coastal ecology on the breeding habits of geese (specifically black brant) in the coastal wetlands of southwestern Alaska. This study was to be the required "human dimension" of a larger National Science Foundation project on goose biology and coastal tundra ecosystems that he and other UAF biologists were undertaking. It would focus on six communities near the four major brant colonies in the Yukon-Kuskokwim

Delta: Toksook Bay, Tununak, Newtok, Chevak, Hooper Bay, and Scammon Bay (Fig. 1).

I agreed to work on the project and initially proposed to visit coastal villages, carry out interviews with knowledgeable elders, and write a report summarizing my findings. On reflection it seemed to me that the project would produce both more useful information and a model for future research in the area if ownership and implementation of the project were in local hands. The regional nonprofit corporation, the Association of Village Council Presidents (AVCP), agreed, and in August 1994 we held a two-day Indigenous Knowledge Recording Workshop in Bethel, Alaska. There I met with members of AVCP's Department of Natural Resources and village researchers from all project communities except Newtok and Tununak to develop research questions to be discussed with village elders (For the final protocol, see Fienup-Riordan, 1997:339–343).

The workshop drew attention to the project's potential to model a collaborative relationship between the Yup'ik and scientific communities. We discussed recording techniques as well as particular questions that the biological component of the study would address. The questions were translated into Yup'ik, and the group reviewed them to ensure clarity and accuracy. The workshop also included a practice interview with 70-year-old Dick Andrew of Tununak, as well as a phone conference with Jim Sedinger.

During the workshop, we distributed U.S. Geological Survey maps and photographs of the plants that elders would be asked to identify. We talked about problems that they might encounter in presenting these maps to village elders and ways that their verbal descriptions of areas where geese nest and feed could be translated into map form. The workshop closed with a discussion of how information gathered could best be archived to facilitate distribution both within and beyond the region.

Following the workshop, throughout fall and winter 1994–95, researchers carried out 29 interviews with village elders in five communities. Elders in Tununak were not interviewed because their IRA council chose not to participate in the project. All interviews were conducted in the Yup'ik language. During summer 1995, Veronica Kaganak, the researcher for Scammon Bay, transcribed all the interviews and translated them into English. The final unpublished report submitted to AVCP included 338 pages of transcripts that provided detailed documentation from particular village elders, including their understanding of how, why, when, and where geese feed, nest, and raise their young and how geese are affected by coastal flooding. Page numbers following quoted statements by individual elders in this paper refer to this unpublished report (Fienup-Riordan, 1997). While researchers worked in their villages, Robert Drozda of Fairbanks reviewed archival records to document past storm surges. Primary ethnohistoric sources were microfilm records of the Oregon Province Archives of the Society of Jesus Alaska

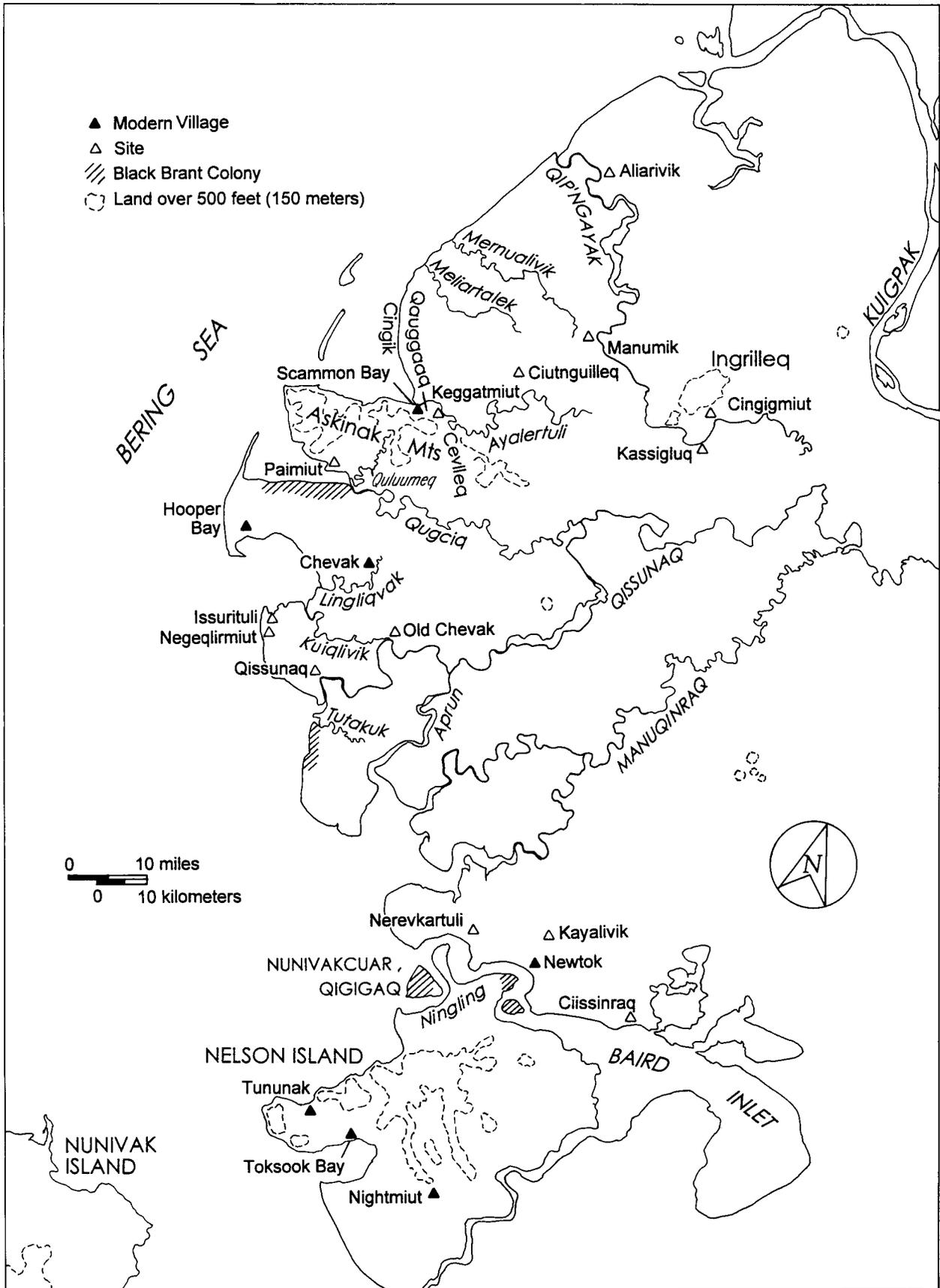


FIG. 1. Study Area, including modern coastal communities, historic sites, and locations of major brant colonies, 1997. Map prepared by Matt O'Leary.

Mission Collection and tape transcripts, map records, and site reports from the Bureau of Indian Affairs, Alaska Native Claims Settlement Act (BIA ANCSA) Oral History Office.

After review by AVCP staff and village researchers, the draft report was shared with both University of Alaska biologists working on the larger brant ecology project and the U.S. Fish and Wildlife Service personnel in Bethel. Both expressed surprise at the detailed, often passionate, responses to the final interview question, which asked residents' views on non-Native research and regulation. This paper attempts to both summarize Yup'ik knowledge of goose ecology and storm surges and put elders' comments in perspective.

PARTICIPATING COMMUNITIES

The communities involved in the study included five Bering Sea coastal villages between the mouths of the Yukon and Kuskokwim Rivers. From north to south, the villages were Scammon Bay, Hooper Bay, Chevak, Newtok, and Toksook Bay. Their combined population is nearly 2500. Because of its valued resources, the coastal zone is the primary region of human habitation throughout the circumpolar Arctic. Yup'ik settlements today continue to be closely tied to coastal processes.

Scammon Bay (population 346) is located on the northern face of the Askinak Mountains. It was established when residents moved from the old winter village of Keggatmiut, one of the seasonal camps of the Marayaarmiut ("people of the muddy lowlands"). Two major storms around 1920 forced the relocation of Keggatmiut 5 km west to the present location of Scammon Bay (Fienup-Riordan, 1986). The founding of a church and a store in the 1920s helped establish the community as a base for many families. The population has increased 40% during the last ten years.

Scammon Bay residents frequent the Black River (Qip'ngayak) region to the north and the Kokechik (Qugciq) River and Bay to the south of the Askinak Mountains (Fienup-Riordan, 1986). In the household economy of the 1980s, birds constituted 7% of the total diet (Fienup-Riordan, 1986), placing a close second to sea mammals in the nonfish category. Fish is the predominant food harvested by the majority of coastal residents.

The dollar cost of replacing subsistence food by outside foodstuffs is prohibitively high. In a 1986 study of three delta communities, the value of subsistence harvesting varied from \$7800 per household in Alakanuk to \$23 000 per household in Scammon Bay (Fienup-Riordan, 1986). In view of the limited wage-earning prospects in Yukon-Kuskokwim Delta communities, any disruption in fish or bird populations could cause a severe food shortage. In 1931 famine resulted after an intense storm surge killed fish, destroyed cached food, and redistributed some fish populations into new, unpredictable locations (Fienup-Riordan, 1986).

The communities of Hooper Bay (population 846) and Chevak (population 597) are the modern descendants of the two closely related and allied winter villages of Naparyaarmiut and Qissunaq, respectively. Their residents speak the Cup'ig dialect of Central Yup'ik (Woodbury, 1984), which implies their own identity within the larger Yup'ik community. Hooper Bay has nearly doubled in population in the last 20 years and is now the second-largest community in the delta. As in other delta communities, children under five comprise 20% of the population. Although Hooper Bay remains in its aboriginal location, Chevak is a comparatively recent village, settled in the late 1950s after a period of disastrous flooding.

Residents of Hooper Bay take geese and migratory birds, principally during spring and fall, although a small amount of summer bird hunting is undertaken (Stickney, 1984). During fall Hooper Bay people travel up to 50 km to various hunting areas on the lower Manuqinraq and Kashunak (Qissunaq) rivers, and northern Kokechik (Qugciq) Bay. Goose hunting may often be accompanied by berry picking, fishing for whitefish, or setting blackfish traps (Stickney, 1984).

Qaluyaarmiut ("people of the dip net") inhabit the two study communities to the south. Toksook Bay (population 405) on the southern periphery of Nelson Island is located on one of the few bedrock knobs in the region. It is a new community, founded in 1964 when residents relocated from Nightmiut. Newtok (population 217), the smallest study community, lies within a soggy lowland plain surrounded by show-and-sink lakes. It was settled in the 1940s by residents of the nineteenth-century site of Kayalivik, 16 km distant. Despite its marshy location, Newtok has also doubled in population since 1970 (Fienup-Riordan, 1983). At present the land is sinking, and many villagers wish to relocate. A proposed move to nearby Nelson Island has recently stirred controversy between villagers and the U.S. Fish and Wildlife Service because of the new site's proximity to important brant habitat (Rearden, 1996; Tom, 1996).

GOOSE ECOLOGY FROM THE YUP'IK POINT OF VIEW

Geese as Nonhuman Persons

Elders' descriptions emphasized geese as sentient creatures, possessing awareness of their surroundings and corresponding decision-making capabilities. When discussing the effects of fall flooding, Joan Bell of Hooper Bay (p. 225) said, "The birds probably move to another nesting ground after they see the damage done. Birds have their own awareness." Charlie Friday of Hooper Bay (p. 175) concluded his interview by telling the story of a human boy who traveled with the geese on their fall migration: "The geese brought him with them. When it was time, the grandfather did a *qaniquun* [shamanistic rite involving incantation] and taught him how to fly. When

the boy learned to fly, he migrated with them....They were like people across on the other side.”

Theresa Moses of Toksook Bay (p. 312) recounted another well-known traditional tale describing a young man who married a goose in human form and brought her to live among people: “I used to hear lots of stories about the animals who wore clothing just like people. There was a story about a girl who wore a Canadian goose feather parka....When spring came, the woman would be out late. She would be smeared all over the face with mud from eating grasses. One day when it was melting out, she disappeared. She flew away with the geese.”

Geese are not the only creatures that possess awareness and merit respect. Many Yupiit view other animals as sentient creatures, capable of responding. From the powerful bear to the small, apparently insignificant tundra lemming, each is a thinking, feeling being. Animals are often depicted as more sensitive and aware than their human counterparts. According to Charlie David, “That was the way the old ones operated when they totally respected the *ella* [universe]....The land animals, like the ocean beings, are very, very keen. Even the fish are aware of people who are in trouble or in a predicament. During this time now, you have heard talk that fish are swimming very deep. Truly, they are keenly aware of everything” (David, 1994).

For many Yupiit past and present, everything has personhood, and human thought and deed constantly take this shared personhood into account. Simply stated by Paul John of Toksook Bay (John, 1994), everything has a *yuk* (person): “My wife’s uncle, since they’ve said that he was almost a shaman, told me this more than once. He told me that everything has a *yuk* and that he had seen them. He said that even a piece of wood that was split in half was half of a person. It was their life” (See also Fienup-Riordan, 1994:46–62).

Jobe Nevak of Toksook Bay (p. 288–289) voiced the opinion that animal populations, including geese, fluctuate because animals have their own worlds.

They used to say, “Sometimes there are fewer of this, and sometimes there are more.”...There is a saying that animals have two worlds. First they live on our world, and then they disappear and live under there in their other world....The mice population varies....The fox population also varies. Sometimes there are lots and sometimes there are few. It’s the same with all fur animals. They have two worlds. It is said that one of their worlds is in the heavens, in the sky. The other world is our world, and another world is under the ground....They used to call mice “the ones from the heavens.” (see also Paul John, p. 277)

Fundamental to these comments is the idea that geese, like other animals, control their own destinies. When they are treated in ways they do not like, they do not return. On the other hand, if they receive proper treatment, including

appropriate hunting, they will return in abundance:

All the animals or birds decrease or increase when they want to. Although many are killed, they increase again. Many years ago we used to kill many geese. Geese don’t decrease to extinction: they become plentiful again when they want to. Even the mink or any living creature that lives on the land decreases and increases when they want to.

They know where they nest and go to their nesting ground. If they know their nesting ground is not good for nesting, they will find another spot. (Thomas Akerelria, Scammon Bay, p. 78)

Harvesting the Geese:

The More Taken, the More will Return

Interviews with coastal residents revealed a detailed understanding of the habits and lifeways of goose populations. In the past, elders said, many geese nested in the muddy lowlands of the Bering Sea coast. “There were so many that in the fall people couldn’t sleep because the geese made so much noise,” recalled Mark Tom of Newtok (p. 238). Michael John, also of Newtok (p. 262), stated:

When the geese first arrived, they didn’t stay only in one place. They went to the areas where the snow had melted first, like on the riverbanks. They look for available food. When it is time to lay their eggs, they probably nest where food is available.

After the eggs hatch, the parents bring their goslings all over the tundra and they are no longer seen. They stay mostly around the *evget* [small grasses, *Carex subspathacea* (referred to as *Carex*)]. They say that when they molt, even though there are lots, they become quiet. It is said that they are scared. You could see a lot of their tracks on the mud between the small grasses.

According to those interviewed, brants prefer to nest closer to the coast than other birds: “The birds that nest close to the seacoast are black brant and spectacled eider. The ones that are inland are emperor geese, Canada geese, and white-fronted geese” (Nathan Kaganak, Scammon Bay, p. 85). Nesting grounds may vary from year to year, depending on the weather. When spring is late, geese may stop short and not come to the coast. Mary Ann Sundown of Scammon Bay (p. 99) noted: “Sometimes we have too much snow and it melts too slowly. The geese don’t come here when that happens. The snow is on the ground like it is winter for a long time.”

During most years, numerous waterfowl make nests along the coast each spring, and the nesting geese produce thousands of eggs. In the past gathering eggs was a major springtime harvesting activity: “When we went egg hunting, my mother used to tell us not to take all their eggs, but to leave an egg or two. It is true that they are like people....They love their young, which are precious to

them” (Mary Ann Sundown, Scammon Bay, p. 103; see also Mike Uttereyuk, Sr., Scammon Bay, p. 42).

Contemporary elders recalled the rule that a person spit in a nest after gathering eggs, a tradition that many still follow. Joan Bell of Hooper Bay (p. 227) explained the practice: “Long ago, they said if you are going to take the eggs, you should take the nest and spit into it and say, ‘Nest again beside this nest so I can find more eggs.’ If we wanted to find more eggs, we spit into the nest.” Edward Aguchak of Scammon Bay (p. 14) said that “more eggs will fill the same nest if we spit into it” (see also Charlie Friday, Hooper Bay, p. 174; Mary Ann Sundown, p. 103).

Others recalled the same rule but gave it an opposite interpretation: “The geese leave their eggs to eat after covering their nest. By smelling the spit, they will understand that the nest is no longer approachable. It will smell our scent when it goes to its nest. It will not go back to its nest because we took all its eggs” (Francis Charlie, Scammon Bay, p. 28; see also Dick Lawrence, Toksook Bay, p. 301).

Few people go egg hunting today. According to Joan Bell of Hooper Bay (p. 224), many people no longer hunt eggs because they are scared of “Fish and Game people,” a term that many use to refer to non-Native biologists and game managers and not specifically to either Alaska Department of Fish and Game or U.S. Fish and Wildlife Service personnel. Paul John (p. 276, 280) added, “If they want eggs, they go to the store to go egg hunting....They don’t go egg hunting as much as they used to because of the chicken eggs.”

During the nesting season, people refrained from handling the eggs and goslings remaining in the nest, lest their parents avoid the young birds and let them die: “They always told us not to handle the goslings because their mothers won’t want them anymore. They say if we touch something, our body scent will be smeared on it....The prey can easily smell us even when we are not aware of it. It was one of the rules” (Frances Charlie, Scammon Bay, p. 23; see also Joan Bell, p. 227; Theresa Moses, Toksook Bay, p. 309; compare Sedinger, 1990).

During the molting season, people harvested geese in large numbers through goose drives. These might take place two or three times a summer in different areas around the rivers. Mike Uttereyuk, Sr., (p. 42) described driving geese (primarily the larger emperors) north of Scammon Bay. Both Bruno Kasayuli (p. 5) and Thomas Akerelria (p. 80) of Scammon Bay added that they harvested only adult geese, letting the goslings go free:

We used to go to the coast and drive the geese downwards and stop right across from Scammon Bay. We used to walk in a semicircle to drive the geese. When we reached the spot, we would look at them and walk in the middle to part the group in half. Then we would let people go around them and free the other geese.

After we killed lots in one year, there would be a lot more returning the next year....Today, since we don’t

catch as much as we used to, the population of geese has declined. The amount of geese we kill is usually replaced. If we killed lots, they would be replaced by many more when they returned. That was how it was! (See also Bruno Kasayuli, p. 4; Jerome Slats, p. 132; Michael John, p. 256)

Uttereyuk’s conclusion—that the present population decline is the direct result of limited harvests—was a recurrent theme in elders’ testimony.

Human predators are not the only ones who threaten the geese during the nesting season. According to Nathan Kaganak of Scammon Bay (p. 91):

Geese are aware. Sea gulls and jaegers like to eat their eggs, and when this happens, geese run after them to keep them away from their eggs. Both red and white foxes also try to eat their eggs. They also like to eat the goslings. Even sea gulls try to eat the young ones, biting and swallowing them when they are small. The red and white foxes, the sea gulls, the jaegers, and the hawks destroy the goose eggs and goslings. They make a loud bang when they catch the goslings. We are not the only ones to catch the geese. (See also Edward Aguchak, Scammon Bay, p. 13; Roy Henry, p. 56)

Joseph Tuluk of Chevak (p. 156) added:

Foxes eat goslings and goose eggs, too. The foxes take the eggs and bury them under moss on the mounds. They dig and bury them just like people. They put a marker on it so they can go back to it. In the winter, when there is snow on the ground, they use the marker to find the buried egg and eat it. (Compare Larson, 1960; Raveling, 1989; Stickney, 1991; Anthony, 1991, 1997)

Different geese were hunted during different times of the year. According to Dick Lawrence of Toksook Bay (p. 298):

During the fall black brant become unwanted in our village because, when they fly, their meat is not so good. They are skinny. The emperor geese meat becomes odorous when they begin to fly. They aren’t like spring geese anymore. That’s why some people don’t hunt for emperors in the fall. They hunt for the Canadian and the white-fronted geese. They become tasty in the fall from eating [berries] from the land.

If people harvested more geese than they needed for immediate consumption, they would either share them with others or dry them on racks for future use: “When people got enough geese hung up they gave what was left to those who didn’t hunt for geese. They shared what was caught. You know, geese easily spoil. Before the geese spoiled, people took care of them. They gave geese to others who didn’t have any after they got their share” (Xavier Simon, Scammon Bay, p. 67). Eddie Bell, Sr., of

Hooper Bay (p. 214) added that “land animals, like the geese, easily poison people because they don’t live in the salty ocean. The sea animals are eaten even after they were kept in the cache” (see also James Gump, Hooper Bay, p. 198; Mike Uttereyuk, Sr., p. 43; Charlie Friday, p. 175).

A central tenet of goose hunting was that the more birds people harvested, the more would return the following season: “Since I have been aware, there used to be a rule about geese. At different years after many geese were killed, they never decreased. It is true. Many years ago there were a lot of people who ate geese. Many people killed them. All summer through the fall they would be hunted” (Michael John, Newtok, p. 257). Conversely, a person who was not going to use a food resource should not handle it and should leave it alone:

They also told us, “If you want that, try to catch it. If you are not going to need it, don’t touch it, just leave it alone.”...When we caught something, the elders would say to us, “Did you catch that because you will eat it? If you are not going to eat it, you are not supposed to touch it.” They wanted to make sure we abided by their rules. (Xavier Simon, p. 67)

Mike Uttereyuk, Sr., of Scammon Bay (p. 43–44) also recalled the rule that people should not kill something they could not use for food:

White men have laws. The Yup’ik people had laws, too, traditional laws....One of the rules was if there is an animal that is hard to reach, even if we are very greedy, we should not kill it. Whether it is on the land or in the ocean, if we can’t get to it,...we should just leave it alone....because you won’t be able to take it and eat it. It will be wasted....People who lived before us made that rule....

Because we don’t kill a lot of geese like they did in the past, the numbers have declined. Because white men are keeping a close eye on them....They are making the goose population decrease.

Uttereyuk’s conclusion highlights a fundamental conflict between the Western scientific view of geese and that held by many contemporary Yupiit. Wildlife managers and biologists maintain that overhunting and harvesting in both Alaska and the Lower Forty-eight are major factors contributing to the decline of goose populations along the Bering Sea coast (Raveling, 1984; Sedinger et al., 1993). For Uttereyuk and many of his generation, the decline of the geese does not reflect overharvesting by Yup’ik hunters. Instead, it is limited harvests that insult the geese, causing them to go elsewhere.

Black Brant Habitat

Mike Uttereyuk, Sr. (p. 43) told a story about a goose telling a story:

It was in the spring, when goose food becomes plentiful....When the goose was coming it said, “In the spring here, plants that have just thawed are so tasty. I am coming your way!” It knew that it would be hunted and caught by a human being....That is why the geese like to come here in the spring, because there are good-tasting foods for them....Even if they know that they are going to be killed, they say that they will come back.

Elders gave detailed accounts of the habits and habitat of black brant, based on years of personal observation. Black brant (*Branta bernicla nigricans*) are called *neqlernat* (singular = *neqlernaq*) on the Kuskokwim and coast, and *leqlernat* on the lower Yukon. Michael John of Newtok (p. 260) remarked that the birds are also sometimes referred to as *kass’at* (white people) because when they make noise, they sound as though they are speaking the English language.

Brant inhabit the muddy lowland along the Bering Sea coast between the mouths of the Yukon and Kuskokwim Rivers (King and Derksen, 1986). According to Francis Charlie of Scammon Bay (p. 25), “Brant are muddy lowland geese....I haven’t seen a brant nest on *nunapik* [tundra]. Brant are not seen farther inland, only on the coast.” Thomas Akerelria, also of Scammon Bay (p. 78), agreed: “Black brant don’t nest on the side of the riverbanks. They nest on the muddy lowland farther away from the bank. Black brant are the only geese that nest on the muddy lowland. The Canada geese, white-fronted geese, and emperor geese nest on small mounds farther inland, on the islands of the tundra.”

This coastal lowland is rich in the small grasses that form the staple of the brants’ diet (Jefferies, 1977; Dau and Hogan, 1985; Kincheloe and Stehn, 1991; J. Sedinger, pers. comm. 1992). Joseph Tuluk of Chevak (p. 157) summarized their diet: “They eat small grasses, sand, blackberries, and plants from the bottoms of the ponds.” Others noted that brant eat from the river edge during low tide. Elders’ accounts reveal strong observational skills and a comprehensive, practical grasp of goose ecology:

They eat plants that grow on the mud, also at the bottom of the ponds. These are called *evegeraraat* [small grasses, *Carex*, also referred to in Yup’ik as *evget* and *evegeraat*]. They eat plants that grow at the bottom of the ponds. These are called *qipaayaat*. They don’t grow on dry land, only on the mud....

Wherever the geese once stayed, these grasses tend to grow. They like to grow on places like the fall gathering grounds. The small grasses [*Carex*] really grow. Seems to me the black brant urine and feces are good for plant fertilization. (Buster Smith, Hooper Bay, p. 181)

Geese look for melted areas to feed on. Soon the whole area melts and they land on a nesting ground. When they nest they quit flying and stay where they are going to nest....

They don't stay in one place after they hatch. When the goslings are ready to walk long distances they start to walk all over the tundra. We see many goslings running around alongside the river after they hatch. When the goslings are about the same size as the parents, they gather on the banks along with many geese. We call it the *aqumgavik* [sitting place]. (James Gump, Hooper Bay, p. 196)

After they hatch, they move around....They move anywhere, alongside the river and on the ponds where there are *nuyaaralget* [lit. "places with imitation hair," probably water weeds]. They also eat sourdock...and blackberries [*Empetrum nigrum*]. (Charlie Friday, Hooper Bay, p. 173; see also Xavier Simon, p. 66)

Evegeraat [small grasses, *Carex*] don't grow very tall. They only grow to about four inches. If they are not eaten they will probably grow about five or six inches tall. These are food to the Canada, black brant, and emperor geese...when they are just growing.

During the spring, before the plants grow, the geese eat roots and tubers. They are tasty for the geese. During the fall, the black brant, the *angilukviit* [larger than the Canada geese], and the snow geese eat *iitat* [the lower stems of cottongrass, *Eriophorum angustifolium*]. *Iitat* are the companions of the *kelegkuat*. They eat the roots of these plants by pulling them out. (Edward Aguchak, Scammon Bay, p. 13)

Elders were shown photographs of *Carex subspathacea*, *Puccinellia phryganodes*, and *Elymus mollis*. They commonly identified *Carex* as simply "goose food." Biologists note that *Carex* and *Puccinellia* account for only 2% of coastal vegetation but 50% of the brants' diet. These two plants grow on inner bends of rivers, areas that are flooded several times a year. They also grow on the areas around eroded ponds, another common brant feeding ground. Moreover, these two plant species have up to twice the protein of other coastal plants, an important factor in gosling growth. Plants grow taller in inland areas, and brants do not like them as well. Also, young goslings cannot eat the larger plants (Kincheloe and Stehn, 1991; J. Sedinger, pers. comm. 1992; Sedinger et al., 1993, 1995a; Sedinger, 1995).

There are various Yup'ik designations for *Carex*, *Puccinellia*, and *Elymus*. Paul John (p. 178) observed, "Some of these that are on paper have different names, although they are one kind. People have different dialects." *Carex* was labeled *cungagpayagaat* [little green things] by Nicholas Tom of Newtok (p. 242), *canyagaquaraneng* [small grasses] by Felix Walker of Scammon Bay (p. 11), *evegeraat* [small grasses] by David Boy Scout of Chevak (p. 121), and *evgerayagaat* [small grasses] by Nathan Kaganak of Scammon Bay (p. 86). These different designations may also refer to different stages of plant growth and development.

In some areas, *Puccinellia* are "just called small grass" (Nathan Kaganak, p. 86), while according to Eddie Bell, Sr. of Hooper Bay (p. 209), "These [*Puccinellia*] are called *ulunguayagaat*" [lit. "fake, little tongues"].

Elymus were labeled *cungagpiit* [long green ones] "because they are green" by Joseph Tuluk (p. 156) while Paul John (p. 278) called them *cukcukuat* and Jerome Slats of Chevak (p. 130) called them *evek*. According to Francis Charlie of Scammon Bay (p. 24):

These [*Elymus*] look like *taperrnat* [coarse seashore grass]. We call the grass here in Scammon Bay *canek*. The ones that grow in the mud are called *taperrnat*. They use *taperrnat* for sewing grass baskets. If these grow on higher land, they are called *can'get* [grass]. The grass that grows on the sides of the rivers is called *kelugkaq* [tall, coarse grass]. The ones we call *kelugkaq* were used for weaving baskets for black fish long ago, when we had no gunny sacks.

Coastal residents classify a number of plants viewed by Western science as distinct species as male and female varieties of a single plant type. Nathan Kaganak (p. 86) identified *Puccinellia* as the male species of *Carex*. Eddie Bell, Sr., of Hooper Bay (p. 209) offered another interpretation: "We call [*Elymus*] *tugglugpak*. Many of these *tugglugpiit* grow on the muddy lowland. Maybe they are the male species of the *evegeraraat* [small grasses, *Carex*]. Everything has a male mate."

Along with these grasses, brant were observed eating a variety of plants, including the tips of the *usgunertuliaret* (lit. "ones that have many joints") (Roy Henry, Scammon Bay, p. 53), the roots of longer plants called *ussut* that grow on the sides of ponds (Joan Bell, Hooper Bay, p. 225), and the sugary bottom parts of *kapuukaraq* (buttercup, *Ranunculus* sp.) (Roy Henry, p. 54). According to Theresa Moses of Toksook Bay (p. 310): "During the fall they start eating blackberries and *utngungssaraat* [tubers of mare's tail (*Hippurus vulgaris*) found in mouse caches, "mouse food"]. They change their diet in the fall. They eat blackberries on the tundra and sand on the coast. They see the sand as food" (see also Dick Lawrence, Toksook Bay, p. 298). Xavier Simon of Scammon Bay (p. 63) noted that after they eat grasses, they eat sand in the evenings: "They stay where there is sand until the sun rises again, and they leave again." Joan Bell (p. 225) spoke like a true naturalist, "I am always amazed when I see them eat. I often wonder why they eat certain plants. I also wonder what else they eat."

Past Flooding and Coastal Storm Surges

I was in a flood, even though I am not a bird. (Eddie Bell, Hooper Bay, p. 212)

The Norton Sound Eskimo have a legend that in the first days the earth was flooded except a very high

mountain in the middle. The water came up from the sea and covered all the land except the top of this mountainside. A few people escaped by going into an umiak and subsisting on the fish they caught until the water subsided. Finally, as the waters lowered, the people who were saved went to live upon the mountains, eventually descending to the coast; the animals also came down and replenished the earth with their kind. During the flood the waves and currents cut the surface of the land into hollows and ridges, and then, as the water receded, it ran back into the sea, leaving the mountains and valleys as they are today. Legends very similar to this are widely spread among other Eskimo on the coast of the Bering Sea. (Nelson, 1899 [repr. 1983], p. 452)

Several times a decade, storm surges flood low-lying coastal areas up to 16 km inland (Dupre, 1980; Wise et al., 1981; Sedinger et al., 1993). UAF biologists are seeking to learn what effect these surges have on plant growth and, as a result, on gosling growth and survival rates (J. Sedinger, pers. comm. 1992). Villagers today describe how winds “blow up the tides” in both spring and fall (Fig. 2). These surges routinely increase the salt content of soil, preventing other plant communities from moving into the lowland (J. Sedinger, pers. comm. 1992). Storm surges can also cause food and resource shortages, although they do not always do so. For example, a major surge in the northern delta during late November 1931 flooded storage pits of dried fish and dispersed fish populations into unpredictable locations.

Coastal residents were asked to describe the floods they had experienced. Many said that when strong winds from the south change to the southwest, they bring high water. James Gump of Hooper Bay (p. 192) recalled, “The wind has a strong impact on the water, and when it hits from the south and southwest, we can have a big flood. When it has a strong impact, even for three or four days, it will flood. It will recede a little, but flood again. When there is a flood, it reaches the little hills, or the mounds around here and towards Chevak. Our village becomes a little island” (see also Albert Therchik, Toksook Bay, p. 320).

Fall floods are usually larger than spring or summer floods, as by autumn “the water is not lazy to rise” (Roy Henry, Scammon Bay, p. 52). According to Xavier Simon (p. 67): “The floods haven’t really changed since I was small. It’s the same. Every fall it floods. Sometimes it’s high, and sometimes it’s not high. It floods every year. It is a recurring thing.” Theresa Moses of Toksook Bay (p. 308) said: “When I was small, I remember waking up in the middle of the night, and people would be moving into our house because of the flood. They lived close to the river. They said their house was filled with flood water....They would run from the flood to our house because it was farther away from the river.”

Autumn floods, however, pose almost no threat to the geese, as the nesting and molting seasons have already

passed: “It floods in the spring and fall, but if it floods in the fall, nothing happens to the birds because they have already flown” (Eddie Bell, Sr., Hooper Bay, p. 209).

In 1882, Johan Adrian Jacobsen experienced a storm surge during his travels in the coastal lowland. He wrote that the oldest people in the area could not remember a similar occurrence and applied their “Eskimo attitude to natural phenomena, saying that the travelers were unlucky birds” (Jacobsen, 1977:162). Like Nelson before him, Jacobsen (1977:130) noted apocryphal floods of the past: “The local Eskimo have a legend that long ago there was an earthquake with a flood that covered the land, and that only a few people with their skin boats could save themselves on the tops of high mountains.”

The late John Henry of Scammon Bay (Henry, 1984a, b) described a flood that occurred during early winter, perhaps as long ago as 1913, in which a couple and their children were killed at Aliarivik, near Qip’ngayak (Black River):

It got very windy at night. After being windy, the wind changed to the east and when it flooded it covered their village. And that person...climbed to the top of his house. His brother was asleep and didn’t know about the flood. He wasn’t able to get out of his house by the time he realized it....He got up and let one of his children escape through the window up above....They all died of hypothermia inside the house.

Older villagers remembered the fall flood of 1931. For many elders alive today, this is the worst flood they personally experienced. According to Jerome Slats of Chevak (p. 129):

When I was young, it flooded before I started traveling. The flood reached the sod houses and filled them with water during the winter. The flood usually didn’t reach the houses. The people went out of the houses because they were flooded. They stayed in tents where the ground was higher. That was the first flood I ever encountered. It covered all the lowlands. (See also Jorjean Charlie, Newtok, p. 248)

Father John Fox reported in Catholic mission records that the 1931 surge occurred on November 26 (Fox, 1931). A letter written by Dr. Maurice Corthell to Mr. Charles Hawkesworth, Acting Chief of the Bureau of Indian Affairs, contains a detailed account of the flood. In his letter, written at Mountain Village on May 12, 1932, Corthell stated that the flood resulted in starvation in both Old Chevak and Qissunaq, but not at Hooper Bay (Corthell, 1932). He continued:

George Sheppard told me that during the high tide in November at one village on the Aproon [Aprun] river the people had to flee from their igloos [sod houses] and run to a high knoll. One of the boys waded through

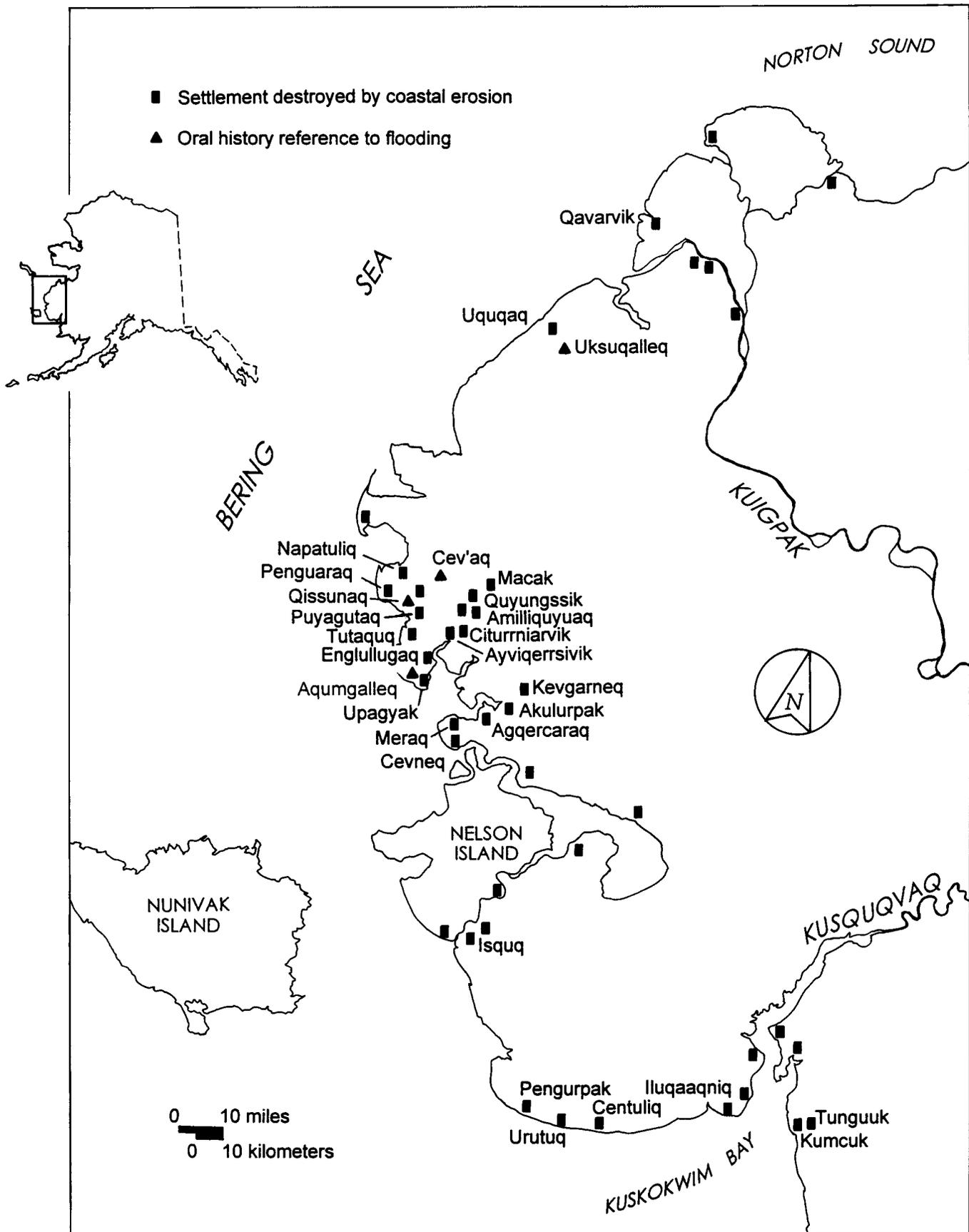


FIG. 2. Historic sites affected by coastal flooding and erosion. Map prepared by Matt O'Leary and Robert Drozda, 1997.

the water up to his knees back to the igloo to get a tent which was pitched, thus saving them from freezing as there was a very high wind blowing at the time. The water rose to the sides of the tent and the ice passed so close they were in fear it would ram their tents. Another family climbed to the roof of their igloo and sat there till morning and when the water went down traveled to [Old] Chevak. The people of Kashunak [Qissunaq] lost all of their skin boats and all but two of their kayaks.

People moved to different camps the following summer, fearing more flooding. Joe Friday (1984) reported that the local priest, Father Fox, said that the people's food supplies were destroyed and washed away, and he asked the federal government for relief funds, which he received. The ice was so thick that it buried all the food storage pits as well as all the land around the village. Even the fresh water on high land turned to salt water.

Most elders interviewed remembered the spring flood of 1960, another strong storm surge. According to Edward Aguchak of Scammon Bay (p. 9): "It flooded for three days to a week and the lowland was all water....Only the mounds on the tundra were visible. The water probably washed the eggs out of their nests. Canadian geese eggs, spectacled eider eggs, *anarnissagaat* [Steller's eider] eggs, and *kep'alget* [greater scaup] eggs were scattered. After that flood we haven't had another like it." Joseph Tuluk of Chevak (p. 155) emphasized the storm's long-term impact:

It covered the lowland and the black brant nesting ground because they nest on the muddy lowland. When it flooded back then, their eggs were scattered from their nests. The eggs drifted away at the edge of the hills. It happened around Tutakuk [River] and this side of Tutakuk on the lowland, on the shore of Qissunaq. Brant eggs were also scattered on the other side of Tutakuk....From my point of view, the black brant population seemed to decrease after the flood. (See also Michael John, p. 257)

Some people remarked that "Fish and Game" officials noted a decrease in the goose population following the flood. According to Felix Walker, Sr., of Scammon Bay (p. 110), "We were told not to hunt for geese. We were blamed for the decrease even though it was the flood that decreased the goose population." According to Eddie Bell, Sr., of Hooper Bay (p. 208), "The flood decreases the numbers, not the Yup'ik people."

Residents also recalled the spring flood of 1992, during which many eggs were scattered and ruined: "The sides of the rivers were full of black brant nests filled with down, and many eggs were ruined" (Mark Tom, Newtok, p. 235). Buster Smith of Hooper Bay (p. 181) concluded, "Only the nests on the muddy lowlands were destroyed. Some of them were of all kinds of little birds....There was a decrease of geese and birds the next year, even the Arctic tern and sea gulls, anything that nests on the lowland."

Effects of Flooding and Storm Surges

As storm tides recede, they often leave deposits of mud on the vegetation. Elders maintained that these large mud deposits inhibit the growth of plants such as *tayarut* (mare's tail), *nasqupaguat* (groundsel, wild spinach), and various small grasses: "The mud deposits on the plants and covers the vegetation. It covers the *tayarut* and some of the plants that the geese eat, like *evgerayagaat* [small grass, *Carex*] and other small grasses....The geese can't eat something that is muddy, only the small grasses like *evegeraat* [*Carex*]" (Mike Uttereyuk, Sr., Scammon Bay, p. 38; see also Buster Smith, Hooper Bay, p. 182; Joseph Tuluk, p. 156).

Elders contend that although geese may not nest in their usual nesting grounds the spring following a big flood, storm surges have no long-term effects on *Carex* or *Puccinellia*. Although the plants might be temporarily discolored, most people did not notice changes in the color or growth of these plants in the summer following a storm tide: "These [*Carex*] are *evegeraat* [small grasses]. After a flood their color becomes lighter and they become limp. These [*Puccinellia*] are longer small grasses....When we take walks after floods we see that the flood makes the plants limp and they fall to the ground" (Joan Bell, Hooper Bay, p. 224; see also Felix Walker, Sr., Scammon Bay, p. 111; Eddie Bell, Sr., Hooper Bay, p. 209-210). According to Edward Aguchak (p. 10):

Mud usually is deposited on them [*Carex*], but they grow every year. They just grow back on top of the mud. These plants close to the coast don't die even though the salt hits them. The food for the geese always grows back. These [*Carex*, *Puccinellia*, and *Elymus*] don't fade even after a flood. Only some of the real grass fades and dies. A lot of plants don't die. (See also Jerome Slats, Chevak, p. 130; Joseph Tuluk, p. 156; James Gump, Hooper Bay, p. 194)

Xavier Simon of Scammon Bay (p. 63) felt that mud deposits did damage the plants of the muddy lowland:

These small grasses grow only on the mud. They don't really grow farther inland. The flood covers the food for the geese. Because of this, geese move and leave the places where they used to gather....The eggs and the vegetation that we eat are not the only things affected, but the food for the geese is also damaged.

Some plants grow back if the mud is washed away in the spring. When the snow melts in the spring, the rushing water cleans some of the mud away. Sometimes not all the mud is cleaned.

Elders commented on the effects of flooding and storm tides on other plants. According to Buster Smith of Hooper Bay (p. 182): "*Tayarut* [mare's tail] grows on the muddy lowland where it gets salty, so they don't die. Salt kills

aatunaq [sourdock] even though it grows on the ground. Plants that grow on the ground become less the next year because of the salt, but when the salt is gone, a lot more grow.” Edward Aguchak (p. 10) continued:

During a flood, the water brings the tomcod farther into the rivers. The floods take the *utnungssaraat* [roots and tubers collected by mice, “mouse food”] away from the mouse caches. It takes it all away. Nothing happens to the needlefish, but it brings them to the source of the river. Nothing happens to the *tayarut* [mare’s tail] even after a flood. I haven’t seen any dead or destroyed mare’s tail plants after a flood. We have so much fresh water from streams, it probably washes out the salt from the mare’s tail plants in the ponds that are located at the base of the mountains. But the salt kills the *canget* [grasses]. Salt doesn’t kill the *evegaat* [*Carex*], the black brants’ food.

According to Xavier Simon (p. 61): “Floods not only take away our driftwood. They also ruin the vegetation that we eat on our land. It ruins the *nasqupaguat* [groundsel] and the *quagcit* [sourdock, *Rumex articus*]. Mice and mouse food [tubers stored by mice] are also ruined by flooding....After a flood, it affects the people. The vegetation doesn’t grow the following year if it was covered by a lot of mud. When it floods, it harms the plants and animals.”

Interviewers also asked elders whether they had observed goslings flying earlier or later in the summer following a storm tide. Elders did not view flooding as a factor in determining when young geese would fly. As Theresa Moses of Toksook Bay (p. 310) put it, “Goslings fly only when it’s time for them to fly. Like children, when it’s their time they do.” Jobe Nevak of Toksook Bay (p. 288) concurred: “Even if there was a flood, the birds fly only when it is their time. If a bird hatched earlier, it flies early, and if a bird hatched later, it will fly later. Just because there is a flood, it doesn’t mean they will fly earlier” (see also Xavier Simon, p. 64; Joan Bell, p. 224; compare Sedinger, 1995).

Some elders did note that food availability could be a factor in determining when it was time for the goslings to fly. According to Felix Walker, Sr., of Scammon Bay (p. 111), “Geese don’t fly early because of a flood. After they eat all they can, they fly when it’s their time. If some didn’t have enough food to eat, they fly later.”

Elders commented on the normal order in which birds depart in the fall: “The one-year-old birds are the first to fly. The birds with young ones fly when they fly. They begin to fly in August. When we go out for salmonberry camp, we notice that they have already begun to fly. *Kangit* are birds that no longer lay eggs. They don’t have goslings. *Kangit* are the first to molt” (James Gump, Hooper Bay, p. 195).

Sedinger (pers. comm. 1992) notes that a change in elevation of only a few centimeters can produce a

complete transition from one plant community to another. Thus, the coastal ecosystem may be dramatically altered by rising sea level or increased flooding frequency (Warrick and Oerlemans, 1990; Maxwell, 1992). Contemporary Yup’ik elders have not observed either a change in flooding frequency or related changes in habitat availability during their lifetime. They see floods as a regular environmental feature and observe that the habitat of nutrient-rich, salt-tolerant plants (including *Carex subspathacea*, *Puccinellia phryganodes* grazing lawns, *Elymus levies*, and *Carex ramenskii* wet meadows) returns to normal the following year. Although they recognize that goose populations are related to the quantity of high-quality food resources, in their view sufficient habitat has always been present, and they do not associate changes in goose populations with more or less frequent flooding.

Changes in Brant Nesting Grounds

Black brant nest in four major colonies in the coastal lowlands between Nelson Island and Scammon Bay (Fig. 1), rather than in scattered single nests that they return to year after year. The population of these colonies declined an average 60% during the early 1980s (Lensink, 1987). Biologists attribute this decline to both high harvest rates and high rates of nest destruction by arctic foxes (Larson, 1960; Eisenhauer, 1977; Sedinger et al., 1985, 1993; Raveling, 1989; Stickney, 1991; Anthony, 1997). The geese also experienced intense predation during 1984 and 1985. Biologists report that since 1986 the population has been gradually increasing, although in some areas there has been a decline in females returning to nest, either because smaller goslings do not survive or because the colony, while recovering its size, prevents their return (Sedinger et al., 1993).

Elders were asked to describe changes they had observed in where geese nest and in their overall numbers, and many provided detailed information. Some attributed these changes to spring flooding and nest destruction, noting that population fluctuations were often the result of changes in land and weather conditions.

A common theme in elders’ descriptions was that in the past many geese inhabited the muddy lowland, but since professional biologists and researchers began work in the area the goose population has declined. Conversely, in coastal areas north of Scammon Bay, brant are increasing now that “Fish and Game” personnel, designating researchers as well as wildlife managers, have stopped work in the area. In written comments on this paper discussed in detail below, Charles F. Hunt of U.S. Fish and Wildlife Service (USFWS) in Bethel pointed out that this objection to the presence of researchers is relatively recent. It was not until after 1983 that people in the villages began complaining that goose population declines were caused by Lower Forty-eight sport hunters, USFWS camps, banding and collaring, red flags to mark nests, numbers put on eggs, human smell from touching eggs and goslings, and

aerial counts. Hunt (pers. comm. 1996) stated: “Prior to the Yukon-Kuskokwim Delta Goose Management Plan of 1983, while I was working and traveling in the Y-K Delta villages, no one complained about the Fish and Wildlife Service working on ducks and geese or any other species of migratory bird.”

Many elders lay strong emphasis on the connection between increased human activity in the nesting grounds and declining numbers of geese:

There used to be lots of brant in the Qissunaq area where the Fish and Game camp. A lot of them nested there. They never used to nest around [Scammon Bay]. Now they have started to nest around here....

Today, in 1995, they are nesting on the coast. They also nest on the riverbanks. When they molt, even at Paimiut, the river is filled with brant. Even inside Quluumeq. There used to be no geese around here, but today there are lots. Since Fish and Game left, the geese are increasing. When people bother the geese, they move. (Felix Walker, Sr., Scammon Bay, p. 111–113)

At Mernualivik there used to be many black brant in the springtime when we go northward. We would pick eggs like we were picking wood from the ground. Then white people came to study the geese, and they became less. Now they don't nest at Mernualivik anymore. (Nathan Kaganak, Scammon Bay, p. 87; see also Xavier Simon, p. 64; Joseph Tuluk, Chevak, p. 156, 157; Margaret Slats, Chevak, p. 146)

Brant used to stay at the mouth of the Qissunaq River. There used to be lots of brant. The land hasn't really eroded, but since the flood scattered their eggs, there are less brant. Today there are more brant....I can't specifically locate where the geese are. They are where there are no Fish and Game in the spring. The place where there were geese is now a camp for Fish and Game. They have tents and markers, now there are no more geese. (Jerome Slats, Chevak, p. 133)

There used to be many geese by Kuiqlivik....There were also lots around Lingliqvak [the river to Chevak]. Since the amount of boats increased, the geese decreased. Also, since the people of Fish and Game began to come they decreased. In Kuiqlivik and Lingliqvak, there are no more geese. (James Gump, Hooper Bay, p. 196; see also Albert Therchik, Toksook Bay, p. 322)

The populations of other small birds are also perceived to be declining. According to Joan Bell of Hooper Bay (p. 226):

Small birds like the *ciilmak* [golden plover] are declining in numbers. There used to be so many. The *iyyuaq* [solitary sandpiper] and the *curumrat* [dunlin] are fewer

than last year. Even though they are not geese, their population is decreasing. The *teleqcaaraat* [northern phalarope] are getting fewer too, especially the *augtuaraat* [red phalarope]....It has been some time now that they have decreased. Also there aren't very many *aarraangiirat* [oldsquaw ducks]....They also nest in the muddy lowland. We wonder why the oldsquaw and the common eider are decreasing. We used to find many common eider eggs and oldsquaw eggs, now there aren't many. We find mostly *yuukaq* [pintail] eggs. There used to be many *kep'alek* [greater scaup], but not as many as we used to have. All these birds nest in the muddy lowlands.

“Fish and Game” are not always blamed for these changes. As the landscape changes, so do its tenants. When previous nesting and feeding grounds become too muddy to support the plants geese feed on, the birds move on. According to Michael John of Newtok (p. 256–257, 262):

Nerevkartuli is the area where the old sites are. The people of Kayalivik gathered here. Others also gathered in this area. When the geese molted, we would go up river and stay there. All over this area and on the riverbanks there would be all kinds of geese....Here, too, near Cevlleq before it dried up they would drive the geese....

When I first became aware, I noticed that black brant gather and nest on Qigigaq island. Also on the smaller island on this side of the island. Now they are gone....I don't know exactly why they are decreasing. The island over there used to have lots of grass, and there would be many eggs. The [island] farther from us no longer has small grasses, only mud...

This is Ciissinraq. Many years ago, when we sailed down the river in a boat we would stop right here and go egg hunting. We would gather lots of eggs. There would be many geese there. All kinds of geese. This is no longer a good river. This place is becoming muddy. The ones that nested there have moved elsewhere.

Like Scammon Bay residents, Paul John of Toksook Bay (p. 276) observed an increase in the brant population following an earlier decline: “I have noticed the decrease and then the increase of the brant. Seems like the goslings and the people are working together and understanding each other because of what is happening. People no longer take the goose eggs during nesting season in the spring. This makes the goose population increase.”

Like residents in villages to the north, Nelson Islanders also make the connection between increased human activity and changes in geese nesting areas, as well as a decline in their numbers. Paul John (p. 277) continued: “From my point of view, some of the geese seem to have moved....These traveling objects make a lot of noise. The numbers of planes have increased. Seems like they leave

their usual breeding places and move to places where the planes don't always pass by." Jobe Nevak, also from Toksook (p. 288), concurred: "Geese used to nest anywhere they wanted to. Today they are probably being scared off by planes, and now there aren't many geese."

While less sure of causes, Theresa Moses (p. 309) also noted a decline:

When we used to go out egg hunting, many geese flew. They made it hard to look across the tundra because there were so many. Today, I don't know where that sight is.

I don't know why there is a decrease in the goose population. We who live on the coast don't play with them because we grew up with them. We leave them alone because they are our food. When they come they make our minds happy....

Today, I never see anyone wearing a bird parka. They only become something to talk about. They say the geese are gone, and it is true. I no longer hear the ones I used to hear. I used to have fun listening to their sounds. Now I don't hear them anymore.

Contrary to biologists' observations that the goose population has been steadily increasing since the mid-1980s (Sedinger et al., 1993; Ward et al., 1997), most Yup'ik men and women interviewed have seen an overall decline. They attribute this decline to a variety of factors—handling of goslings and eggs by biologists, increased noise and activity in the nesting grounds, and increased harvesting with modern technology. In the end, however, most elders interviewed stated that although changes in human activity set the stage, the geese are ultimately responsible for their own decline: "Sometimes we can't really blame anything and anyone for the decrease of geese. When they want to be fewer within a year they are fewer. We don't know why it happens, but the next year there are more. Even though a lot are killed, their numbers don't seem to change the following year" (Charlie Friday, Hooper Bay, p. 173).

COASTAL RESIDENTS' VIEWS ON NON-NATIVE RESEARCH AND REGULATION

Along with questions about goose habitat and the effects and frequency of flooding, village researchers asked elders to comment directly on the presence of non-Native researchers in their areas. This question was not part of the original protocol requested by UAF biologists, but was added by Yup'ik participants during the initial training workshop. Village researchers who attended felt strongly that elders who gave information on goose ecology should also be given the opportunity to express their opinion concerning this important and emotionally charged issue.

Many people deeply resent research and regulatory activity in the breeding grounds. Every elder interviewed

spoke out against "Fish and Game," using this term comprehensively to include all non-Native biologists and game managers working in the area. David Boyscout of Chevak (p. 123) reported: "The gathering grounds for geese are like sacred ground. No one should be there in the nesting grounds...I would hunt there but not camp there. By summer I saw a tent pitched on that ground. All summer it was there. The next year, I checked that ground, there were no geese." Others made similar observations:

Sometimes we blame Fish and Game for the decrease of geese. In the island around Qissunaq at Kuiqlivik, there are many markers put up by the people of Fish and Game. There are always many people from Fish and Game in that area when the geese arrive....

I mind when biologists or any person comes to the geese nesting grounds during the nesting season because they will scare them. They won't want to nest where they used to nest if they see people or markers in their nesting ground, or if they handle their eggs....They don't have to keep track of the geese. The geese belong to the tundra. (James Gump, Hooper Bay, p. 196–198)

I don't think that it is helping the goose population go up with white people traveling to nesting grounds on airplanes. Geese don't usually encounter noise like planes, so when they see and hear planes on their nesting grounds, they move. The white people also put bands over their necks and gather them to do something with them....Seems like the white people are making the geese decrease. (Michael John, Newtok, p. 263)

Elders insisted that people should never handle either goose eggs or goslings. They maintained that handling the nest and its contents imparts a human smell that will "soak into the feathers" and scare adult birds away, leaving young birds prey to foxes, jaegers, and gulls. Handling goslings especially will ruin the waterproof coating on their feathers, and the young birds will die. According to Thomas Akerelria of Scammon Bay (p. 79):

Geese have their own world, their own awareness. If their eggs are handled, they won't go back to their eggs. They smell the scent of the people....Biologists should not handle their eggs....Goslings should not be handled even when they are grown...Their feathers are ruined and they easily get wet....They cannot easily fly anymore.

Edward Aguchak, also of Scammon Bay (p. 14), added:

Fish and Game disturb the eggs and young and put markers on their nests. When that happens, the parents leave their eggs and young....I am telling you how it is....We are not happy about the way they handle the geese. In the past we never handled the young at all. We treated the nest with respect when the geese

nested....Today, the geese are increasing slowly, even though Fish and Game are keeping track of the geese, because they handle them—and because owls, hawks, and gulls eat them.

As in many contexts, people base their views on personal experiences. Roy Henry of Scammon Bay (p. 52) stated: “Sometimes when people keep checking eggs when it is nesting time in the spring, the parents won’t go back to their eggs, and the eggs won’t hatch. This summer, not far from our tent at Black River, someone found eggs and kept checking on them. I decided to check on the nest and found that the parents had abandoned the nest.”

Just as people attribute the decline in numbers of geese to the presence of “Fish and Game,” the recent increase in geese is associated with “Fish and Game’s” departure: “Yes, I noticed the decrease for two to four years, and then they increased again...because they are not bothered. There are no more Fish and Game people on the other side of our mountains” (Roy Henry, Scammon Bay, p. 52–55). According to many of those interviewed, handling goslings leads directly to predation: “We don’t mind the biologists coming to study, but we mind them handling the young geese. All young geese don’t survive. Many gulls and jaegers eat the young geese. When the geese are small, after being handled by people, they probably don’t get to be with the parents” (Edward Aguchak, p. 13).

Even if biologists do not handle the geese, their presence disturbs them. Many residents believe that by studying them, the biologists are “making the geese disappear” (Eddie Bell, Sr., Hooper Bay, p. 213). Dick Lawrence of Toksook Bay (p. 298) testified, “The white people are studying the geese. When anyone makes a fuss over something, they don’t increase. There used to be lots of caribou. Since the white people started keeping track of them, they disappeared. Same thing is happening with the geese.” Conversely, “when the geese had no one to keep an eye on them, there were so many” (Albert Therchik, Toksook Bay, p. 321).

Underlying these statements is the Yup’ik understanding of geese as nonhuman persons, aware of their surroundings and capable of deciding where to nest and what to avoid. According to Eddie Bell of Hooper Bay (p. 213), “When people are on their land, they won’t stay there. They may be birds, but they have minds that work, too!” Nathan Kaganak of Scammon Bay (p. 87–88, 90) added, “The black brant is smart. Anything that lives has a sense of awareness; they have a creator....They will move to other places if they are bothered....All living creatures including geese try to live, like we do, and anything that might harm them should not be put on their bodies.”

Because all animals, as nonhuman persons, are aware, they respond to human action. People are supposed to hunt what presents itself. This position is dramatically opposed to the non-Native view that refraining from hunting will conserve resources and cause animal populations to increase. Michael John of Newtok (p. 258–259) spoke at length on this issue:

A long time ago I used to hear that nothing ever finishes. The prey, our food, is said to go into the ground. When they go underground, they decrease on the surface. After they seem to decrease, they will come back again.

They also used to say that if a lot of something was killed, they won’t decrease, but if they are not hunted, they will decrease.

There is also a saying that when food is available on our land, when our neighbors come, we should not be stingy. We should be thankful for them and let them hunt for food and clothing. If we followed the saying, it is said that there will always be food available.

Sometimes I think that the way of life you live, since it is a life of an outsider rather than ours....our land from the past has a law. The food from the land, also plants and fish, have laws for us. While they are available, we should gather without limits. There is also a saying: We should share the ones we have caught with our neighbors....

If we follow the rules of the past, the land’s source of food, the fish, the geese, and birds won’t be gone forever....If we use the white people’s rules, the food source won’t increase.

As significant as this fundamental conflict between the non-Native view of geese as manageable wildlife and the Yup’ik view of geese as persons possessing awareness and acting intentionally is the deep resentment many Yup’ik men and women feel toward the nonlocal control that non-Native researchers and wildlife managers represent. Their response to research and management activities reflects not only the Yup’ik perception of geese as other-than-human persons, but their view of themselves as persons free to determine what occurs in their homeland. Theresa Moses (p. 31) spoke with feeling:

I am furious and can’t stand it when the white people look after the geese. They act like they own the geese! I always think that it was a gift from God for all the people. I tell you the truth, my mind is unhappy about it. When I was growing up, we used to do what we wanted to do, abiding by our traditional laws. Now the white people come and handle the geese, going against the traditional laws.

Many of those interviewed agreed with Moses:

I like the Fish and Game rules because they are trying not to let living creatures become extinct, but it hurts me at the same time. It hurts because the traditions that the elders made in the past are prohibited....Before the elders die, they want to eat what is now restricted to hunt. Today we cannot hunt before we pay for a piece of paper....Since [non-Natives] took over Alaska, it’s just like we are not able to do anything anymore. (Francis Charlie, Scammon Bay, p. 29)

People don't really like the way the white people came in to our land and changed the way we lived.... We mind the biologists who come and go on our land. We mind because they might tell us something that might give us hardship.... We don't want to be too bossed around on how we should live.... The white people have invaded our lifestyle, and it seems to be taking the traditional ways of life away. It's like washing our laws away that our elders gave us. (Nathan Kaganak, p. 89, 91; see also Bruno Kasayuli, Sr., Scammon Bay, p. 5; Mark Tom, Newtok, p. 237)

Mike Uttereyuk, Sr., (p. 41) comes to the point:

Any person, whether white or nonwhite, should not boss us around when we hunt from the wild. Fish and Game are toying with us! Food from the wild has no boss. The people of Fish and Game may be intelligent, but they don't understand our traditional way of life. They don't understand that our creator made it with no boss!

From the Yup'ik point of view, it is inappropriate to tell others what to do. Elders and parents can educate young people in proper behaviour, but it is ultimately the individual's choice how to live life. Thus, they resent the constraints of outside regulation as well as overt nonlocal interference and attempts at controlling them, "bossing them around" in their homeland. As Jorjean Charlie of Newtok (p. 250) put it, "The Yupiit were born on the land, and it belongs to them. They cannot tell their neighbors what to do. Fish and Game came and told us what not to do. That is what we are unthankful for."

This objection to the presence of biologists is not a lightly held opinion, but is perceived to be based on experience. For example, David Boy Scout of Chevak (p. 123) testified, "I know the geese won't gather where people camp or stay because I have experienced it. It happened in my presence.... They may not appreciate what I have to say, but it has to be spoken. That's how I feel." Conversely, it will take a positive experience with biologists and game managers to change the opinion of Boy Scout and others like him.

ELDERS' COMMENTS IN PERSPECTIVE

A first draft of the AVCP report was sent both to UAF biologist Jim Sedinger, one of those who originally requested this project as the human dimension to a larger NSF-funded investigation of goose ecology, and to the USFWS personnel in Bethel who are responsible for goose management in the study area. Sedinger gave brief comments during a telephone conversation in December 1996, and the two USFWS Yup'ik contact representatives, Charles F. Hunt and Pascal Afcan, provided detailed written commentary.

Sedinger, Hunt, and Afcan were all surprised that the draft report included such detailed responses to the question on how elders felt about biological research in their region. They viewed the concluding section of the report on coastal residents' views on non-Native research and regulation at best as tangential complaints irrelevant to the project's stated topic and at worst as detrimental to UAF and USFWS efforts to improve relations between researchers and the local population. In fact, the inclusion of this information was specifically requested by village researchers at the initial AVCP training workshop in Bethel, which biologists were invited to but did not attend. From the beginning, village researchers defined their mandate as full documentation of the elders' perspective, whether or not this exceeded the boundaries of what non-Native biologists considered appropriate to the understanding of goose ecology in their region. USFWS representatives, however, rightly pointed out that this gave the study a "traditional" bias, and they suggested that the report would be more balanced if the "agency" side of the debate were also included.

Indeed, comments by USFWS representatives Hunt and Afcan (both of whom are local Yup'ik residents) help put elders' statements into perspective. They are two among many individuals who have worked diligently to resolve differences and find common ground in this contentious issue. Both are well respected within their communities. Hunt, especially, who often writes letters and comments in the local Bethel newspaper *Tundra Drums*, has credibility and commands respect from both those who agree with him and those who disagree.

Hunt initiated his comments with a detailed rebuttal of the traditional admonition, "The more one kills, the more will return," stating that "we modern Yup'iks who have studied the scientific methods" know this is not true. In the past, Hunt said, hunting methods were crude, and it was easy to believe that the more killed, the more would return. At the present time, however, with improved hunting technology and increased numbers of hunters, "we now can make a dent in the animals, birds, and fish populations we take for food." Hunt also mentioned the problems with pollution, disease, lead poisoning, diminishing waterfowl habitat, and sport hunting along the Pacific flyway, which "take a heavy toll on...birds we Yup'iks once knew to be in the millions." Hunt believes his elders are in denial concerning the enormous social and economic changes that have occurred in their homeland over the last 50 years and have a difficult time understanding what is going on or how to solve the problems. Regarding the traditional admonition "the more killed, the more will return," Hunt states, "Not to be disrespectful to my Yup'ik elders and the things our ancestors believed in, many I don't believe in at all."

Afcan agreed with Hunt that the traditional admonition "the more we hunt, the more will return" needs reinterpretation to continue to supply useful guidance in southwestern Alaska today: "The use of firearms when the population

of the Yup'iks in the Y-K Delta was about 10 000 was not too bad, until the human population suddenly rose to 15 000 in the 1980s and...automatic guns for hunting became popular....This situation spells doom for many of the natural resources, as the Yukon Delta Native population is still booming." The overuse of resources is hard for smaller villages to recognize. From their point of view, "they could not be at fault or contribute towards the decrease of natural resources, since they follow the Elders' mandates on not playing with or wasting the resources, they use this as a justification for use, legal or otherwise." Afcan (pers. comm. 1997) concluded:

I often wondered what was meant by "the more you use, the more will return" when I had seen my father's and grandmothers' sayings to be true that anything, no matter how much of a resource there is, will become depleted if not used wisely. I eventually gathered that the Elders meant "only wise use of resources would ensure the availability and increase of natural resources" instead of "take without limit" as we hear from the later Elders. This "taking without limit" would have been feasible only when the human population among the villages was very low in precontact days. It cannot work in these modern times when the Native population is growing and booming to over 20,000 already. (Compare Klein, 1966)

Hunt went on to note that although he has heard the rule that disturbance causes geese to abandon their nests and eggs, in his experience this applies only to small birds. Working with USFWS biologists, he has seen that eggs hatched in most nests even when they had been marked by "human smelly hands." He stated, "In my learning process about ducks and eggs, I found out that scientific studies have proven that ducks and geese do not have the ability to smell" and that USFWS has provided AVCP with a report to this effect (Sedinger, 1990).

Hunt also noted that when he visited research camps, he observed ducks and geese nesting within 20 feet and flying around the tents with no appearance of being disturbed. But if people visit camps during molting season, they will not see these birds, as they hide from predators during this vulnerable time. Afcan added that he has escorted elders to visit research camps to gain a better understanding of what is taking place: "They didn't have anything to complain about once they were physically there witnessing all the activities and communicating directly with the camp leaders. They developed a better understanding of the scientific work that was being carried on in those camps, but they have not been very verbal about what they saw and experienced for themselves."

Both Hunt and Afcan pointed out that none of those chosen by their communities to be interviewed for this study were people listed in USFWS files as having visited field camps. Afcan is certainly correct that the interviewees' lack of first-hand experience of the camps affected

their responses. Yet we cannot ignore the political choices village leaders made in naming those to be interviewed for this report. The point is not whether the traditional Yup'ik adage "the more taken, the more will return" is factually correct, but that it is an opinion still strongly held by many people living in coastal communities adjacent to bird nesting grounds.

Hunt and Afcan both noted that three of the elders interviewed—Paul John of Toksook Bay, and Xavier Simon and Francis Charlie of Scammon Bay—are also members of AVCP's Waterfowl Conservation Committee (WCC), and all three have spoken in support of working together instead of fighting with USFWS to resolve conflicts over geese and other wildlife management issues. What Hunt and Afcan interpret as a contradiction between these elders' comments during interviews and their public positions at WCC meetings may reflect their "agreement to disagree." As leaders in their communities they feel strongly that it is important to try to work with the USFWS to resolve differences, even though personally they may not agree with the scientific interpretation of goose ecology.

Hunt brings up an important point that profoundly colors debate on goose research and management in the region. In the end, the issue of respect for elders may affect the debate as much—if not more—than that of respect for animals. Hunt concludes:

We, as young Yup'ik children, were taught to have respect for our elders and those who have authority over us. We were told not to say anything unless we are spoken to. We were taught not to talk back to our elders on any subject that might be under discussion. We are taught not to act like we know more than our elders as well as our parents.

In light of this respect we show our elders and parents, even young people in villages that are in leadership positions will keep quiet, even when they know the elder is wrong...for fear if they speak opposing them, the young leaders will be ousted from their leadership position.

Hunt's statement may partly explain why apparent agreement at WCC meetings between biologists and Yup'ik community members does not "solve" the communication problem at the village level. The Yup'ik representatives speak for themselves but not always for their communities, and even younger men and women who find the biologists' arguments reasonable cannot speak for others.

In our phone conversation, UAF biologist Jim Sedinger stated that he believed that elders' adamant denouncement of biological work in their region was evidence of a breakdown in communication between the village representatives with whom he has spoken at WCC meetings and the people they represent. Sedinger stated that biologists had met repeatedly with WCC members and explained that their presence did not, in fact, disturb the geese. Biologists had done their part, and it remained the responsibility of

WCC members to communicate what they had learned to the people they represented.

Non-Native biologists' frustration with this apparent communication breakdown is understandable. Researchers raised in a Western democratic tradition might reasonably expect the appearance of agreement at a formal meeting in Bethel to translate into improved understanding of their work at the village level. Yet Yup'ik community members come to the table with a sense of personal responsibility that allows them to evaluate what they hear and make decisions that may change their view of the situation but does not allow them to make decisions or force changes in the actions or attitudes of the people they are "representing." As stated above, many Yupiit consider it inappropriate to tell others what to do in many contexts. When they return to their villages, people will listen to what their "representatives" have to say but will be free to make up their own minds on the basis of their personal knowledge and experience.

Some biologists recognize that to gain general acceptance, work in southwestern Alaska must be founded on personal relations. Although discussions with the WCC can lay the groundwork for these relations, they are no substitute for biologists' establishing and maintaining direct contact with village councils and individuals in the communities in their study areas. If biologists want to change attitudes toward their work in the delta, they must start at the village level, building trust and respect from the inside out rather than from the outside in.

DISCUSSION

In southwestern Alaska today, many people continue to view humans and animals as sharing common personhood. Many see animals as sentient and aware of themselves and others (including human hunters). Inappropriate human behaviour may jeopardize harvests, causing animals to withdraw. Many Yupiit believe that appropriately respectful humans cannot overhunt but can offend animals by not taking them when they offer themselves. As Mike Uttereyuk, Sr., stated (p. 42), "After we killed lots of geese in one year, there would be a lot more returning the next year. That was how it was. Today, since we don't catch as much as we used to, the population of geese has declined." Biological research involving tagging birds and handling their eggs offends the sensitive geese, causing them to withdraw.

Biologists and wildlife managers have had a difficult time accommodating conservation efforts to traditional beliefs about hunting and egg gathering. To many, modern technology has effectively tilted the balance between humans and animals (Klein, 1966; Raveling, 1984). The precontact use of bows and arrows, dog sleds, and kayaks was more appropriate to the Yup'ik worldview. Many Yup'ik people would answer that respect transcends technology.

The present methods of biological research in the region are unacceptable to many village residents. They find the

handling of both eggs and goslings highly offensive. Albert Therchik of Toksook Bay (p. 323) speaks for many villagers when he says, "How would I perfect the biologists? When they quit watching over the geese, it would be perfected!"

Biologists defend their practices on the basis of empirical evidence in their camps and study areas, which they invite villagers to visit. They observe no adverse reaction by geese to their presence in the area (J. Sedinger, pers. comm. 1997). Yet villagers only rarely visit these camps as, by their very existence, the camps represent an unsolicited intrusion into their homeland. Some biologists hope that educating the local population will change people's minds in favour of their research programs (Raveling, 1984). Yet education without collaboration, and in a situation where villagers have no control over the researchers' presence or agendas, rings hollow to local ears.

USFWS has worked hard to establish good communication and a positive relationship with village and regional organizations. According to Yup'ik contact representative Charles Hunt (pers. comm. 1996):

USFWS has bent forward with open ears to listen to people in village meetings about their complaints and concerns on wildlife resources the Yup'ik people cherish. They have worked with members of the AVCP Waterfowl Conservation Committee on how they would do better in research on waterfowl. They have, more than any other organization, hired Yup'ik employees so they could do a better job in communicating with people. They are contracting with private Native organizations to assist in the work they do with wildlife research. Even with the continuing complaints and name-calling they have received, they still plan to continue this positive effort.

In fact, USFWS is increasingly successful in its efforts to develop management strategies that are acceptable to village residents. I do not believe that elders' comments are aimed at USFWS in particular. Rather, elders are speaking out against external control in general: they criticize USFWS only insofar as its work reflects nonlocal agendas. Hunt says as much:

One person commented...they were afraid to hunt ducks and geese or take their eggs in spring because they were afraid of Fish and Game. We have been talking with people in villages since 1983 about the Y-K Delta Goose Management Plan [see Pamplin, 1986]. It appears they have only heard "Don't take ducks and geese," and it cannot quite be removed from their thoughts, so they could hear it is Okay to take certain ducks and geese." The only reason they are afraid is because of what happened in the mid-1960s and late 1970s when the State enforced the Migratory Bird Treaty Act. It will take some time before they become comfortable enough to open their ears and see what the Fish and Wildlife Service has been saying is not what they thought they heard.

Along with articulating resistance, elders' testimony also presents possible solutions to this stand-off if researchers and community members work together. Many said that it would be better if biologists took the time to listen to what villagers had to say. Felix Walker, Sr., of Scammon Bay (p. 115) stated, "Biologists are like your grandfather [Teddy Sundown]. The [elders] are very knowledgeable even though they have no papers....They are not different than the certified biologists....To improve the work of a biologist, I would let a Native person work with them." Paul John (p. 278) reflected, "I like the work of the biologists. They try to make us understand, not hide things from us....If we work together, it would be better....I understand what biologists do. There are different kinds of biologists. Some stick with only what they know, they don't try to expand their knowledge. There are the others who want to learn more and expand their knowledge to help us....I know some traditional Yup'ik rules. I often tell Fish and Game about these rules, but they don't listen."

Elders suggested that researchers visit communities before studies are planned. Acceptable studies would pursue jointly determined research questions. Cooperative management of local resources has worked to mitigate resource use conflicts in other parts of the region (Albrecht, 1990). Comparable co-management and collaboration in the planning and implementation of research projects may be necessary for village acceptance of biological research.

In October 1995, local objections came to a head. At its annual meeting in Kasigluk, AVCP demanded a five-year moratorium on field research on migratory birds in the study area, asking that "USFWS, National Biological Service (NBS), and University of Alaska Fairbanks (UAF) refrain from unnecessarily disturbing the four goose species and all other birds during their nesting, rearing, molting, staging, and pre-migration periods" (AVCP, 1995). The resolution was as much an expression of local resistance to nonlocal control as it was about geese research and management.

Since the moratorium was proposed, an emphasis on co-management has begun to characterize both sides of the debate. UAF biologists have written to village councils indicating their desire to work more closely with community members. Community leaders like John Pingayak of Chevak, who led the demand for a moratorium, see advantages to continuing biological research in their areas but, like this project, under strict local control.

In a February 1996 interview to accompany his videotaped performance "The Last Winged Creature" (a play commissioned by the Arctic Science Conference's Harvest Assessment Symposium to present an Alaska Native perspective on fish and wildlife management and presented to a gathering of scientists during their annual meeting), Pingayak told Alaska Department of Fish and Game's Craig Mishler:

Some things that I try to talk about in that play is for a scientist to talk with the Native people because Native

people they're the people of this land....

We feel that if the state or federal government provided us with a five-year moratorium then the scientists would maybe start listening....

And if you have a five-year moratorium, that will keep those camps out of the sensitive area where the birds nest....

But we will not completely throw out the biologists and scientists. We'll probably have one. We bring in one and let him train maybe nine people or eight people, train them and let the biologists go out there. They don't have to have camps out there, but the people can go out there and take field notes, and at the same time, when the five-year moratorium is also honored, then maybe co-management will actually take place, because what the Native community is saying about the wildlife...is vitally important for the scientists to also know.

For Pingayak, "what the scientists have been leaving out is the spiritual part of the land," and co-management may provide the means to bring it back in.

During the interview, Mishler asked Pingayak what he thought Fish and Game and USFWS could do to improve communication between villages. In response, Pingayak emphasized the need for agencies to listen to community members and to go out to the communities:

Some communities are not going to allow them to go out at all because [the government agencies] already have established...a bad reputation, but there's got to be a way to open up the communication between the Native community and the Fish and Wildlife or Fish and Game...

Or what they can also do is train our own people, too, and enforcement officers....Under co-management maybe it would be a lot better and [there would be] a lot more understanding between the two. Because we can talk to our people.

Co-management, as described by Pingayak and other village leaders, is not just a policy outcome but an attempt to renegotiate their relations with the outside world. The demand for co-management is as much a statement of resistance as a statement of belief in a particular view of the world (Spaeder, 1997). In their comments on this report, UAF biologists and USFWS Yup'ik representatives focused on the reliability of knowledge in a scientific paradigm and where elders' statements fit this paradigm. They saw a partial solution in education (narrowly defined) of community members, for example, taking people to research camps and letting them see for themselves that the geese are not being disturbed. They do not read the subtext of elders' complaints: "We want local control of our land and our lives." It is not just what the camps do that is objectionable, but the camps' very existence on ancestral lands. Perhaps more people do not come to the camps to be "educated" because whatever their environmental

impact, people do not want the camps there in the first place, unless locally manned and under local control.

Yup'ik community members of all ages share this opposition to perceived encroachment on their homeland. For example, Nick Tom, Jr., (1996) of Newtok wrote an angry Letter to the Editor in the *Tundra Drums* objecting to "Fish and Game" aerial surveys. A month later Larson King, Natural Resource Director of the village of Mekoryuk, wrote objecting to wooden bird counting towers in nesting grounds scaring away the birds, concluding: "This will continue to happen if we let ourselves be run over by a system imposed on us which is not compatible to our lifestyle" (King, 1996). Local control of their land and their lives, many feel, is more in jeopardy than the geese.

Over and over again, villagers' statements reflect their view that how things are done in their area is as important as what is accomplished. Sharing management of research projects is as important as any specific research policy decided on or results obtained. Researchers and those who fund them need to ask if what they learn from projects planned outside the community is worth the cost in terms of resentment and resistance on the local level. Conversely, research projects perceived as responsive to local concerns in all stages—planning, implementation, and review—stand a much greater chance of eliciting community cooperation and support.

The collaborative research model this project followed represents a concerted effort to operate within the new ethics mandated by the National Science Foundation (Principles for Conduct, 1990). These principles not only apply to studies of subsistence harvests but extend to studies of species and ecological processes of heightened interest to Native communities. As this project shows, communities' involvement in research has the potential to affect a project, as communities bring their own concerns and questions into the research program and make it their own. If the new ethics is to have real meaning, we need to pay close attention to these local conversations and what they say about the practice of science as well as its object.

The stated goal of AVCP's goose ecology project was not only to allow scientists to hear elders' voices, but to begin to de-politicize biology within the Yukon-Kuskokwim Delta by explaining the methodology and importance of science to members of the Yup'ik community. This ambitious goal was not met. Yet a beginning was made in better understanding the Yup'ik attitude toward both coastal ecology and biology and the non-Native scientists who study them.

Elders have shared a great deal of information, providing plant nomenclature, local place names, and historical accounts that biologists can use to place what they learn in a local context. By seeking permission from local governments, using local researchers working in their own language, treating elders as recognized experts, and including local perspectives and objectives along with those of the biologists, future researchers in the Yukon-Kuskokwim Delta can make their work more meaningful to residents.

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