

# Nushagak River Watershed Traditional Use Area Conservation Plan



Nushagak-Mulchatna Watershed Council  
November, 2007





Harvey Samuelsen, 1926 – 2006

*Land is the gift of our ancestors and the guarantee of our right to continue our subsistence lifestyle. Land is the heart of our culture. Without the land, we are nothing.*

— Harvey Samuelsen, Bristol Bay Village Leadership Conference, 2001





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## Contact Information

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# Introduction

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The Nushagak-Mulchatna Watershed Council is pleased to present our overall plan for protecting the waters and natural resources of the Nushagak-Mulchatna watershed. This plan is the product of an examination of the natural resources of the watershed that began over two years ago with extensive interviews with elders, residents and others who use the river system. The foundation for the plan was developed from the traditional ecological knowledge that we obtained from these interviews. The information was converted to maps to help us identify the places within the watershed that were most important for supporting the traditional lifestyle of area residents and the natural resource related activities that contribute to the local economy. I wish to thank all of those people who participated in the interviews and shared with us their knowledge, opinions and insights.



Luki Akelkok Sr.

This project would not have been possible without the generous financial and technical support provided by the Bristol Bay Native Association, the Curyung Tribal Council, the U.S. Fish and Wildlife Service, the Gordon and Betty Moore Foundation, U. S. Fish & Wildlife Service, Bristol Bay Native Corporation and The Nature Conservancy. I would also like to thank the members of the Watershed Council for endorsing the project and the members of the Steering Committee appointed by the Council to direct the project. The members of the Steering Committee were Tim Wonhola, Sr., Phillip Akelkok, Sr., Daniel Chythlook, and Billy Maines. I would also like to thank anthropologist Ann Fienup-Riordan for her guidance and insightful suggestions for conducting interviews, and to Francisca Yanez, Molly Chythlook, Gust Tungjung Jr., and Daniel Chythlook who provided critical translation and interpretation services to the project.

I want to convey special thanks to Sue Flensburg at BBNA who can justly take credit for initiating this project, guiding the Watershed Council through the process, and keeping us on task. Sue also provided the oversight critical for managing the grant funds supporting the project. Simply put, without Sue there would be no plan. Also deserving recognition is the staff at The Nature Conservancy, in particular Randy Hagenstein, Corrine Smith, K Kosky, Frank Rue, and Tim Troll who headed the project team and designed and wrote most of the plan.

We are very fortunate today because the watershed we want to protect is sound, healthy and ecologically intact. The purpose of this plan is to keep it that way. Our challenge is to overcome the fact that the watershed is not legally intact. Within the last half-century land ownership and management responsibilities within the watershed have been conveyed and delegated to various State and Federal agencies, Alaska Native corporations, and private individuals. To keep and preserve our watershed means land owners and managers must develop a shared vision for the watershed and must be willing to take action or make sacrifices to assure that the land and waters we give to our descendents is as nourishing as the land and waters that are the gift to us from our ancestors.

Luki Akelkok Sr.

Chairman, Nushagak-Mulchatna Watershed Council







# Executive Summary

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The Nushagak River Watershed Traditional Use Area Conservation Plan is a document prepared under the direction of the Nushagak-Mulchatna Watershed Council to guide conservation related activities within the watershed. The plan proposes four basic strategies to address the foreseeable threats to the important areas within the Nushagak-Mulchatna watershed over the next half-century.

Our first task was to determine the places important to the area residents and users of the watershed and the location of habitat critical to the survival of the natural resources upon which residents and users depend. The Nushagak-Mulchatna Watershed Council identified key plant and animal resources of traditional importance to the people of the region. These resources included the five species of Pacific salmon that return to the watershed, whitefish, other freshwater fish, moose, caribou, waterfowl and areas important for the harvest of berries and medicinal plants. Over a two-year period, Tim Troll of The Nature Conservancy in Alaska, with translation and interpretative help provided by Molly Chythlook, Daniel Chythlook, Gust Tungjung Jr., and Francisca Yanez, conducted interviews with elders, residents and visitors to the region to determine the places that needed to be preserved in order to protect these resources. This traditional ecological information was mapped and when combined with resource data obtained from federal and state agencies an overall picture of the natural resources within the watershed was developed.

Staff and scientists from The Nature Conservancy along with a steering committee selected by the Nushagak-Mulchatna Watershed Council identified the probable threats to the watershed in the next 50 years. The principal threats identified include: commercial development, community development, recreational subdivisions, recreational activities, mining, roads, and global climate change. None of these threats at present appears to be causing serious environmental harm. However, some threats like commercial and recreational development are already having a noticeable impact suggesting that serious harm could occur if action is not taken in the near future. Other potential threats, like mining, are difficult to assess because there is no history of significant mining activity within the watershed. However, mining exploration is occurring and extensive mining may pose a serious threat in the near future because sizeable deposits of minerals have been discovered in the watershed and could be permitted for extraction.

The following are the four strategic actions of the Nushagak River Traditional Use Area Conservation Plan designed to address the potential threats to the watershed:

- 1. Reserve adequate water flow for the Nushagak River and tributaries under existing laws for in-stream flow reservation.**
- 2. Maintain the vegetative complex that supports moose, fish and other species within and adjacent to the floodplain.**
- 3. Maintain water quality standards that protect wild salmon and other fish.**
- 4. Prevent habitat damage that could result from mining.**

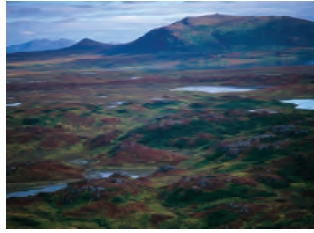
Within the Nushagak River Watershed there is no single entity that can implement all of the strategic actions necessary for our conservation action plan because land ownership and regulatory authority within the traditional use area is shared among many different private and public organizations. Further, these organizations, many of whom are partners in this planning effort, have different policy imperatives that will drive their priorities. So, the first challenge to implementing the strategic actions identified in this plan is to determine who among the many potential stakeholders and partners may be best suited to undertake which tasks. Not every strategic action falls within the mission of each potential partner, nor does every potential partner have the financial, administrative, technical or legal capacity to manage a particular task. The strategic actions proposed in this plan can only move forward in an environment where partners are willing to take on the task most appropriate to their respective organizations. Each strategic action is followed by one or more specific tasks. As part of this of the plan we have suggested organizations that may be the most appropriate for carrying out a particular task.





# What's At Stake

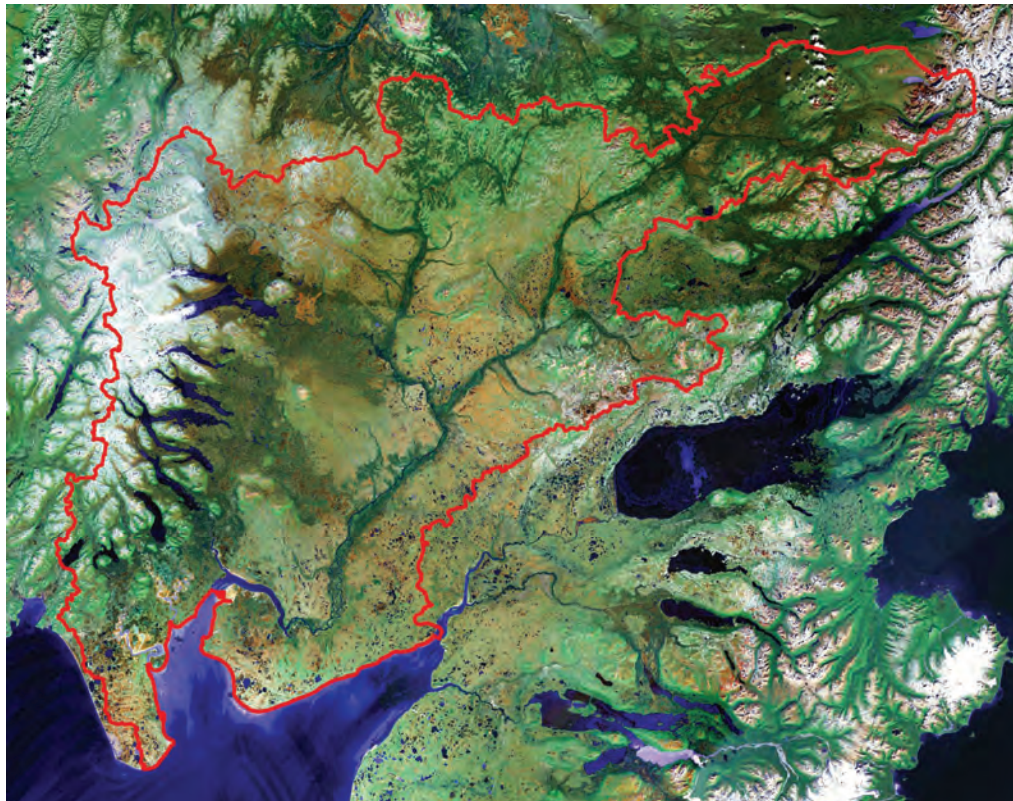
## HABITAT • *Nunapik*



The Nushagak-Mulchatna River watershed, an area of about 1,800,000 hectares, and the country of the Wood-Tikchik State Park was formed by repeated Pleistocene glacial advances and retreats ending about 12,000 years ago. The modern shoreline of Bristol Bay was created in the same period when sea levels rose, inundating the Bering land bridge and creating the Bering Sea. This area encompasses the entire Nushagak and Mulchatna River drainages and all of Nushagak Bay. The Nushagak River watershed is composed of mountains, mixed forests, tundra, lakes, and rivers. The dominant terrestrial vegetation is tundra, mixed coniferous/birch forest, and willow/cottonwood/alder riparian corridors.

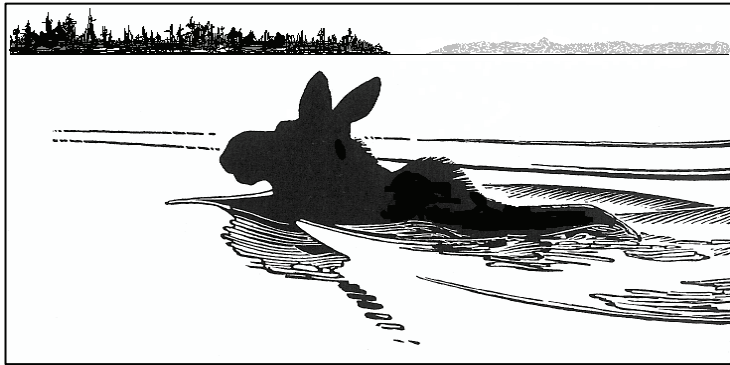
In general, white spruce and mixed spruce-birch forests as well as muskeg and willow-alder thickets exist up to elevations of 900 feet. Above this, bare rock, heath tundra, and alpine meadow dominate. At the lowest elevations, wet tundra or marsh is common, and a large tidal marsh exists at the mouth of the Nushagak River.

Tidal mudflats, sandy and/or gravelly shorelines, and bluffs of glaciofluvial material up to 200 feet high characterize Nushagak Bay. The Nushagak watershed is considered one of the richest areas in the state for its abundance of natural resources.



**Above Photo**  
**Credit:** Robert Glenn Ketchum  
**Left:** Satellite Image of Conservation Area. Nushagak River Watershed outlined in red.

## TERRESTRIAL MAMMALS • Nunamiutaq

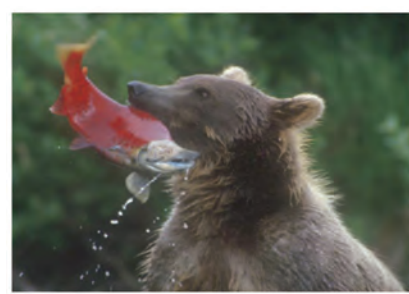
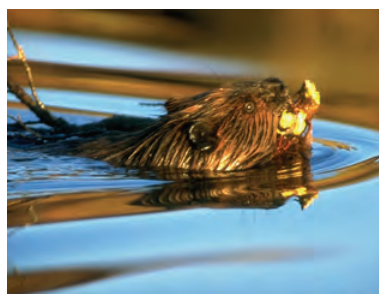


© Tim Troll

TERRESTRIAL MAMMALS IMPORTANT FOR SUBSISTENCE	
<i>Tuntuvak</i>	Moose, <i>Alces alces</i>
<i>Paluqtaq</i>	American beaver, <i>Castor canadensis</i>
<i>Cuignilnguq</i>	River otter, <i>Lutra canadensis</i>
<i>Issaluuq</i>	Porcupine, <i>Erethizon dorsatum</i>
<i>Tuntu</i>	Caribou, <i>Rangifer tarandus</i>
<i>Taqukaq/ Carayak</i>	Brown bear, <i>Ursus arctos</i>

The Nushagak River watershed provides important habitat for moose, especially in lowland forests near lakes and rivers. Caribou from the Mulchatna Herd migrate and calve throughout the area where tundra and open boreal forest is found. Caribou breed in the upper Nushagak basin; post-calving congregations have numbered between 40,000 to 200,000 animals. The area also provides habitat for brown and black bears, wolverine, wolves, porcupine, and fox. Lynx and marten tend to be found in the woodlands of the area. Beaver are abundant throughout most streams and large lakes. Also common are snowshoe hare, weasels, mink, ground squirrels, and microtenes.

*Brown bear: People living on the Nushagak often use the word “carayak” (ghost or spirit), rather than “taqukaq” when talking about brown bears. The reason is said to be so the bears, who can hear very well, won’t know when they are the subject of conversation.*

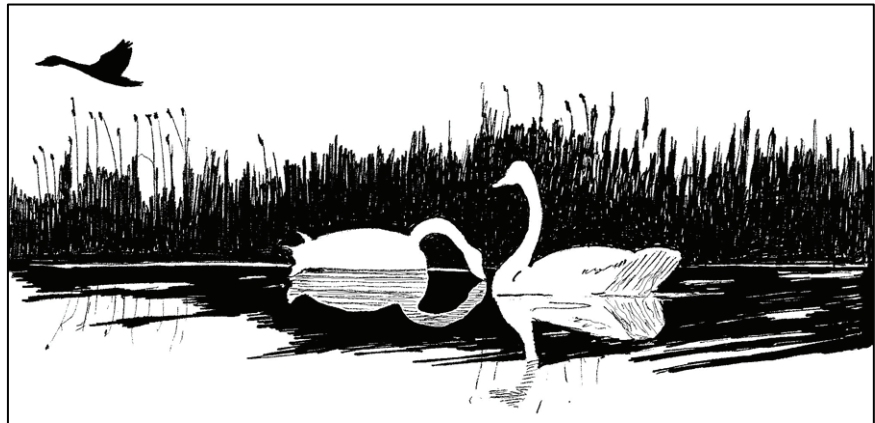


**Photo Credits:** (moose) Alaska Division of Tourism, #2606; (beaver) TNC; (bear) Barry and Cathy Beck; (caribou) © Mark Wayne, Alaska Division of Tourism, #5874



## BIRDS • *Yaquirit*

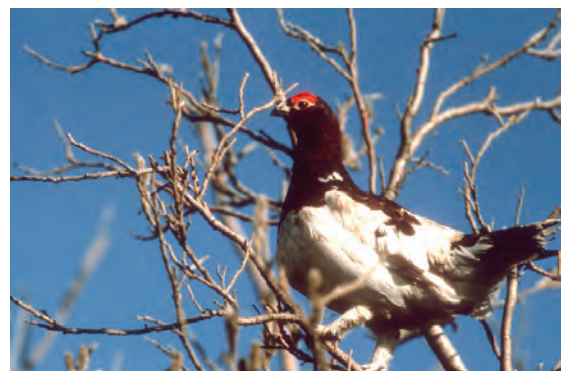
The Nushagak area provides staging, nesting, molting, or year-round habitat for some 150 species of birds. These include 32 species of waterfowl, 22 species of shore birds, 55 species of passerine, 17 species of raptors, 5 species of upland birds, and 10 species of sea birds. Audubon considers Nushagak Bay an *Important Bird Area in the Bering Sea* for waterfowl and shorebirds, and the Western Hemisphere Shorebird Reserve Network has



© Tim Troll

identified the bay for its importance to migrating godwits, dunlins, golden plover, western sandpiper, and black turnstone. The Bristol Bay lowlands, of which this area makes up a significant portion, may host up to 25 percent of the North American population of greater scaup and roughly 10 percent of the breeding population of red-throated loons. The Nushagak area also has prime breeding habitat for black scoters and long-tailed ducks, and eiders molt in shoals near the mouth of the bay. The abundant freshwater fish resources support Alaska’s largest concentration of osprey.

BIRDS IMPORTANT FOR SUBSISTENCE	
<i>Lagilugpiaq</i>	Canadian goose, <i>Branta canadensis</i>
<i>Kep’alek</i>	Greater scaup, <i>Aythya marila</i>
<i>Nacaullek</i>	Emperor goose, <i>Calidris alpina</i>
<i>Uqsuqaq</i>	Pintail duck, <i>Clangula hyemalis</i>
<i>Cetuskar</i>	Harlequin duck, <i>Histrionicus histrionicus</i>
<i>Qucillgaq</i>	Sandhill crane, <i>Grus canadensis</i>
<i>Qugyuk</i>	White swan, <i>Olor columbianus</i>
<i>Tungunqeggliq</i>	Black scoter, <i>Melanitta nigra</i>
<i>Qatkegqliq</i>	Wigeon, <i>Mareca americana</i>
<i>Qengallek</i>	King eider, <i>Somateria spectabilis</i>
<i>Curcurliq</i>	Mallard, <i>Anas platyhynchos</i>
<i>Aqesgiq/ Kangqiiq</i>	Willow Ptarmigan, <i>Lagopus lagopus</i>



**Photo Credits:** (top) TNC; (bottom) Willow Ptarmigan, Alaska Division of Tourism, #5092

## FISH • Neqet amlertut maani (The fish are plentiful here)

The Nushagak River system is the fifth largest river in Alaska by volume of water discharged. The drainage supports at least 13 anadromous species, 16 resident species, and four species of fish restricted to estuaries. The Nushagak River and its tributaries host five species of Pacific salmon and provide significant habitat for Bristol Bay sockeye salmon – the largest run in the world. The Nushagak River hosts the largest sport fishery for Chinook salmon in the United States, with the third-largest Chinook run in the country. In addition, there are significant numbers of rainbow trout, grayling, Arctic char, Dolly Varden, northern pike, lake trout, and non-game species.

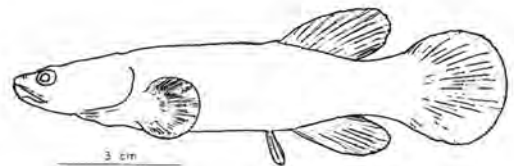


Photo Credit: Alaska Division of Tourism, #3255

FISH	
<b>Cuukvak</b>	Northern pike, <i>Esox lucius</i>
<b>Amaqayak</b>	Pink salmon (Humpy), <i>Oncorhynchus gorbuscha</i>
<b>Kangitneq</b>	Chum salmon (Dog), <i>Oncorhynchus keta</i>
<b>Caayuryaq</b>	Coho salmon (Silver), <i>Oncorhynchus kisutch</i>
<b>Talaariq</b>	Rainbow trout, <i>Oncorhynchus mykiss</i>
<b>Sayak</b>	Sockeye salmon (Red), <i>Oncorhynchus nerka</i>
<b>Taryaqvak</b>	Chinook salmon (King), <i>Oncorhynchus tshawytscha</i>
<b>Iqalluaq</b>	Rainbow smelt, <i>Osmerus mordax</i>
<b>Yugyak</b>	Arctic char, <i>Salvelinus alpinus</i>
<b>Iqallugpik</b>	Dolly varden, <i>Salvelinus malma</i>
<b>Culugpauk/ Nakrullugpak</b>	Arctic grayling, <i>Thymallus arcticus</i>
<b>Can'giiq</b>	Alaska Blackfish, <i>Dallia pectoralis</i>

### Can'giiq

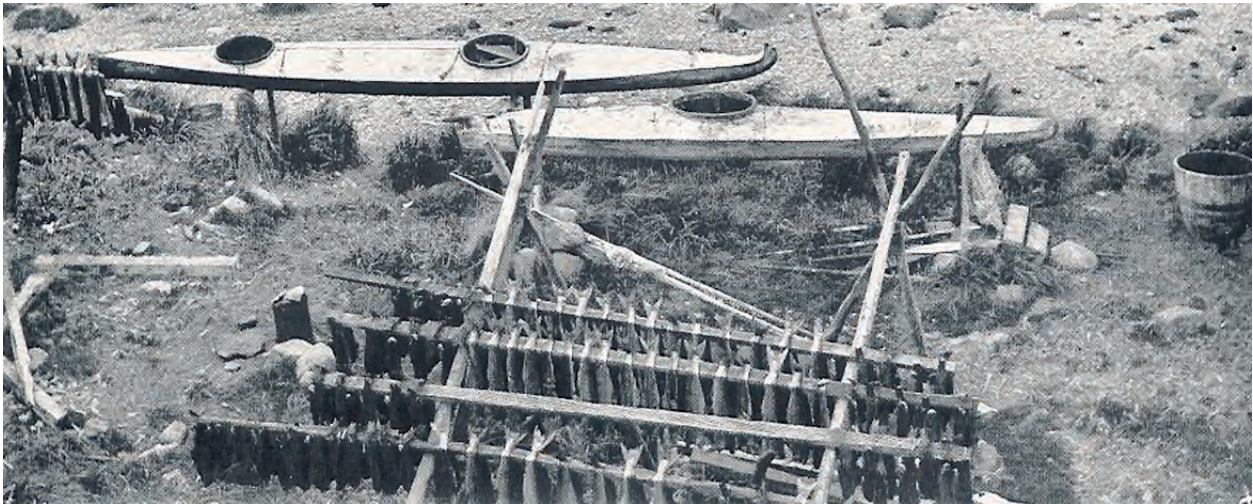
The Alaska Blackfish (can'giiq) can be found throughout the watershed. Able to survive in stagnant water and revive after freezing, the small, apparently insignificant blackfish is a subsistence safety net – a resource that is almost always available if you know where and how to catch it. Traditionally, blackfish were caught in funnel shaped traps made from spruce.





## THE SUBSISTENCE WAY OF LIFE – YUP'IK CULTURE

Evidence of the earliest Nushagak inhabitants is scarce, but archaeologists believe that human occupation began when nomadic hunters entered the region shortly after the ice from the last glacial period receded. The oldest known sites in the drainage are found in the uplands and date from about 7,000 years ago, give or take 2,000 years. These early inhabitants probably found the Nushagak and the surrounding coastline more hospitable than the harsh frozen landscape of their Beringia homeland. The Yup'ik Eskimos who occupied the region at the time of contact with Western explorers are likely their descendants. Although methods have changed, the Yup'ik residents of the region today, like their ancestors, still rely on the bounty of the watershed. Moose, caribou, salmon, geese, berries, and plants are the principal resources that fill smoke houses, drying racks, freezers, and canning jars. Hunting, fishing, and gathering are a vital part of the local way of life. To lose these resources would not only jeopardize the health of people in the watershed, but their culture as well.



**Historic Photo Credits:** (top) Fish & Wildlife, US National Archive, circa 1910; (bottom) Dave and Mary Carlson collection, Samuel K. Fox Museum, circa 1990



## COMMERCIAL FISHING ECONOMY



Bristol Bay is the world's largest wild salmon fishery, and the sockeye or red salmon is the prize. The exploitation of the salmon resource of the Nushagak did not begin until the period of American influence (which coincided with the development of canning technology). The schooner Neptune prospected for salmon in Nushagak Bay in 1883, and in that same year the first cannery was built by the Arctic Packing Company at the village of Kanulik.

The first salmon pack was produced in 1884, a harvest of about 4,200 salmon. Within a few short years, the harvest topped one million fish as canneries were built at Scandinavian Beach, Wood River, Kanakanak, Snag Point, Clarks Point, Ekuk, and Nushagak. By 1900, the industry was also well established on the east side of Bristol Bay.

Fishing in the early days was done with traps. However, traps were discontinued by 1924 in favor of drift gillnet fishing from sailboats, in particular the Columbia River sailboat with a double-ended hull and distinctive sprit sails. In their heyday, the sailboats could net more than 20 million salmon in a season – all snared in linen nets and pulled aboard by hand. Sailboats were replaced in the early fifties when a federal ban on the use of power boats for fishing in Bristol Bay was lifted in 1951. Today the salmon of Bristol Bay are harvested by modern vessels that can cost hundreds of thousands of dollars. Vessels, however, cannot exceed 32 feet in length. In addition to the drift fishing fleet, salmon are harvested by set nets anchored on local beaches. All fishing is done by fishermen who own permits issued by the State of Alaska. There are no fish farms or fish hatcheries in Bristol Bay.

The Bristol Bay sockeye salmon harvest for 2007 was approximately 30 million fish. The sockeye harvest on the Nushagak was nearly the largest in history, second only to the 2006 harvest.



**Historic Photo Credit:** Dave and Mary Carlson collection, Samuel K. Fox Museum, circa 1940

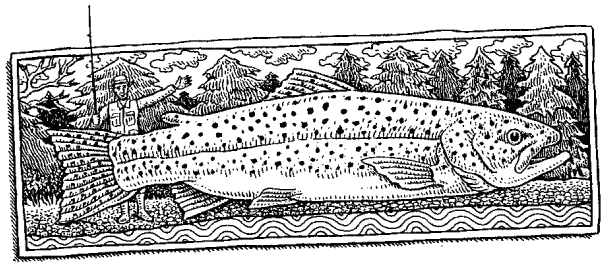
Alaska's salmon fisheries, including Bristol Bay, have been certified as a sustainably-managed wild fishery by the Marine Stewardship Council, an independent, global, charitable organization with a mission to safeguard the world's seafood supply for the future by promoting the best environmental choices.





## RECREATIONAL FISHING ECONOMY

The bounty and size of rainbow trout in Bristol Bay is responsible for the emergence of the sportfishing lodge as an important component of the visitor industry in Alaska. Unlike commercial fishing, the business of recreational fishing got its started on the Kvichak side of Bristol Bay when Ray Peterson built the Angler's Paradise Lodges and hosted his first guests in 1950. Operating from an old scow, John Pearson's Wood River Trout Camp was the first lodge to open on the west side of Bristol Bay in 1959.



© Ray Troll

It eventually became the Wood River Lodge on the Agulowak River. The following year Pearson also hosted clients on Tikchik Lake, and the shack he built at Tikchik Narrows eventually became the Tikchik Narrows Lodge. The third lodge to appear in the Wood-Tikchiks was Golden Horn lodge on Mikchak Lake, which opened for business in 1967.

In the 1980's, the Chinook salmon run on the Nushagak River began to attract more interest. The village corporation landowners along the river have accommodated the demand by making land available for temporary commercial leases. Today a river management program operated by all of the village corporations under the management of Choggiung Ltd. permits some 40 commercial sportfishing camps during the short Chinook salmon season.



**Dr. Linus Hiram French with rainbow trout.** Dr. French founded the Kakanak Hospital in 1913, and may have been the first to discover the pleasure of sportfishing for trout in the Nushagak watershed. He built a cabin at Aleknagik Lake, and according to letters, spent several weeks there each fall fishing for trout. **Photo Credit:** Sue Brown French, courtesy of Dr. Charles Black, circa 1917



Choggiung river rangers set out on patrol. Choggiung's Nushagak River patrol has been operating for nearly a quarter of a century. **Photo Credit:** Tim Troll

## HISTORY

Barely a decade after Lewis and Clark began their historic exploration of what is now the Western United States, the first Russian expedition into Western Alaska embarked from Kodiak Island. Leading the party were two employees of the Russian American Company, Peter Korsakovskiy and Fedor Kolmakov. These men were charged with finding new territory in Bristol Bay to enhance the company's fur-trading portfolio. Beaver was the prize, and they found plenty of beaver in the Nushagak.

If these four men were to return today and once again travel the courses they pioneered, which pair of explorers would be more surprised? Lewis and Clark, because so much is different? Or Korsakovskiy and Kolmakov, because so much remains the same?

Change has not avoided the watershed of the Nushagak River, but change has not significantly diminished what Komalkov and Korsakovskiy experienced. It is possible to follow their journals and camp in the same locations, look out upon the same unaltered landscape, observe the same wildlife and catch salmon from the same streams that nourished their expedition.

Conserving the natural environment does much more than protect the ground under our feet. Through conservation, we safeguard the remnants of a past that are important for understanding the character and meaning of a place and the people who live there. In other words, conserving the land helps us to know the land as our ancestors knew it and to preserve the stories and memories that connect us to the land and to our past.



**Left:** Elia Ishnook with pictures of his father and mother.

**Right:** Keenan Troll at the gravesite of John W. Clark and his wife Natalia at Nushagak. Clark was a trader for the Alaska Commercial Company. He is often credited with being the father of Bristol Bay's commercial fishery. He is the namesake of Lake Clark and Clark's Point. **Photo Credit:** (right) Tim Troll



# Who We Work With

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## OUR PARTNERS

This Traditional Use Area Conservation Plan was prepared by The Nature Conservancy (TNC) under the guidance and direction of the Nushagak-Mulchatna Watershed Council (NMWC) and the Bristol Bay Native Association (BBNA). Funding was provided by the Curyung Tribe of Dillingham, through a Tribal Wildlife grant from the U.S. Fish & Wildlife Service, and by BBNA through a Coastal Conservation Program grant, also from the U.S. Fish & Wildlife Service. The Gordon and Betty Moore Foundation provided matching funding through The Nature Conservancy. Bristol Bay Native Corporation provided assistance through its employee Francisca Yanez with translation and transcription of interviews and the collection of Yup'ik place names.

The implementation of this plan will depend upon a similar and continuing partnership among these same organizations and others who have a vested interest in the environmental health of the Nushagak watershed. Although the Nushagak watershed remains intact as a viable ecosystem, the ownership and management of the land, water and other resources within its boundaries is partitioned among a variety of private owners and government agencies. This fragmentation of ownership and responsibility could become the most serious obstacle to the future health of that ecosystem.

Alaska Native corporations are the primary private landowners in the traditional use area owning approximately 750,000 acres distributed among the village corporations for Aleknagik, Clark's Point, Manokotak, Dillingham, Ekwok, New Stuyahok and Koliganek and the regional corporation Bristol Bay Native Corporation. Most of this acreage is further split between each village corporation and Bristol Bay Native Corporation into surface and subsurface estates. The State of Alaska owns approximately 5.7 million acres, not including Wood-Tikchik State Park. Most of the state acreage is managed by the Department of Natural Resources for general public use. The Federal Government through the Bureau of Land Management retains ownership of approximately 250,000 acres. There are also hundreds of privately owned Native allotment parcels ranging from 30 acres to 160 acres scattered throughout the plan area.

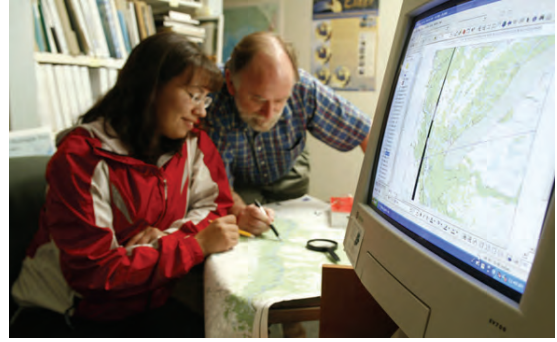
It is the intent of the Watershed Council to include all of these owners and managers in the discussion of watershed health and the implementation of this plan. If our watershed is to continue to provide for the traditional uses of watershed residents then all land owners and managers must share a vision for the watershed that recognizes traditional use as a value worth protecting.



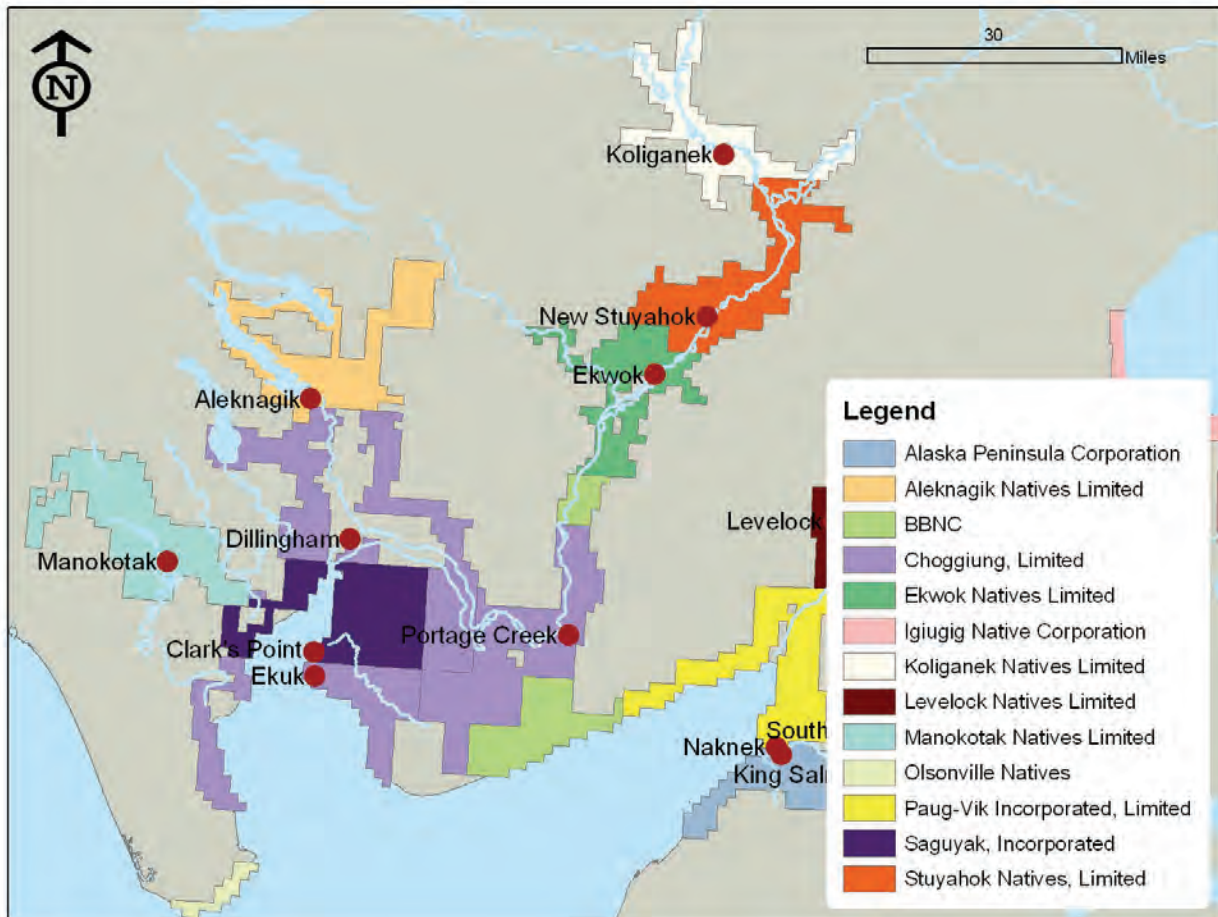
**Steering Committee at work.** Tim Wanhola Sr., Billy Maines, Phillip Akelkok Sr., and Sue Flensburg work with Tim Troll of TNC to refine mapping techniques.

## Nushagak Watershed Stakeholders and Potential Partners:

1. Nushagak River Village Corporations
2. Nushagak River Tribal Governments
3. Nushagak River Municipalities
4. Bristol Bay Native Corporation
5. Bristol Bay Native Association
6. Nushagak-Mulchatna / Wood-Tikchik Land Trust
7. Commercial Fishermen
8. Commercial Fish Processors
9. State of Alaska, Department of Natural Resources
10. State of Alaska, Department of Fish & Game
11. Nunamta Aulukestai
12. The Nature Conservancy
13. The Conservation Fund
14. Bristol Bay Economic Development Corporation
15. Recreational Lodge Owners

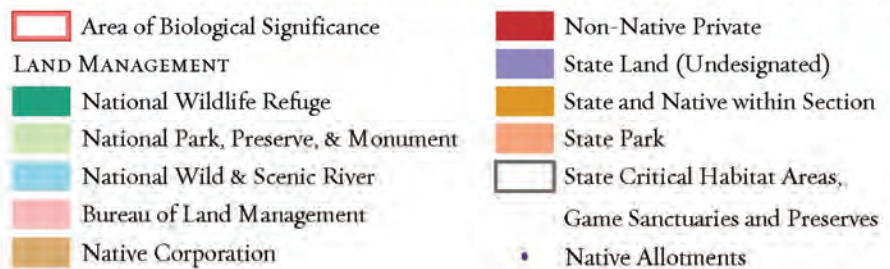
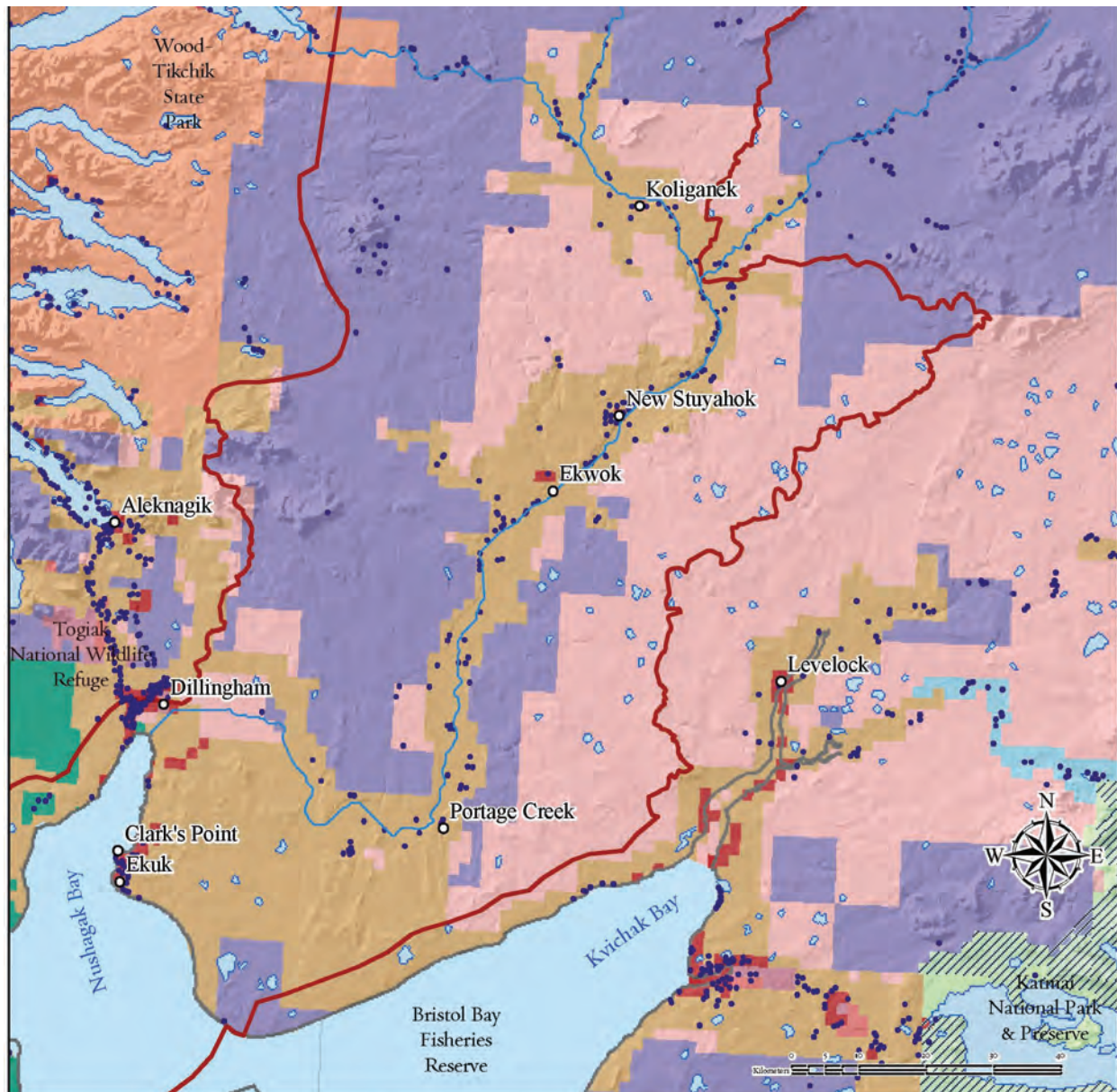


## Native Corporation Lands Along the Nushagak





## Land Ownership Map of the Area



Albers Equal Area Projection

Source: Alaska Dept. of Natural Resources and Bureau of Land Management

Map created by Shane T. Feiler, The Nature Conservancy in Alaska, February 2009





## Traditional Knowledge – *Elisngaciq*



The foundation of a traditional use area conservation plan is knowledge of the plants and animals important to people and the places important for the harvest and the health of the plant, as well as animal species upon which people depend for survival.

The first task of the plan was to develop a body of traditional ecological knowledge (TEK) about the Nushagak watershed through interviews and mapping sessions with elders and residents of the villages in the region. This database of traditional ecological knowledge is the foundation upon which a plan can be developed to protect natural systems and the subsistence and cultural traditions they support.

A Steering Committee was selected by the Nushagak-Mulchatna Watershed Council and assigned the following tasks:

- Provide general oversight of project
- Develop list of potential persons to be interviewed
- Approve Interview formats and protocols
- Review information obtained from interviews for accuracy and thoroughness
- Review presentation formats (maps and text)
- Approve TEK report for presentation to NMWC and inclusion in Traditional Use Area Conservation Plan

### Steering Committee:

- Tim Wonhola, Sr., New Stuyahok
- Phillip Akelkok Sr., Ekwok
- Sue Flensburg, BBNA
- Billy Maines, Dillingham
- Daniel Chythlook, Aleknagik

**\*Summaries of interviews in villages are in Appendix C.**



**Left:** Chief Gregory of Koliganek, 1931. **Photo Credit:** Ales Hrdlicka, Smithsonian Museum

**Right:** Chief Gregory's grandson, Gust Tungiung and great grandson, Gust Tungiung Jr. mapping place names and resource areas around Koliganek





**Historic Photo Credit:** Ales Hrdlicka, Smithsonian Museum, circa 1931

# What We Want To Protect

## TRADITIONAL USE FLORA AND FAUNA

### Flora and Fauna Considered Most Integral to Traditional Use:

#### Fish

1. Sockeye, Chinook & Coho Salmon
2. Pink & Chum Salmon
3. Whitefish
4. Winter Freshwater Fish

#### Mammals

5. Moose
6. Caribou

#### Other

7. Waterfowl
8. Edible & Medicinal Plants

The primary purpose of the Traditional Use Area Conservation Action Plan (CAP) is to protect habitat in the Nushagak River watershed important for the preservation of fish, mammals, birds and plants that residents of the watershed harvest for food. The Nushagak-Mulchatna Watershed Council identified the flora and fauna considered most integral to traditional use. Included are five species of wild Pacific salmon, whitefish, other freshwater fish, moose, caribou, waterfowl and edible and medicinal plants. Tasked by the Watershed Council, The Nature Conservancy staff interviewed elders, residents and other knowledgeable individuals to identify critical habitat for these species, as well as locations where they are harvested.

In addition to the above flora and fauna, interviewers collected information that respondents provided about other species. Elders were also asked about traditional place names. All interview sessions were recorded and photographed.

Traditional place names have been transcribed and provided to the Bristol Bay Native Association and the Bristol Bay Native Corporation for inclusion in the Bristol Bay place names database. Place names collected can be found in Appendix E.



**Above:** Map made by Pete Petla of Koliganek in the late 1960's and submitted to Congress to demonstrate traditional use in Bristol Bay in support of Native land claims.



## CONSERVATION TARGET AREAS

The information provided to us by the people we interviewed showed the same geographic areas often provided habitat important for several species. Thus, rather than think of the watershed entirely in terms of species, it is more useful to think of the watershed in terms of habitat types, and to develop conservation strategies that protect the key characteristics of each type.

For the purposes of applying The Nature Conservancy’s Conservation Action Planning process, we delineated six conservation target areas that represent habitat types important for the traditional use species identified by the Watershed Council. (See Appendix A for a detailed description of the CAP process.)

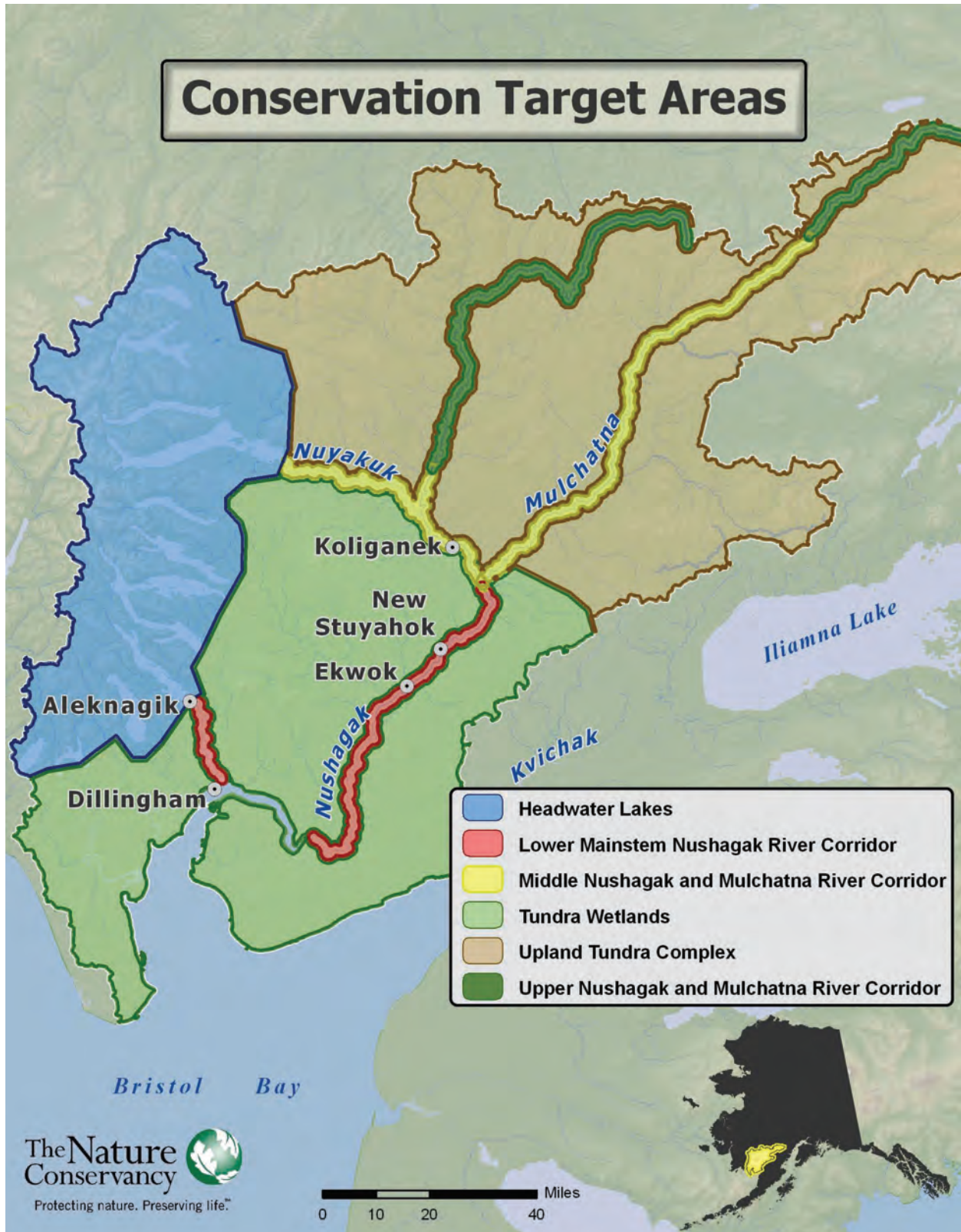
CONSERVATION TARGET AREAS	
<b>Lower Mainstem Nushagak River Corridor</b>	Nushagak River from the confluence of the Mulchatna River to confluence of Wood River, including the Wood River.
<b>Tundra Wetlands</b>	Wet and moist tundra generally in the lower watershed.
<b>Middle Nushagak and Mulchatna River Corridors</b>	Mouth of the Mulchatna River to confluence of the Chilikadrotna River, Nushagak River from Mulchatna confluence to Chilikadrotna River, Nushagak River from Mulchatna River including the King Salmon and Nuyakuk. The Iowithla, Kokwok and Muklung rivers also exhibit similar characteristics.
<b>Upland Tundra Complex</b>	Alpine tundra generally in mountaneous area in the upper watershed.
<b>Upper Nushagak and Mulchatna River Corridors</b>	Mulchatna River above Chilikadrotna River, Nushagak River above King Salmon River.
<b>Headwater Lakes</b>	Deep glacial lakes of the Wood-Tikchik State Park. Small and moderate sized lakes draining into Mulchatna and Nushagak rivers. Amanka, Ualik and Nunauaugaluk Lakes.
<b>Salmon</b>	Dispersed throughout the watershed.

The conservation strategies we suggest may not affect every target area because human use and potential human impact will vary considerably over the next fifty years. Human impact has been, and is likely to be, more apparent along the main river corridor, so protecting habitat in conservation target areas that include the main river corridor is more imperative. Large portions of the Headwater Lakes target area are protected within conservation units, thus, requiring less attention. Target areas like the Tundra Wetlands or the Upland Tundra Complex, though important for maintaining the biodiversity of the watershed, are more remote and presently experience minimal human impact. However, vigilance may change if some proposed human activities, like mining, become a reality.

An exception to the notion of “conservation target areas” has been made for salmon. Salmon are considered a conservation target species because they either occupy niches in every conservation target area or provide nutrients that are important for maintaining biodiversity in every target area. If the salmon are robust and are returning in sufficient numbers we can be relatively assured the biodiversity that sustains human use of the other natural resources in the watershed is also healthy.



## Boundaries of the Conservation Target Areas





**Photo Credit: (bottom)** Mike Weidmer

## **1. Lower Mainstem Nushagak River Corridor**

This conservation target area includes the Nushagak River from the confluence of the Mulchatna River to the confluence of the Wood River, including the Wood River.

This portion of the drainage extends from salt water up the Nushagak River to the Mulchatna River confluence and includes the entire floodplain. This corridor is characterized by high discharges, low channel gradients, salt water infusion and often very complex multi-channel forms with well-vegetated islands. Along portions of the western shoreline in the upstream portion of the corridor, tall, unconsolidated gravel bluffs form the river bank. The lower Nushagak is critical for the upriver adult spawning migration and the seaward migration of all five salmon species. Chinook salmon rear throughout the length of the corridor, particularly along cutbanks where faster currents flow near the shore.

The interaction of vegetation, geology and stream flow create a constantly changing mosaic of salmon, moose, and other fish and wildlife habitats.

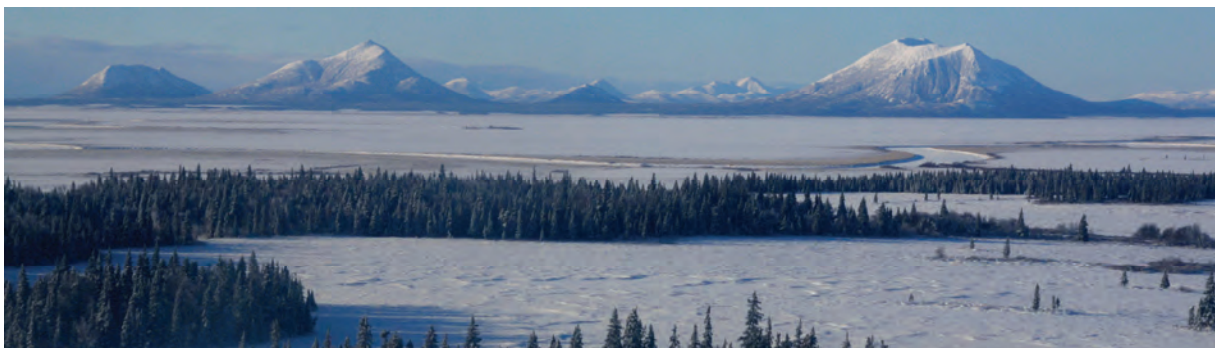
## **2. Tundra Wetlands**

This conservation target area includes wet and moist tundra, generally in the lower watershed.

Tundra wetlands provide critical habitat for most of the waterfowl that migrate to the Nushagak region to breed. The lakes and meandering sloughs that often connect them also provide habitat for pike and the resilient Alaska blackfish. Wetlands are also an important buffer absorbing floodwater and storm surges.



**Photo Credit:** Mike Weidmer





### 3. Middle Nushagak and Mulchatna River Corridors

This reach, the middle Nushagak and Mulchatna Rivers, includes the Mulchatna River to its confluence with the Chilikadrotna River, and the Nushagak River from its confluence with the Mulchatna River up to the King Salmon River. Morphologically, these corridors are characterized by moderate gradients, moderate discharges, lower valley confinement, and complex multi-channel form. These sections of the mainstem provide extensive nearshore rearing habitat and mainstem spawning habitat for Chinook salmon, and selected spawning and rearing habitat for sockeye salmon, particularly in off-channel habitats and other slow-flowing waters. Coho salmon rear in slower-moving sites in the Mulchatna River upstream of the Stuyahok River confluence.



Photo Credit: (left) Mike Weidmer

### 4. Upland Tundra Complex

Alpine tundra is generally found in hilly and mountainous areas in the upper watershed, but can be found throughout the Nushagak drainage.

Alpine tundra provides the plants and lichen that feed bear and caribou. Important subsistence plant food sources like blueberries, salmonberries, cranberries and blackberries are found in areas of upland tundra.



Photo Credits: (for both above) Robert Glenn Ketchum



## 5. Upper Nushagak and Mulchatna River Corridors

These reaches of the Nushagak and Mulchatna Rivers include the Nushagak River above King Salmon River and the Mulchatna River above Chilikadrotna River. Morphologically, these corridors are characterized by higher gradients, lower discharges, greater valley confinement, and a higher proportion of single channel form. Chinook salmon spawn and rear throughout these areas, and coho salmon rear and likely spawn here as well. Sockeye salmon also spawn and rear in the upper Nushagak mainstem and migrate to Turquoise Lake at the head of the Mulchatna River.



Photo Credit: (left) Mike Weidmer

## 6. Headwater Lakes

Headwater lakes provide the prime spawning and rearing habitat for sockeye salmon, the most abundant of all the salmon species in the watershed. Most of these lakes were formed by glaciers and are amongst the deepest in Alaska. Of all the conservation target areas the headwater lakes have the greatest legal protection. Most of the Wood River lake system and the Tikchik lake system fall within Wood-Tikchik State Park. Twin Lakes and Turquoise Lake at the head of the Mulchatna River fall within Lake Clark National Park. Amanka and Ualik Lakes that feed the Igushik River are within the Togiak National Wildlife Refuge, but most of the shoreline of these two lakes is privately owned. The only major lake without any legal protection is Nunavaugaluk (*Nunvarluq*) Lake (“poor little lake”) feeding the Snake River. However, as the Yup’ik name implies it has never been a lake that produced much fish.



Photo Credit: (above) Robert Glenn Ketchum

Photo Credit: (right) Dan Hourihan

## 7. Salmon

All five species of Pacific Salmon are distributed throughout the watershed. Salmon nourish everything. Their health and abundance are the clearest indicator we have that the Nushagak Watershed remains a viable ecosystem.



**Photo Credits:** (top and bottom left) TNC; (middle left) © John Hyde Alaska Department of Fish & Game, Alaska Division of Tourism, #5066; (middle and bottom right) Wild Salmon Center





**Historic Photo Credits: (top to bottom)** Sue Brown French, courtesy of Dr. Charles Black, circa 1917; San Francisco Maritime National Historic Park, circa 1905; Anchorage Museum of History and Art B62.1.1397, circa 1985; John Omli collection, San Francisco Maritime National Historic Park, circa 1930



# Potential Threats to Our Conservation Target Areas

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The potential threats to the watershed were determined from information and observations provided by members of the Watershed Council and the people we interviewed. The Nature Conservancy Conservation Action Planning (CAP) process normally focuses on assessing and addressing threats that presently exist or are anticipated to exist within ten years. For the purposes of this CAP, a 50-year horizon was selected because the planning area is a relatively undisturbed ecosystem. The current human imprint on the habitat of the watershed is small, although human harvest activities can significantly affect the populations of fish and wildlife within the watershed. The goal of this conservation plan is to maintain the health and abundance of subsistence species and the habitat that supports them. We are fortunate to be in a position where we can prevent impacts to critical renewable resources, rather than trying to restore what has been damaged.

All of our conservation target areas are vulnerable to multiple threats which can act together to alter habitat viability. Some of these threats include activities we want to protect, like recreation and sportfishing. These activities provide an economic base, but if pursued to excess, can harm the habitat that makes the activity possible. The following are the key threats identified:

## 1. Recreation

Recreation is the combination of all those activities that bring people to the watershed, not out of necessity, but for enjoyment. It includes those who come as guests of lodges, those who come to stay in cabins or cottages (either as owners or guests), those who come to experience the wildness without expectation of killing fish or animal, and those who come with every expectation of killing fish or animal. Recreational users come from all over the world, from Alaska, and from the watershed. Recreational users can put a lot of money into the local economy.



Bank to bank fishing on the Russian River, Kenai Peninsula

The periods of high recreational use in the Nushagak watershed are generally during the peak of the Chinook salmon run (between mid-June and mid-July) and during the moose hunting season (from mid-August to mid-September). Most people who come to the region to hunt or fish do so for enjoyment. Although most watershed residents hunt or fish out of necessity, many local residents also hunt or fish primarily for enjoyment.

To the extent recreational use continues to rise and is even encouraged, we must be aware of the long term potential impact on habitat, particularly damage to river banks and shoreline. As people increasingly fail to find a remote experience in places where they used to have that experience, they are likely to venture into more isolated locations. Moving into more distant locations is not inherently bad; the concern is what destruction may be inflicted in order to get there. For example, if it is necessary to cut out snags and overhanging trees to gain boat access to a stream away from the crowds, that destruction may result in the removal of organic debris and woody structures important for spawning and rearing trout and salmon.

## 2. Recreational Subdivisions

The allure of fish and wilderness that attracts people to the region can become the cause of fish population declines and the disappearance of wilderness. The increasing availability of private land within the region, particularly Native allotments, has the potential to transform the remote wilderness experience of the watershed and significantly alter the landscape. To date, most of the allotments that have been purchased have been or are planned to be converted to lodges that accommodate guided or unguided sportfishing and hunting. However, a small number have been converted into subdivisions. One such conversion of an allotment into 80 one-acre lots on the Nushagak River at the mouth of the Iowithla River raised concern in the late 1990's, as watershed residents became alarmed by the prospect of a summer community larger than most villages on the river. To date, the impact of this subdivision has been minimal because most lots have either not sold or not been developed.

The impact of allotment sales is most noticeable on Aleknagik Lake in the adjacent Wood River drainage where the sale of allotments over the last decade or so has resulted in subdivisions and additional lodge development. Aleknagik Lake is tied to Dillingham by road making it a popular destination for many Dillingham residents.

## 3. Commercial Lodge Development

Over the last quarter century the strength of the Nushagak Chinook salmon run has spawned a growing guide-based sportfishing industry. For



one month from mid-June to mid-July more than 40 sportfishing lodges host clients that come from around the world to catch fish from Alaska's largest Chinook salmon sport fishery. Although the size of the Chinook salmon do not rival those caught on Alaska's more popular Kenai River, the chance to escape the crowds and to catch and keep more fish has contributed to the growing popularity of the Nushagak River. The popularity of the Nushagak River as a recreational fishing destination has grown to the point where many local residents fear the Nushagak River could become another Kenai River with all of the environmental concerns and habitat degradation that comes with too many people.

Most of the sportfishing camps and lodges are located within the Lower Mainstem Nushagak River Corridor. Many are situated on land leased from local Native village corporations. All of the Native village corporations along the river participate in a unified leasing and permitting program managed by the largest corporation, Choggiung Ltd. The number and size of sportfishing camps is controlled by policies approved by each corporation. The program now produces a modest income for each of the participating corporations. The Native village corporations, however, cannot control growth on other properties in the watershed. Although Native corporation land makes up nearly all of the private lands along the river corridor (in the area we have described as Lower Mainstem Nushagak River Corridor) these lands are peppered with private inholdings called Native allotments. Commercial guide lodges have been purchasing these allotments, often to escape the building and client number restrictions placed upon them as lessees of Native village corporation lands.

Uncontrolled commercial lodge development along the main river corridor and within the drainages of major tributaries can lead to the environmental hazards and habitat degradation that come from fuel, boat launches, runways, and dumps, as well as clearing critical salmon habitat features like log jams to allow clients easier access to the resources of the watershed.

Fishing activity associated with lodges and sportfishing camps is also growing in the Middle Nushagak and Mulchatna River Corridors. Most of the land within this conservation target area is owned by the State but this land is also peppered with Native allotment inholdings. The State's management plan for



its lands within the watershed makes reasonable accommodation for recreational use within a framework designed to protect subsistence and habitat. However, this plan is merely administrative policy and does not provide any long-term certainty.

\* Note: Commercial development does not include industrial ventures like mining or manufacturing.

#### 4. Community Development

Though all of the communities in the watershed would be considered small by any standard, each in time could experience significant growth. Other than Dillingham, most community growth in the region has come from within, as opposed to people moving into the community. Community growth



simply puts more people into the watershed, increasing pressure on resources and resulting in the inevitable tension between habitat preservation and needed community infrastructure like fuel storage, sewage disposal, landfills, roads, and gravel.

Archeological evidence suggests the watershed may have supported more people in the past, providing some assurance that more community growth can be absorbed without significant impact. However, any assurance must be tempered by the observations made by some of the elders interviewed for this project: life in the old days was hard. There were no snowmachines, no boats with motors; people followed the seasons and moved to where the game and fish were. If a hunter saw moose tracks, he followed those tracks for days if necessary to catch it. People died of more diseases, people died of starvation, and many people died young. This kind of hard life existed well into the 20<sup>th</sup> century. Life is easier today. People don't fall victim to disease so easily, starvation is no longer a worry, and more people live into old age. Even though the number of people may be smaller, they can have as much or more impact on the environment than their ancestors. Today, people use tools like boats and snowmachines that can pollute and can take them quickly to places where game were once relatively unthreatened. People now heat their homes and travel using hazardous substances like diesel fuel and gasoline that must be carefully stored. The trash and garbage that people generate no longer degrades innocuously into the environment, but must now be contained in sanitary landfills.

Although it may be difficult, it is possible to plan for community growth and to develop infrastructure in such a way as to minimize the risk of damage to critical habitat.



**Above:** “Old” Koliganek at the mouth of the Nuyakuk River, circa 1931 **Photo**

**Credit:** Ales Hrdlicka, The Smithsonian Institute

**Left:** “New” Koliganek or “Third” Koliganek on the Nushagak River, 2005

## 5. Mining

The Upper Nushagak and Mulchatna Rivers Corridor and Upland Tundra Complex target areas include State lands open to mining. The Nushagak and Mulchatna drainages were heavily prospected in the early part of the last century with little result. However, a large copper and gold deposit has been discovered in the upper reaches of the Koktuli River, a tributary of the Mulchatna River. The deposit is called the Pebble Prospect and its potential development is stirring controversy both inside and outside the region. Preliminary plans for exploring the prospect call for the development of one of the world's largest open pit mines and construction of tailings dams that would dwarf the largest dams ever built in the United States. The possible development of this prospect has also led to the widespread staking of claims throughout the areas open to mining. In addition to the Pebble Prospect, exploration of a gold deposit in the Shotgun Hills near the headwaters of the King Salmon River has been ongoing for many years.

The feasibility of mining any deposit in the watershed has not been determined. However, given the presence of a highly mineralized area running through the watershed, mining development, unless prohibited by law, must be considered likely at some point in the future.

Large-scale, open-pit mining poses the most significant threat to the integrity of the Nushagak watershed. The potential impacts are both direct and indirect. The development of an open pit with the attendant processing facilities, waste storage areas, dams, roads and tailings ponds will destroy the habitat that falls within this footprint. Direct habitat alteration can also result from airborne or waterborne contaminants that escape from the mining site and from the diversion and pollution of surface and ground water. The legacy of mining around the world is unfortunately one of serious and long-term environmental damage to freshwater habitats. Although mining practices have improved, the risk of long-term environmental damage cannot be eliminated.



The Bingham Canyon copper/gold mine in Utah is the largest open pit mine in the world.



The indirect result of mining in the headwaters of the Nushagak could be an acceleration of the impacts from some of the other threats we have identified. A mine will create a sizeable population base at the mine site and will likely result in more people moving into existing communities. A mine will create the need for roads, which in the Nushagak drainage means roads that must cross salmon-bearing streams. Roads will also provide access for recreational users. More recreational users will likely create a greater demand for guide services, lodges, and land for both commercial and private use. These impacts may be viewed favorably by those who value development and access. However, the impact of increased population and the accompanying pressure on fish and wildlife habitat cannot be overlooked.

## 6. Roads

Roads are a constant concern because they must often cross anadromous streams and extensive wetlands. Road crossings have the potential, if poorly constructed and maintained, of blocking or disrupting the migration routes of salmon and other fish. Roads can also foul salmon spawning and rearing areas. Major road construction in the region would most likely follow the development of mines, so at this time the impact from roads is speculative. Roads will continue to be built within the communities of the region, and the construction of intercommunity roads within the next 50 years is likely.

## 7. Oil and Gas

The presence of commercially viable deposits of oil or gas in the Nushagak watershed is considered remote. The location of potentially viable deposits are in the offshore regions of Bristol Bay in the vicinity of Port Moller. Onshore deposits may also exist along the Alaska Peninsula. The development of these deposits may threaten populations of salmon that are bound for the Nushagak watershed.

## 8. Habitat Shifting and Alteration

This description accounts for the threat often described as “global warming” or “climate change.” Of all the threats identified, this one, over time, is likely the most significant. A rise in the temperature of local rivers and streams could prove disastrous for salmon as well as resident fish that are adapted to cold water. However, the cause of “global warming” is beyond the influence of watershed residents and therefore cannot be a basis for local action, other than preparing for the possible consequences. Although global warming could neutralize the results of any conservation plan, that possibility does not diminish the need for protecting habitat. Salmon are a very adaptive species and have survived previous warm periods. Maintaining habitat is the most important thing watershed residents can do to provide conditions that will favor adaptability.

Sometimes habitat shifts are a natural succession and may prove beneficial. For example, many elders who were interviewed commented on the presence of alder and willow in areas that were once barren tundra. Photographs taken in the region in the late 1800’s and early 1900’s seem to corroborate this observation. However, the increase in these shrubs, particularly willow, may account for the presence of moose in the area. In the modern era, moose are considered relatively recent immigrants, having begun to significantly populate the watershed within the last century. Moose are now a key source of red meat, rivaling and perhaps surpassing the historic importance of caribou.



**Photo Credit:** Wild  
Salmon Center





# Our Strategic Actions to Protect Conservation Target Areas – Summary

The strategic conservation actions proposed in this plan are not typical. The ecosystem in our conservation area is intact. Presently, there is no need for such ground-based activities like removing invasive species, restoring stream channels, or reforestation. Our proposed strategies are directed at taking preventive measures now, to eliminate the need for undertaking ground-based restoration activities in the future. Most of the proposed strategies involve legal protection – doing what is necessary to invoke environmental protections afforded under current law, or seeking to change, alter or create new law where gaps occur.

We propose four strategies to achieve our conservation objectives for the Nushagak watershed, all of which emphasize working with partners. Each conservation strategy directly or indirectly addresses one or more threats. Each strategic action below is comprised of several primary action steps with varying partners and time frames.

## 1. Maintain Flow Regime

Primary Actions Steps:

- Reserve adequate water flow for fish and wildlife habitat in the Nushagak River and tributaries under existing laws for in-stream flow reservation.
- Promote legislation establishing automatic in-stream flow reservations for anadromous fish in watershed.

## 2. Maintain Vegetative Complex that Supports Moose, Fish and Other Species Within and Adjacent to the Floodplain

Primary Actions Steps: Private Lands Strategy

- Identify key areas for protection, including assessment of small private parcels.
- Develop recommended best management practices for private and public landowners to protect key areas identified.
- Acquire easements or title to small private parcels that if developed would detrimentally affect key areas identified.
- Negotiate with appropriate Native corporations for acquisition of easements on corporate lands which if developed would detrimentally affect key areas identified.
- Raise funds for acquisitions.

Primary Actions Steps: Public Lands Strategy

- Identify key areas for protection, including assessment of small private parcels.
- Acquire conservation easements or title to small private parcels that if developed would detrimentally affect key areas identified.
- Promote legislation at Federal and State levels to permanently protect public lands in watershed.

## 3. Maintain Water Quality Standards that Protect Wild Salmon and Other Fish

Primary Actions Steps:

- Identify and prioritize sites in the watershed that need to be sampled so that existing or potential sources of contamination can be located.
- Collect baseline water quality data from identified sites.
- Develop and implement tissue sampling program to monitor heavy metals in salmonids and other key subsistence or commercial species.

## 4. Prevent Habitat Damage that Could Result from Mining

Primary Actions Steps:

- Prevent or minimize habitat damage from mining.



**Top:** Pacific Alaska Fisheries Cannery in Dillingham, 1955; Cannery constructed in 1901  
**Photo Credit:** Steve McCutcheon, Anchorage Museum of History and Art, 10628  
**Bottom:** The same cannery, now owned by Peter Pan Seafoods, 2007



## Implementing Our Strategies

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*What good does it do to create a federal park and provide 100 percent protection to some fish and game habitat onto which caribou and salmon migrate, if the desecration allowed to occur outside its borders in the same ecosystem is left to the discretion of state or private owners.*

– Jay Hammond, “Tales of Alaska’s Bush Rat Governor”

### INTRODUCTION

Within the Nushagak River Watershed there is no single entity that can implement all of the strategic actions necessary for our conservation action plan because land ownership and regulatory authority within our traditional use area is shared among many different private and public organizations. Further, these organizations, many of whom are partners in this traditional use area conservation planning effort, have different policy imperatives that will drive their priorities. So, the first challenge to implementing the strategic actions identified in this plan is to determine who among the many potential stakeholders and partners should undertake which tasks.

Not every strategic action falls within the mission of each potential partner, nor does every potential partner have the financial, administrative, technical, or legal capacity to manage a particular task. The strategic actions proposed in this plan can only move forward in an environment where partners take on the tasks most appropriate to their

respective organizations. In this section of the plan, we suggest the organizations we believe are the most appropriate for carrying out a particular task. (Appendix D outlines which entity might undertake which task and a timeline for these actions to take place.) The second and perhaps greater challenge is to create a forum in which all of the potential stakeholders and partners can develop a shared vision for the watershed that balances development in the region with the absolute necessity to protect habitat important for the animals and plants that sustain human subsistence.

This Traditional Use Area Conservation Plan may in some respects be a first attempt to develop a shared vision for the Nushagak-Mulchatna watershed, but in other respects it merely articulates a vision that is already shared. Although land ownership and regulatory control in the watershed has become more fragmented since statehood, there has nevertheless been an enduring deference to traditional use among most of the new landowners and regulators. For example, protecting subsistence is a mission of the Wood-Tikchik State Park established in 1978, insuring subsistence as a priority activity is a goal of the Choggiung Ltd. plan for the management of its corporate lands along the Nushagak River, and protecting the subsistence opportunities of local residents from growing recreational pressure was the impetus for the adoption of the Nushagak-Mulchatna Rivers Recreation Management Plan by the Alaska Department of Natural Resources and the Bristol Bay Coastal Resource Area Coastal District in 1990.

The problem this Traditional Use Area Conservation Plan seeks to address is the fact that each landowner and regulator is legally free to decide for itself what actions protect or threaten traditional use, or for that matter, is free to decide that protection of traditional use is no longer a priority. Essential to the long-term viability of subsistence in the watershed is a cooperative management structure in which landowners and regulators can institutionalize a shared vision through a system of restrictions, incentives, and trade-offs that deter some human activities and encourage others.



Governor Jay Hammond with Secretary of the Interior James Watt in New Stuyahok **Photo Credit:** Samuel K. Fox Museum

## **STRATEGIC ACTION 1: MAINTAIN FLOW REGIME**

### **1. Reserve adequate in-stream water flow for salmon and other fish in the Nushagak River.**

Salmon and the other freshwater fish require a sufficient amount of water in a river or lake at various life stages in order to survive. The construction of dams and the removal of water for irrigation and other human uses led to the depletion and even disappearance of wild salmon in many rivers in the Lower 48.

Like most western states, Alaska allows people to withdraw water from rivers and lakes. To use water, the process is initiated by the filing of an application to withdraw a designated amount of water. An enforceable right is created once the applicant proves to the satisfaction of the Alaska Department of Natural Resources the need for the water requested. A priority use of water is established at the time of application, although the exact amount of water that can be used is determined at the time of approval. Years may pass between the date of application and the date of approval.

Alaska water law is unique in that it also allows individuals and organizations to file reservations to keep water in rivers and lakes. Most often these reservations are filed in order to maintain flow levels for fish. The process also begins with an application to reserve water. The applicant must then provide credible data to the Alaska Department of Natural Resources to support the claim for reservation. Priority for the claim is established at the time of application. An enforceable right to maintain a certain flow level is created once the application is approved. Again, years may lapse between the date of filing and approval.



### **Implementation**

2008

- Determine appropriate waterbodies and priority for applications and begin process for collection data and filing in-stream flow applications on those waterbodies.
  - Note: The first step is the selection of streams for in-stream flow applications and raising funds to support the work. The Nushagak-Mulchatna Watershed Council and BBNA are already in the process of gathering flow data for the purpose of supporting an in-stream flow application for the lower Kuktuli River.

We recommend that the selection be determined on the basis of value for salmon and other fish and potential threat. The streams that flow through the areas open for mineral exploration should be priorities, including the Kuktuli, Stuyahok, King Salmon, and Mulchatna (see discussion of mining in Strategic Action #4). All partners should agree on a funding strategy for the effort.

2009

- Continue application process for Kuktuli in-stream regulation, establish procedure for gathering flow data, gather data on other tributaries, and submit to the Department of Natural Resources.

2010 – 2012

- Continue application process, gather data, and submit to the Department of Natural Resources.



Suggested Partners – This strategic action is one that supports the mission of the Nushagak-Mulchatna Watershed Council, and the Council or one of its member organizations would be the most appropriate applicant for in-stream flow reservations. The Council will need technical and financial support. BBNA, TNC, and possibly the Bristol Bay Science and Research Institute would be appropriate partners to either provide or raise funds for that support.

## **2. Promote legislation establishing automatic in-stream flow reservations for anadromous streams in the watershed.**

This strategic action is directed to changing the law in Alaska to provide automatic in-stream flow reservations on any stream listed in Alaska’s Anadromous Waters Catalog. Such a change would create a reputable presumption favoring defined water flows and thus reduce the need for some organization or person to apply for a specific reservation of water for fish. The legislation should shift the burden to the applicant seeking to withdraw water to show that the withdrawal would not affect the defined water flows needed for fish or that for a particular water body the defined water flows exceed the amount necessary for fish. A change in the law could have statewide application. An alternative would be to create a special area or refuge in the Nushagak-Mulchatna watershed for which automatic reservations would apply.

### **Implementation**

2008 – 2012

- Suggest and support legislation, and advocate its passage before the Legislature and Governor.

Suggested Partners – This strategy is best carried out by TNC working with conservation advocacy groups to suggest in-stream flow legislation and determine appropriate means for getting that legislation introduced and enacted. Strategic actions related to the creation of such protections should be carried out by representatives from communities of the region. Others should advocate and testify on behalf of the legislation.



**Photo Credit:** Robert Glenn Ketchum

## STRATEGIC ACTION 2: MAINTAIN VEGETATIVE COMPLEX THAT SUPPORTS MOOSE, FISH AND OTHER SPECIES WITHIN AND ADJACENT TO THE FLOODPLAIN

The key to assuring that a river system like the Nushagak has healthy habitat for the plants and animals that provide for subsistence is to protect the vegetative complex within the riparian corridor of the river. Each conservation target area we have designated has different vegetative features that are largely determined by an interaction of climate, geology, landform, soils, and hydrology (surface and groundwater flows). These features define the unique role that a conservation target area plays in the life stage of land mammals and fish (See the description of our conservation targets on page 20). Our conservation targets straddle both public lands and private lands, and it is this difference in land ownership that largely directs our conservation strategies.

### 1. Private Lands Protection

#### a. Alaska Native Corporation Lands

The local Native corporations created under the Alaska Native Claims Settlement Act of 1971 (ANCSA) own most of the land within and adjacent to the 100-year flood plain in the Lower Mainstem and Riparian conservation target area. This area

encompasses three permanent villages, Portage Creek, Ekwok, and New Stuyahok, and is the target area most influenced by current human activity. The area receives the largest amount of recreational and subsistence hunting and fishing pressure. Land ownership within this target area is apportioned among six ANCSA Native village corporations: Aleknagik Natives Ltd., Choggiung Ltd., Ekwok Natives Ltd., Stuyahok Ltd., and Koliganek Natives Ltd. The regional Native corporation, Bristol Bay Native Corporation, also owns land along the river between Portage Creek and Ekwok.

Native corporation ownership of land is further divided between the surface and subsurface estate. The regional corporation Bristol Bay Native Corporation owns the subsurface estate under all village corporation lands. Under Alaska Law the subsurface estate is the dominant estate. The surface owner cannot deny the subsurface owner access to resources that may lie in the subsurface estate.

The habitat threat posed by Native corporation ownership is not immediate, nor is it a function of current leadership or management in these corporations. At present, all of the corporations with land holdings on the Nushagak River participate in a unified land management program that controls recreational and subsistence activities on these lands. The program has been functioning for nearly a quarter century and is a model of responsible land management. The



**Twenty plus years of Choggiung, Ltd. River Bosses.** Ward Jones, Johnny Johnson, Don Leclair **Photo Credit:** Tim Troll

#### Goal for Management of Choggiung, Ltd. Village Corporation Lands

Insure future ownership, options, preservation of the lands and resources, and a priority for subsistence activities while allowing a variety of activities by multiple users in a manner that will generate a financial profit.

program is administered by Choggiung Ltd., the ANCSA village corporation organized for Dillingham, Ekwok, and Portage Creek. The goal of the program is to allow multiple uses that generate financial returns for each participating corporation, but not at the expense of the subsistence values of the land.

The lands selected and now owned by these corporations were the lands most important for perpetuating the survival of the people who traditionally depended upon the wildlife and plant life that lived on these lands and the fish that lived in the adjacent waters.



However, under ANCSA, the ownership of these lands was transferred by the Federal government to corporations established by each Native community, rather than transferred to a tribe or converted into Indian reservation lands.

The result is that lands once valued for subsistence, are now a corporate asset whose value can only be measured in financial terms. Under the law, the priority use of corporate assets is to make money for its shareholders.

In the years since the passage of ANCSA, the original shareholders (those born before 1971) are a diminishing number. Shares are being transferred to a younger generation that has grown up less dependent upon the land and increasingly no longer lives in the watershed. Also, this new generation generally owns fewer shares per person because they have either been given shares or inherited them from parents. The likely consequence is that in the not too distant future the majority of shareholders will measure the value of the Native corporation not in terms of whether it is “protecting the land,” but in terms of the size of its annual dividend. Corporate land will come under increasing pressure to produce profit, and this most likely will mean development or sale.

Our strategy for the long-term protection of Native corporation lands is to harness financial resources that will make it possible for these corporations to perpetuate a land management program that continues to recognize subsistence as the highest and best use of its lands in the Nushagak Watershed.

#### b. Small Parcels

Throughout the watershed there are hundreds of small privately owned parcels, mostly Alaska Native allotments. These parcels can range in size from forty acres to one hundred sixty acres. Development on only a few of these parcels, however, is likely to cause concern for habitat. The task before us is to identify those parcels for conservation protection. Generally, the parcels of concern will be those easily accessible by boat or air where development could result in bank erosion, increased sedimentation or other forms of disruption in areas of salmon spawning, rearing or holding activity. Also of concern will be those parcels that if developed would facilitate increased hunting or fishing pressure in areas where subsistence resource depletion may already be a concern. We also want to identify those small parcels that if developed could undermine the land management program of the Alaska Native corporations that own the uplands in the lower portion of the watershed or the management of State and Federal lands in other portions of the watershed. It will become increasingly difficult for these entities to maintain a low impact land management program that protects subsistence resources if these small parcels are used to construct infrastructure that attracts and accommodates more recreational hunters and fishers.

Our strategy for protecting important habitat from damage by development on these small parcels is to first prioritize the parcels and then secure funding to acquire conservation protections on the highest priority parcels. The highest priority parcels would be those located in important subsistence or habitat areas, owned by one person, accessible, and with good land for building.

## Implementation

2008

- Identify areas of high biological value for traditional use species in watershed.
- Prepare maps of high habitat value areas for partners and for Native corporation landowners.
- Complete Memoranda of Understanding with each Native corporation landowner in watershed.
  - Note: As of the date of this report, there are signed MOU's with Koliganek Native Ltd., Ekwok Native Ltd., and Choggiung Ltd.
- Develop sensitivity criteria for review and analysis of small parcels and prioritize for protection.
- Acquire conservation protections on one to three small parcels.

2009

- Acquire conservation protections on two to four small parcels.
- Initiate negotiations for conservation protections with Native corporation landowners.
- Review existing village corporation land management programs, and, if necessary, recommend changes to best management practices to ensure protection of target species and areas.

2010

- Acquire conservation protections on two to four small parcels.
- Continue negotiations for conservation protections with Native corporation landowners.

2011

- Acquire conservation protections on two to four small parcels.
- Continue negotiations for conservation protections with Native corporation landowners.
- Acquire conservation protection on most sensitive lands of one Native corporation.

2012

- Acquire conservation protections on two to four small parcels.
- Continue negotiations for conservation protections with Native corporation landowners.
- Acquire conservation protections on most sensitive lands of one Native corporation.

Suggested Partners – The successful implementation of this strategy will require raising significant amounts of public and private capital to acquire conservation easements from the respective Native corporations. TNC and the NMWT Land Trust are the most appropriate entities to spearhead this effort. However, local leadership (particularly the leadership of each corporation) must be willing to support the effort to raise the necessary funds. Such support might include meeting with legislators and hosting visits to the region for potential funders.

The Nature Conservancy and the Land Trust are also the most appropriate entities to implement the strategy for protecting small parcels. The Nature Conservancy has both the TEK and ADF&G data to help determine which small parcels are located in or near important subsistence or habitat areas. Working with the Land Trust, BBNA, and the village corporations, TNC can collect the other data necessary to assign priorities to the private parcels in the watershed. TNC and the Land Trust would take the lead in raising the funds necessary to acquire conservation protections on high-priority parcels.

## **2. Public Lands and Waters Protection**

Most of the land and water in the Nushagak-Mulchatna drainage is publicly owned. Ownership is divided between the Federal and State governments. Land management and regulatory authority is further apportioned over several federal and state agencies. Our conservation strategies depend upon which particular public agency has management authority in the conservation target area.

Our strategy for public lands within a conservation unit is to further the mission of the public land manager by protecting high-habitat-value private lands that are inholdings within the respective conservation unit.

Our strategy for public lands that are not part of a conservation unit is to identify areas of high habitat and subsistence value and seek an appropriate degree of conservation protection for these lands, given the conservation target values.

### **a. State Lands**

Alaska Division of Parks – The Alaska Division of Parks has management authority for all state lands within the Wood-Tikchik State Park. Most of the headwater lakes target area falls within the park and has the highest degree of conservation protection afforded under state law. The primary conservation concern in this area is for inappropriate development on the small private parcels scattered throughout the park.



Alaska Division of Mining, Land & Water – The Alaska Division of Mining, Land & Water has management authority for all state lands within the watershed outside of the Wood-Tikchik State Park. The Division manages most of the lands within the Middle Nushagak and Mulchatna River Corridors target area, the Upland Tundra Complex target area, the Upper Nushagak and Mulchatna River Corridors target area, and the Tundra Wetlands target area south of the Nuyakuk River and between the Nushagak River and the Eastern border of the Wood-Tikchik Park.

A significant portion of the land managed by the Division of Lands falls within the parameters of the Nushagak-Mulchatna Rivers Recreation Management Plan. This plan was enacted to protect the subsistence opportunities of local residents. However, because these lands do not have statutorily enacted conservation protection, the Division, after sufficient notice and public comment, can revise its plan and accord priority to other land uses.

A significant portion of state lands in the Middle Nushagak and Mulchatna River Corridors target area and the Upland Tundra Complex target area fall within lands that are open to mining. These lands are now papered with mining claims. Mining and other potentially incompatible land uses are a particular concern in these target areas because this is where much of the spawning and rearing activity for Nushagak king, red and silver salmon occurs.

Alaska Division of Habitat – The Alaska Department of Natural Resources, Division of Habitat Management and Permitting, has jurisdiction over all anadromous waters within the watershed. Hundreds of rivers and streams in the watershed have been nominated by the Alaska Department of Fish and Game for inclusion in the catalog of anadromous waters. Once a water body is determined to support anadromous fish and is listed in the catalog, the water body cannot be disturbed without a permit from the Division. This permitting responsibility was moved to the Department of Natural Resources from the Department of Fish and Game in 2004, a move considered by some to be an effort to ease the permitting process for developers.

#### b. Federal Lands

The National Park Service – The very upper reaches of the Mulchatna River and tributaries fall within the jurisdiction of the Lake Clark National Park and Preserve. The Chilakadrotna River is a National Wild and Scenic River. This area generally falls within the Upper Mulchatna River Corridor and Upland Tundra Complex target areas. Two headwater lakes fall within the park. These areas are managed by the National Park Service and already have the highest conservation status accorded under federal law. Some small parcels exist as inholdings on these lands.

U.S. Fish & Wildlife Service – The U.S. Fish & Wildlife Service manages lands within the Togiak National Wildlife Refuge. The protection of wildlife habitat is the goal of the refuge Land Protection Plan adopted in 2000. Refuge boundaries include the Nushagak Peninsula. The Nushagak Peninsula is primarily a part of the Tundra Wetlands target area providing critical waterfowl habitat. However, the major rivers of the Nushagak Peninsula are part of our watershed and in particular the Igushik River and its headwater lakes is a major salmon producing system. The development of small parcels within the refuge and the development of Manokotak Native Corporation lands around Amanka and Ualik lakes could pose a significant problem for critical salmon habitat.

Bureau of Land Management – Lands managed by the BLM can be transferred, leased, opened for mineral entry, or otherwise developed. Land managed by the BLM in the watershed is primarily within our Tundra Wetland target area, however, a significant portion also falls within the Upper Watershed target area and includes salmon spawning habitat.

BLM-managed lands within the watershed currently remain unavailable for development under section 14(d)(1) of the Alaska Native Claims Settlement Act of 1971. However, because the BLM has satisfied the requirements of section 14(d)(1) for its remaining lands in Bristol Bay it is now in the process of determining the future status of its lands. The BLM has recently

completed a hearing process seeking public comment on four proposed alternatives, including a preferred alternative that would open lands in the Nushagak watershed for mineral entry.

## Implementation

Our strategy for addressing small parcel inholdings within the federal and state conservation units in the watershed would be to enhance management in these protected areas. Accordingly, priorities for small parcel protection within the Wood-Tikchik State Park and the Togiak National Wildlife Refuge are established by their respective management agencies. Most small parcel acquisitions would be turned over to the conservation unit for management.

As of the date of this plan, The Nature Conservancy and The Conservation Fund have made several small parcel acquisitions in the Wood-Tikchik State Park. Most of these parcels have been reconvened to the State. A few have been conveyed to the Nushagak-Mulchatna / Wood-Tikchik Land Trust. The Conservation Fund has assisted with numerous small parcel acquisitions in the Togiak National Wildlife Refuge. None of these, however, fall within the Nushagak River watershed.

Our strategy for protecting State lands in the watershed managed by the Alaska Department of Natural Resources is to advocate for and hopefully secure a greater degree of administrative or statutory conservation protection for the most sensitive habitat within these lands. Fortunately, most State lands within the watershed are currently managed pursuant to The Nushagak and Mulchatna Rivers Recreation Management Plan approved by the Department of Natural Resources. This document should remain the seminal plan for managing State lands in the watershed. However, because the provisions of the plan are regulatory they can be changed, altered or even removed by the Department. The only restraint on the Department's authority is the obligation to provide public notice of proposed changes and an opportunity for public comment. The Jay Hammond Refuge proposed in Senate Bill 67 in 2007 is the kind of legislation that would provide the appropriate restrictions.

There are also small parcel inholdings scattered throughout State lands. Many of these parcels also fall within areas of high habitat value. Conservation protection for priority parcels will be sought. At the time of this plan, The Nature Conservancy and The Nushagak-Mulchatna Watershed Council, acting on information provided during the gathering of traditional use information, purchased a parcel at the confluence of the Mulchatna River and Keefer Creek. The parcel straddled an important crossing point for the Mulchatna caribou herd.

Our strategy for BLM lands is to encourage BLM to postpone lifting the restrictions of Section 14(d)(1) of ANCSA until such time as the BLM can identify areas on those lands important for subsistence and wildlife habitat and to accord those areas identified the highest available degree of conservation protection.

### 2008

- Identify areas of high biological value for traditional use species on State and Federally managed areas of the watershed.
- Develop sensitivity criteria for review and analysis of small parcels and prioritize for protection.
- Advocate the creation of statutory protections for the Nushagak Watershed similar to those set forth in Alaska Senate Bill 67.
- Advocate for the extension of the restrictions on Federal Lands in the watershed currently subject to Section 14(d)(1) of ANCSA.





2009 – 2012

- Acquire conservation protections on priority small parcels that are inholdings on State or Federal land.
- Continue to advocate as necessary for the creation of statutory protections for the Nushagak Watershed similar to those set forth in Alaska Senate Bill 67.
- Continue to advocate as necessary for the extension of the restrictions on Federal Lands in the watershed currently subject to Section 14(d)(1) of ANCSA.

Suggested Partners – The Nature Conservancy and the Land Trust, along with The Conservation Fund, have been able to protect several small parcel inholdings in the Wood-Tikchik State Park and in the Togiak National Wildlife Refuge. These organizations are the most suited for continuing this role. The Conservation Fund has focused its efforts on protecting small parcels within conservation units and is probably best suited to continue this effort. The Nature Conservancy and the Land Trust may be the most appropriate entities for protecting small parcels on public lands outside of conservation units.

Local governments, regional organizations, tribal and village corporations are the most appropriate partners for pursuing legislative and administrative protections for State lands and waters outside of Wood-Tikchik State Park and for Federal lands remaining under the management of the Bureau of Land Management. The Nature Conservancy can provide the scientific support for greater habitat protection and can identify the most valuable lands needing protection.



If this or a similar refuge is created, our strategy should be to obtain automatic in-stream flow protection for all anadromous waters within the refuge boundaries.

## STRATEGIC ACTION 3: MAINTAIN WATER QUALITY STANDARDS THAT PROTECT WILD SALMON AND OTHER FISH

In order to know whether our conservation efforts are successful or to determine whether certain uses within the watershed may be turning into significant threats, it is necessary to regularly take the pulse of the ecosystem. Routine water quality testing and monitoring other viability indicators like salmon escapement, returning salmon population structure, and changes in vegetation cover can help us maintain the health of the watershed.

### Implementation

2008

- Identify sites for periodic water quality and water chemistry sampling.
- Design water sampling program for threat analysis and initiate sampling.
- Design tissue sampling program for detection of heavy metals in fish.

2009 – 2012

- Continue Sampling Program.

Suggested Partners –Nushagak-Mulchatna Watershed Council will have the lead on this strategic action. The Council will need technical and financial support. The BBNA, TNC and possibly the Bristol Bay Science and Research Institute would be appropriate partners to either provide or raise funds for that support. The Nature Conservancy has developed three viability indicators that if observed may help us anticipate a threat to the future viability of the ecosystem. (See page 45 for discussion of viability indicators.) The Watershed Council and BBNA with help from The Nature Conservancy are the most appropriate partners to monitor these indicators.

### Measuring Our Success

#### Measuring and Monitoring

The fundamental question facing any conservation project team is: “Are the conservation strategies we are using having their intended impact?” However, because our efforts are directed more to protecting a relatively undisturbed watershed, the question needs to be reframed slightly: “Are the potential threats we have identified beginning to have a noticeable impact on habitat?” To answer this question, we need to collect data on a number of indicators that gauge the health of habitat and whether change may be occurring that could threaten the viability of our conservation target areas. A proposed monitoring framework follows.



**Photo Credit:** Lisa Ferber for the Bristol Bay Native Association



THREAT MONITORING	PROBLEM INDICATORS
Water Quality	<ul style="list-style-type: none"> <li>• <b>Dissolved Oxygen</b> &lt; 8mg/liter</li> <li>• <b>Ph Level</b> &lt; 6.5 or &gt; 8.5, or varies more than 0.5 units from natural conditions</li> <li>• <b>Temperature</b> &gt; 59°F or 16°C</li> <li>• <b>Turbidity</b> &gt; 5 NTUS above baseline conditions</li> </ul>
Water Chemistry	<ul style="list-style-type: none"> <li>• <b>Heavy Metals</b> – presence of heavy metals exceeds ADEC or EPA standards or is elevated above baseline levels</li> <li>• <b>Hydrocarbons</b> – presence of hydrocarbons or physiological indicators of hydrocarbon exposure exceeds ADEC or EPA standards or is elevated above baseline levels</li> </ul>



**Photo Credit:** Lisa Ferber for the Bristol Bay Native Association

### Description of Landscape Context, Condition and Size

#### Landscape Context

An integrated measure of two factors: 1) The dominant environmental regimes and processes that establish and maintain the conservation target area; and 2) connectivity.

#### Condition

An integrated measure of the composition, structure, and biotic interactions that characterize the target area.

#### Size

Size is a measure of the area of the target (i.e., its geographic coverage). Minimum dynamic area, or the area needed to ensure survival or reestablishment after a natural disturbance, is another aspect of size.

VIABILITY MONITORING	PROBLEM INDICATORS
<b>Landscape Context</b>	
Percent intactness of naturally occurring early seral and mature spruce forest mix in the riparian area	More than 5% of riparian vegetation 300' back from ordinary high water along entire length of river has been disturbed, noticeable disturbance in important spawning and rearing areas.
<b>Condition</b>	
Salmonid Population Structure and Recruitment	The average size, sex ratio, age, and distribution of adults and juveniles, and, timing of adult returns have fallen below normal ranges per ADF&G surveys for a period of five years.
<b>Size</b>	
Salmonid escapement and commercial, sport and subsistence needs satisfied	Restrictions have been placed on subsistence fishing or for a period of three years limits have been placed on the maximum opportunity for sport and commercial fishing as defined by Alaska Board of Fish.



**Photo Credit: (top left and right) Tim Troll**



## **STRATEGIC ACTION #4: PREVENT HABITAT DAMAGE THAT COULD RESULT FROM MINING**

Large scale open pit mining poses the most significant potential threat to the integrity of the Nushagak watershed. A large deposit of copper and gold at the headwaters of the Nushagak River known as the Pebble Prospect is currently undergoing extensive evaluation to determine whether constructing a large scale open pit mine could be a viable economic enterprise. Millions of dollars are also being spent gathering the information necessary to satisfy the requirements of the numerous Federal and State permits that must be obtained before any mining can commence. The feasibility of mining any deposit in the watershed has not yet been determined and at the time of this report the first permit applications for the Pebble Prospect are not expected to be submitted before 2011. However, even if the Pebble Prospect is not feasible or is not approved for development, mining in the watershed, unless prohibited by law, must be considered likely at some point in the future.

Many organizations and individuals have already concluded the risks associated with mining the Pebble Prospect are too great. Most of the tribal governments and ANCSA village corporations along the Nushagak River have gone on record opposing the development of the Pebble Prospect. An alliance of sport and commercial fishing interests have formed an advocacy organization called The Renewable Resources Coalition to lead the campaign against the development of Pebble. National conservation groups like Trout Unlimited are also rallying behind the effort to stop the mine.

### **1. Minimize Habitat Damage Resulting from Mining**

The inherent nature of mining, and particularly sulfide ore body mines like the Pebble Prospect, presents unavoidable risks to fish and wildlife habitat. If the Pebble Prospect is not developed a significant threat to habitat within the watershed will have been removed. The Nushagak-Mulchatna Watershed Council believes, however, it is wise to anticipate that a mine proposal will be put through the permit process and accordingly we must be prepared to work within the legal process established to evaluate permit requests to assure the application of environmental standards that minimize habitat damage and to obtain trade-offs or concessions for damage that cannot be avoided if a mine is eventually permitted.

### **Implementation**

2008 – 2009

- Determine the risk factors associated with the Pebble Prospect (i.e., groundwater pollution from the open pit, dam failure, direct destruction of fish habitat from mining and tailings disposal, slurry pipeline failures, water appropriation, etc.) and the most likely pathways for risks to manifest themselves.
- Develop or adopt environmental standards that will address the risks and pathways and be used to evaluate the adequacy of plans for proposed mines in the watershed by the Watershed Council. The Framework for Responsible Mining published by the Center for Science in Public Participation may provide an appropriate starting point, but should be revised to reflect the specific environmental conditions found in the Nushagak River Watershed.

2008 – 2012

- Advocate for rigorous mine permitting standards, and that, at a minimum, existing environmental standards for permits are not relaxed.
- Weakened environmental standards adopted by the State in recent years for mixing zones and coastal management create new threats. Advocate no mixing zones be allowed.
- Provide and/or secure science supported comment, input and evaluation of all material submitted to support permit requests to the appropriate State and Federal permitting agencies.
- Gather flow data and file for in-stream flow reservations to protect water volumes needed for fish and pollution abatement. (Strategic Action 1)
- Gather baseline water quality data to serve as the basis for evaluating mining compliance with water quality standards. (Strategic Action 3)

- Advocate for solid financial assurances from mining companies to cover the cost of any remediation or clean-up necessary because environmental standards were violated. Corporate guarantees should not be considered solid financial assurances.

Suggested Partners – Regardless whether the Pebble Mine moves toward permitting, our strategy assumes that all potential partners can agree that any mine developed in the watershed should not be permitted unless it can be demonstrated that the traditional uses of the watershed will not be compromised by the mine or by any activity associated with or caused by the presence of the mine.

The Watershed Council will play a continuing role in the strategy to press for mining permit standards in the watershed that minimize if not eliminate the habitat impact of any mine that is developed. In this effort the Council will continue to rely upon the advice, input and suggestions of Bristol Environmental and Engineering Services, a subsidiary of Bristol Bay Native Corporation, Bristol Bay Native Association, and The Nature Conservancy as well as other organizations that can provide the Council with the capacity to address the threats posed by mining. These organizations are expected to provide critical input into the development of a locally appropriate framework for responsible mining.

If the permitting process for the Pebble Mine proceeds, the Watershed Council must be able to marshal both the internal and external resources to monitor the permitting process, provide science based comments and input where appropriate, and if a mine is to be approved negotiate for concessions that balance unavoidable habitat damage with greater protection for other lands in the watershed.

The Watershed Council should also be prepared to vigorously monitor environmental quality standards should a mine proceed to development. This means gathering data now (Strategic Action 3) on water quality and chemistry and other system viability indicators that can become the baseline for detecting harmful environmental changes in the watershed that could result from mining activity.



First cannery in Bristol Bay, Arctic Packing Company at Kanuluk, circa 1900



# Appendix A: The Nature Conservancy Action Planning Process

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## Conservation Planning

The Nature Conservancy uses conservation area plans to develop site-specific conservation strategies and prepare for taking action and measuring success. These plans follow what we call the 5-S Framework:

**Systems** – The conservation area planning team identifies the species and natural communities that will be the conservation elements for the area. To do so, element lists developed during the ecoregional assessment are modified to include site-specific conservation elements.

**Stresses.** The team determines how conservation elements are compromised; by habitat reduction or fragmentation, or by changes in the number or type of species in a forest or grassland.



Photo Credit: Robert Glenn Ketchum

## Implementation

The team will then identify and rank the causes, or sources, of stress for each element. The analysis of stresses and sources together make up the threat assessment.

**Strategies** – An important step in the process is finding practical cooperative ways to mitigate or eliminate the identified threats and enhance biodiversity.

**Success** – Each plan outlines methods for assessing our effectiveness in reducing threats and improving biodiversity—usually by monitoring progress toward established biological and programmatic goals.

**Situation** – An understanding of the cultural, political and economic situation behind the threats is essential for developing sound strategies. This human context is often referred to as the sixth “S.”

## Biodiversity Health and Viability Ranking System

The viability/integrity of the selected conservation elements should be assigned a rank using a four-level scale. The viability/integrity ranking system uses simple categorical ranks, as follows:

**Very Good** – The factor is functioning at its ecologically desirable status and requires little human intervention.

**Good** – The factor is functioning within its range of acceptable variation. However, it may require some human intervention to maintain this status.

**Fair** – The factor lies outside of its range of acceptable variation and requires human intervention. If unchecked, the target will be vulnerable to serious degradation.

**Poor** – Allowing the factor to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.

## Viability Criteria

The assessment of viability is based on three criteria:

**Size** – This is a measure of the area or abundance of the conservation target or element's occurrence. For ecological systems and communities, size is simply a measure of the occurrence's geographic coverage. For species, size takes into account the area of occupancy and number of individuals. Minimum area needed to ensure survival or re-establishment of an element after natural disturbance is another aspect of size.

**Condition** – We make an integrated measure of the composition, structure and biotic interactions that characterize the occurrence. This includes factors such as reproduction, age structure, biological composition (e.g., presence of native versus exotic species; presence of characteristic patch types for ecological systems), structure (e.g., canopy, under story, and groundcover in a forested community) and biotic interactions (e.g., levels of competition, predation, and disease).

**Landscape Context** – This is an integrated measure of two factors: the dominant environmental regimes and processes that establish and maintain the element occurrence, and connectivity. Dominant environmental regimes and processes include herbivory, hydrologic and water chemistry regimes (surface and groundwater), geomorphic processes, climatic regimes (temperature and precipitation), fire regimes and many kinds of natural disturbance. Connectivity includes such factors as species elements having access to habitats and resources needed for life cycle completion, fragmentation of ecological communities and system, and the ability of any element to respond to environmental change through dispersal, migration, or re-colonization.

## Threat Ranking Guidelines

Threats are composed of stresses and sources of stress (or "sources"). A stress is defined as a process or event with direct negative consequences on the conservation element (e.g., alteration of water flow into a marsh). The source of stress is the action or entity that produces a stress (e.g., channel building). The planning team must identify and rank the stresses and sources for each of the conservation elements. Guidelines for selection and ranking of stresses and sources are below.

The stress ranks and source ranks for individual elements:

- 1) help elucidate the factors influencing that element and subsequently, the necessary conservation strategies, and
- 2) contribute to the analysis of threats for the conservation area. A conservation element's stress and source rankings are analyzed together via computer to provide threat ranks for the element.

Stresses are ranked based on the severity and scope of damage expected within 10 years under the current circumstances. Sources of stress are ranked based on the expected contribution of the sources and the irreversibility of the impact.





# Appendix B: Project Work Plan

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The following is the scope of work for the Nushagak River Watershed Traditional Use Area Conservation Plan project.

## Task #1 – Data Gap Analysis

- TNC will conduct a data gap analysis to determine data availability on habitat and distribution of salmon and other key subsistence species within the Nushagak River watershed.

## Task #2 – Digitization of Existing Data Sets

- TNC will, to the greatest extent possible, acquire existing data sets on habitat and distribution of salmon and other key subsistence species within the Nushagak River watershed and will digitize hard-copy information from those data sets as necessary.

## Task #3 – Traditional Ecological Knowledge (TEK) Study

- TNC will conduct a Traditional Ecological Knowledge study to document unpublished information held by residents and other users of the Nushagak River Watershed. This study will focus especially on identified data gaps in the knowledge about the habitat and distribution of salmon and other key subsistence species within the watershed. TNC will digitize and map the TEK information obtained.

Focal Species for Investigation:

- Sockeye (Red) Salmon
- Chinook (King) Salmon
- Coho (Silver) Salmon
- Other Salmon Species
- Whitefish
- Winter Fishing Locations
- Waterfowl
- Moose
- Caribou
- Plants (common berry pickings sites, medicinal plants)



## Task #4 – Threats Analysis

- TNC will conduct a threats analysis to assess the potential sources of stress to the salmon and other key subsistence species within the Nushagak River Watershed.

## Task #5 – Identification of Key Areas for Conservation

- TNC will first identify areas of biological importance using the scientific and traditional ecological knowledge information and second, will identify priority areas for conservation and sustainable, compatible management based on biological value, traditional use, and potential threats.

## Task #6 – Strategic Action Plan

- TNC will produce a conservation-based strategic action plan that will include recommendations to reduce or eliminate identified threats and conflicts, as well as recommendations for an ecosystem-based monitoring framework to measure the status over time of the salmon and other key subsistence species of the Nushagak River watershed.

## Task #7 – Publication of Traditional Use Area Conservation Plan

- TNC will compile and publish all of the data, information and recommendations produced as a result of the accomplishments of Tasks 1 through 6 into a professionally-designed publication of the Traditional Use Area Conservation Plan for the Nushagak River Watershed with CD/DVD PowerPoint presentations of data obtained and key strategies and outcomes. TNC will also produce a map/poster for use in each village.

### APPROACH TO TEK STUDY

The TUACP proposed by TNC contemplates a product that incorporates both scientific information and traditional ecological information regarding the habitat and distribution of salmon and other key subsistence species throughout the Nushagak River Watershed. The TEK component (Scope of Work Task #3) is to be used to both confirm the reliability of the existing scientific knowledge and to provide new information where gaps in that knowledge exist.

The Work Plan incorporates this blend of scientific and traditional information within the framework for developing a TUACP proposed in the publication “Chief Kerry’s Moose” written by Terry N. Tobias and published by The Union of BC Indian Chiefs and Ecotrust Canada in 2000.

#### 1. Prepare to Collect Data

##### a. Develop Community Support

TNC undertakes this project at the request of and under contract with the Bristol Bay Native Association (BBNA). The BBNA helped organize and provides staff support to the Nushagak-Mulchatna Watershed Council that is made up of representatives from each of the communities within the project area. The Watershed Council is the primary governing body overseeing the project and is the organization to which both the BBNA and TNC shall report. The Watershed Council also established the primary goal of the TEK component to be: “Documenting ecological knowledge of habitats and sites critical to the survival of important animal populations.”

The Watershed Council appointed a Steering Committee to guide and provide direction for the project. The following parties were appointed to the Steering Committee:

- Tim Wanholla, New Stuyahok
- Philip Akelkok, Ekwok
- Herman Nelson, Koliganek
- Billy Maines, Dillingham and Curyung Tribe
- Sue Flensburg, BBNA

Specific Tasks assigned by the Watershed Council to the Steering Committee include the following:

- Review recommendation of non-salmon species to be the subject of TEK
- Advise who is to be interviewed
- Advise who is to interview
- Advise who is to translate, transcribe and edit interviews (if necessary)
- Review Interview formats and protocols
- Review information obtained from interviews for accuracy and thoroughness
- Help determine when TEK is complete
- Review presentation formats (maps and text)
- Approve TEK report for presentation to NMWC and inclusion in TUACP





#### b. Hire and Train Interviewers

It is anticipated that student interns and other persons may be involved in conducting interviews to collect information for the TEK. It is also anticipated that it may be necessary to conduct some of the interviews in Yup'ik, which will require the services of a translator. The decision whether to hire interviewers will be made by the TNC Project Director after TNC has completed its data gap analysis and prepared maps reflecting the existing knowledge of habitat and distribution of salmon and other key subsistence species (Scope of Work: Task #1 and #2). A specific focus of the TEK is to obtain new information where there are gaps in existing information. Once the extent of existing knowledge is known, the Project Manager should be able to determine what information is needed and whether it will be necessary to hire interviewers, translators, and possibly a professional TEK consultant to obtain the information. Decisions about who to hire to conduct interviews, who to hire for translation, and who to hire as a possible professional consultant will be made by the TNC Project Director with the advice and consent of the Steering Committee.

#### c. Interview Guide

The TNC Project Director shall prepare an interview guide establishing the format and protocols that will be used to conduct any key respondent interviews. To the greatest extent possible, the Interview Guide will follow the guide prepared by the Togiak National Wildlife Refuge for obtaining TEK information on freshwater fish species inhabiting the Togiak National Wildlife Refuge. Incorporating a similar format may facilitate the integration of data collected for this project with data collected by the Togiak National Wildlife Refuge. Such data integration may have future application as the Togiak National Wildlife Refuge is adjacent to the study area for this project. Although the Interview Guide may be designed for single key respondent interviews, it may be adapted for use in small group interviews.

#### d. Research Design

TNC has developed a conservation planning process that focuses on eight key target species or habitats to assess biodiversity and the environmental health of a particular ecosystem. This project is designed to provide information that will lead to recommendations for protecting biodiversity and key species important for the subsistence needs of the residents of the Nushagak River Watershed. The following species and habitat areas will constitute the eight targets for the purposes of this project:

- **Sockeye (Red) Salmon** (*Oncorhynchus nerka*). Sockeye is the most abundant salmon species that enters Nushagak Bay. It is the most important salmon species for the commercial fishery of Nushagak Bay. It is the primary fish harvested by residents to make dried fish and is frequently harvested for subsistence in the fall during spawning. TEK will seek to identify specific habitat locations important for the various life stages of these fish in freshwater.
- **Chinook (King) Salmon** (*Oncorhynchus tshawytscha*). Chinook salmon are the first to arrive in Nushagak Bay and are particularly important for subsistence because their flesh is prized for dried and smoked strips. Chinook are second to sockeye in importance to the commercial fishery; however, Chinook are the economic foundation of a prospering recreational fishery in the lower Nushagak River. TEK will seek to identify specific habitat locations important for the various life stages of these fish in freshwater.
- **Other Salmon Species: Chum (Dog) Salmon** (*Oncorhynchus keta*), **Pink (Humpback) Salmon** (*Oncorhynchus gorbuscha*), and **Coho (Silver) Salmon** (*Oncorhynchus kisutch*) are considered together. These salmon species are less important for subsistence use today but remain important for gauging the health of river habitat. Coho are particularly prized by local rod and reel fishermen and are sometimes targeted for fall subsistence use. TEK will seek to identify specific habitat locations important for the various life stages of these fish in freshwater.

- **Other Freshwater Fish.** Other species of freshwater fish provide an important source of nutrition during the winter. Some species like whitefish may be targeted with nets under the ice while others like smelt or northern pike are taken on hook and line through ice holes. In the not too distant past the resilient abundance of blackfish could be depended upon by local residents to prevent starvation. The focus of the TEK will be to identify important winter harvest areas for freshwater fish and which fish are harvested in those locations.
- **Moose** (*Alces alces*). Moose are relative newcomers to the Nushagak watershed, having migrated into the area within the last 150 years or so. In that short time moose have become the primary terrestrial animal harvested for subsistence use. TEK will seek to identify habitat locations for the various life stages of moose.
- **Caribou** (*Rangifer tarandus*). For thousands of years caribou were the most important terrestrial animal harvested for subsistence by the residents of the Nushagak watershed. Caribou remain an important subsistence species, hunted most heavily during the winter months. TEK will seek to identify habitat locations for the various life stages of caribou.
- **Waterfowl.** Residents of the Nushagak watershed hunt a wide variety of waterfowl and will harvest the eggs of some species. TEK will seek to identify important areas for nesting, rearing, and harvesting.
- **Berry Picking Areas.** Blueberries, cranberries, blackberries, and salmonberries are the primary species of interest and are most often incorporated into a local delicacy called akutaq. TEK will seek to identify those berry-picking areas routinely visited by many residents of the watershed.
- **Spruce Trees.** Spruce is an important source of wood for heating, building log cabins and for fires in local steam baths. TEK will seek to identify locations of important stands of trees harvested for these purposes.

## 2. Data Collection



Data collection for this project will fall into two distinct efforts: 1) Collection of published and available scientific and traditional ecological information, and 2) collection of new traditional ecological information in an effort to complete our understanding of the habitat and distribution of salmon and the other key species identified for research. Accordingly, the effort to collect new traditional ecological information will not begin in earnest until the existing scientific and traditional ecological information has been assembled, digitized, and mapped. It is anticipated that during this process, TNC will interview fish and game biologists familiar with the Nushagak River Watershed. Once TNC and the Steering Committee have an understanding of the scale of need for new ecological information, focused TEK interviews will commence. It is anticipated that these interviews will be conducted in the summer and fall of 2005. Prior to conducting interviews, the Steering Committee will also review maps prepared with the existing scientific information to determine whether the maps are considered accurate by the residents of the watershed.

Also relevant to the need to collect new information is the extent to which other organizations may also be targeting the collection of the same information during the study period. TNC will try to coordinate its efforts with any other known efforts. For example, Northern Dynasty Minerals, Ltd has engaged a consultant to undertake subsistence research as part of its overall environmental baseline study needed for permitting its potential development of the Pebble Gold Copper Project at the headwaters of the Kuktuli River, a tributary of the Nushagak River. New Stuyahok, Ekwok, and Koliganek are targeted communities for that research. To the extent possible, TNC will obtain data from the Northern Dynasty research and will not duplicate the effort of Northern Dynasty in these three villages.



TNC will also determine whether the Alaska Department of Fish and Game will be doing any subsistence harvest surveys or other fieldwork in the Nushagak Watershed during the study period. TNC will coordinate its efforts with the Department if it will be undertaking research in the area.



a. Participant Interviews and Maps:

There will be several groups targeted for TEK interviews. The Steering Committee will assist the TNC Project Director with the selection of the appropriate persons to interview. It is not anticipated that these interviews will be a formal survey using a probability sample; rather, the respondents will be persons considered by the Steering Committee to be key knowledgeable persons. The interviews will emphasize spatial information, asking respondents to relate their information to places on a map.

- Retired Hunters and Gatherers: At least three elders from each community who have harvested the key subsistence species in the study area and can provide an historical (40- to 50-year) perspective.
- Current Hunters and Gatherers: At least three persons from each community who currently harvest the key subsistence species in the study area and can provide information about contemporary (within the last 10 years) subsistence use areas and areas important for the survival of subsistence species. Interviews were conducted between September 1 and November 30, 2005.
- Pilots: Three to four pilots who have been working for air services (e.g. Mulchatna Air, Shannon's Air, Bristol Bay Air and Pen Air) who have been regularly flying the Nushagak River for at least five years. The primary focus for these interviews will be observations about areas used by moose and caribou. Interviews were conducted between June 1 and August 30, 2005.
- Sportfishing Guides: Three to four sport fishing guides who have been working on the Nushagak River for at least five years. The primary focus for these interviews will be observations about salmon habitat areas and areas important for the other focal species. Interviews were conducted between June 1 and July 31, 2005.
- Choggiung River Patrol: One to three employees or former employees of Choggiung Ltd. Village Corporation who worked in the river patrol program for at least five years. The primary focus for these interviews will be observations about salmon and areas important for the other focal species. Interviews were conducted between June 1 and August 30, 2005.

### 3. Data Processing

a. Published Data

Once the TNC Project Director and the TNC Project Team are satisfied that the collection of previously published, scientific and traditional ecological information is complete, this information will be digitized and mapped.

b. Raw Data

Two copies of raw data in the form of interview tapes will be made. The original and one copy will be delivered to the BBNA at project completion. To the extent practicable, interviews with elders and current hunters and gatherers will be videotaped. Raw data in the form of map biographies will be digitized as soon as practicable after the interview is conducted. Original map biographies will be delivered to the BBNA upon completion of the project.

c. Translation and Transcription

It is likely that some interviews will need to be conducted in Yup'ik. The Project Director and the TNC project team in consultation with the designated translator will determine whether it is necessary to do a written transcript of an interview and a written translation of an interview. Interviews conducted in Yup'ik will be translated into English simultaneously as the interview is being conducted, provided the interview participant does not object.

d. Map Preparation

Each interview will be map intensive. Participants will be asked to indicate on maps those locations they know or believe are important for the salmon and other focal species of the TEK study. The map information from each interview will be digitized and transferred to master maps maintained by TNC.

e. Elimination of Redundant Data

Once all of the TEK map information is digitized, it will be combined with maps showing the scientific and previously published traditional knowledge. The TNC Project Director and the TNC project team will assess the composite maps and eliminate from the final composite maps data that appears to be redundant.

#### 4. Data Use and TEK Report

a. Data Verification

Drafts of the composite maps will be reviewed by the Steering Committee. After any comments made by Steering Committee members have been evaluated and incorporated, the maps will be made available at public meetings to be held in each of the communities of the watershed and at a meeting of the Watershed Council. Meeting participants will be asked to review the maps, confirm the data, and offer corrections. Comments and suggested corrections will be reviewed by the TNC project team with members of the Steering Committee. Maps will be revised where appropriate.

b. TEK Report

A Draft Final TEK Report will be submitted by TNC and the Steering Committee to the Watershed Council for final approval. The approved TEK study will be incorporated into the final publication of the Traditional Use Area Conservation Plan for the Nushagak River Watershed (Task #7) which will be a professionally designed publication with CD/DVD PowerPoint presentations of data obtained and key strategies and outcomes. A stand-alone TEK report, however, will be available for use until its incorporation into the TUACP.



**Photo Credit: (right) Agnew::Beck Consulting**



## Appendix C: Traditional Knowledge Interviews

The Nature Conservancy assembled an interview team to talk with individuals and selected community members about the traditional use flora and fauna identified by the Nushagak-Mulchatna Watershed Council. The following pages contain descriptions of the interview sessions conducted in Dillingham, Ekwok, Koliganek, New Stuyahok, and Aleknagik.

Thanks to the following individuals who provided place name and resource area information:

Ward Jones, Steve Perkins, Jerry Liboff, Russell Nelson, Jeremy Toman, Jason Dye, Mac Minard, Bill Hines, Luki Akelkok, Sr., Phillip Akelkok, Sr., Anuska Nicholai, Anna P. Akelkok, Anecia Nelson, Oxenia McCarr, Effikia Ishnook, Pelescovia Johnson, Elia Ishnook, Sally Tungiung, Gust Tungiung, Herman Nelson, Sr., Jennie Tungiung, Gust Tungiung, Jr., Moxie Andrew Sr., Charles M. Gumlickpak, Nick Gumlickpak, Donald Apokedak, Wassily Hanson, Sr., Tim Wonhola, Sr., Sacally Wanhola, Sr., Molly Chythlook, Wassillie Etuckmelria, Raymond Andrews, Wassilie Ilutsik, Benjamin Tinker, Adam Chythlook, Moses Chythlook, Daniel Chythlook, Chris Itumulria, Gust Bartman, Harry Barnes, Sr., Jonathan Hiratsuka, Billy Maines, Hjalmar Olsen, William Johnson, and William Tennyson.

Anne Fienup-Riordan provided consulting services to the project.

Francisca Yanez, Molly Chythlook, Daniel Chythlook and Gust Tungiung Jr. provided interpretative and translating services to the project.



**Top Left:** Luki Akelkok, Sr., guide and lodge owner. **Photo Credit:** Agnew::Beck Consulting

**Top Middle:** Russell Nelson, Former Choggiung Ltd. Land Manager, and son Sydney

**Top Right:** Bill Hines, guide

**Bottom Left:** Ward Jones, NMWT Land Trust Chairman, and Tim Troll

**Bottom Right:** Jerry Liboff, Gust Tungiung Sr. and Gust Tungiung Jr.

## Dillingham Traditional Knowledge Interviews

**Dates:** April 27 and 28, 2006

### **Background:**

Dillingham is the largest community located on the Nushagak River and serves as a hub for the region. Dillingham has a population of about 2400 people with a highly mixed population of Natives and non-Natives. The Nature Conservancy assembled an interview team to talk with selected community members about traditional use areas identified by the Nushagak-Mulchatna Watershed Council. These areas include habitat important for all five species of Pacific salmon, moose, caribou, whitefish, and waterfowl, as well as locations for winter fishing through the ice and areas used for the harvest of plants. In addition to focusing on traditional use areas the team would also collect traditional place names.



### **Interview Team:**

**Tim Troll:** Southwest Alaska Program Director for The Nature Conservancy with overall responsibility for the Nushagak Traditional Use Area Conservation Project

**Daniel Chythlook:** A resident of Aleknagik and a member of the Steering Committee for the TEK project. Daniel recorded and translated the session as well as participating as a key respondent.

**Clark James Mishler:** Anchorage based commercial photographer with extensive experience working in rural Alaska. Clark was engaged to photograph the village and participants in the interview sessions. The photographs in this summary are his work.

### **Key Responents:**

Daniel Chythlook, Chris Itumulria, Gust Bartman, Harry Barnes, Sr., Jonathan Hiratsuka, Billy Maines, Hjalmar Olsen, William Johnson, William Tennyson

### **Interview Format:**

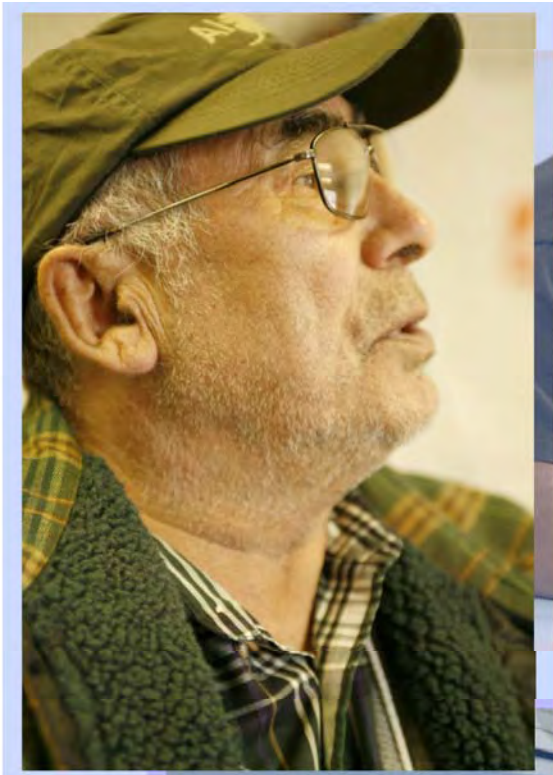
Interviews for Dillingham were scheduled on April 27 and 28, 2006. The Curyung Tribe was asked to provide a group of informants for interview and mapping sessions. Billy Maines, a member of the Steering Committee for the TEK project enlisted the group of informants. A group of nine men of various ages provided information over the two-day session.



### **Information Obtained:**

The team was able to collect extensive traditional use, habitat and place name information for the Nushagak River and tributaries from Portage Creek to the mouth of Nushagak Bay, for the Nushagak Peninsula, and for the area around Manokotak and Dillingham.





Appendix C: Traditional Knowledge Interviews



## Ekwok Traditional Knowledge Interviews

**Dates:** April 25, 2006

### **Background:**

Ekwok is the longest continuously-inhabited village on the Nushagak River. Ekwok has a population of about 120 people, most of whom are Yup'ik. The Nature Conservancy assembled an interview team to talk with selected community members about traditional use areas identified by the Nushagak-Mulchatna Watershed Council. These areas include habitat important for all five species of Pacific salmon, moose, caribou, whitefish, waterfowl, as well as locations for winter fishing through the ice and areas used for the harvest of plants. In addition to focusing on traditional use areas, the team would also collect traditional place names.



### **Interview Team:**

**Tim Troll:** Southwest Alaska Program Director for The Nature Conservancy with overall responsibility for the Nushagak Traditional Use Area Conservation Project.

**Francisca Yanez:** Translator and Transcriber. Francisca works in the Land Department of the Bristol Bay Native Corporation (BBNC). She is responsible for the collection and presentation of information for the Bristol Bay Place Names Project, a cooperative venture between the Bristol Bay Native Association (BBNA) and the BBNC.

**Clark James Mishler:** Anchorage-based commercial photographer with extensive experience working in rural Alaska. Clark was engaged to photograph the village and participants in the interview sessions. The photographs in this summary are his work.

**Sara Tungjung:** A resident of Koliganek who is engaged as an intern for the BBNA. Sara was responsible for videotaping all interview sessions.



### **Key Respondents:**

Luki Akelkok Sr., Phillip Akelkok, Sr. Anuska Nicholai, Anna P. Akelkok and Anecia Nelson

**Interview Format:**

Interviews for Ekwok were scheduled on April 25 and 26, 2006. The community was asked to provide a group of informants for interview and mapping sessions. Phillip Akelkok, Sr., a member of the Nushagak-Mulchatna Watershed Council and part of the project Steering Committee arranged the group for interviews. A group of five from the village with a mix of women and men were selected.

Interviews were conducted with Phillip Akelkok, Sr. and the three women in a group session for one day. Luki Akelkok, who was busy during the session, was interviewed individually later. Interview sessions were completed in one day.

**Information Obtained:** The team was able to collect extensive traditional use and place name information for the Kokwok River, the Nushagak River, and tributaries from Ekwok to the mouth of the Wood River near Dillingham.









## Koliganek Traditional Knowledge Interviews

**Dates:** November 14 to 17, 2005

**Background:** Koliganek is the last village up the Nushagak with a population of about 170 people, most of whom are Yup'ik. The Nature Conservancy assembled an interview team to talk with selected community members about traditional use areas identified by the Nushagak-Mulchatna Watershed Council. These areas include habitat important for all five species of Pacific salmon, moose, caribou, whitefish, waterfowl, as well as locations for winter fishing through the ice and areas used for the harvest of plants. In addition to focusing on traditional use areas, the team also collected traditional place names.

### Interview Team:

**Tim Troll:** Southwest Alaska Program Director for The Nature Conservancy with overall responsibility for the Nushagak Traditional Use Area Conservation Project.

**Francisca Yanez:** Translator and Transcriber. Francisca works in the Land Department of Bristol Bay Native Corporation (BBNC). She is responsible for the collection and presentation of information for the Bristol Bay Place Names Project, a cooperative venture between the Bristol Bay Native Association (BBNA) and the BBNC.

**Ann Fienup-Riordan:** Anthropologist. Ann was engaged to assist and provide guidance to the team with its first interview session. Ann is a distinguished scholar and author with numerous works to her credit that focus on various aspects of Yup'ik culture. She has done extensive interview sessions with Yup'ik elders and informants.

**Clark James Mishler:** Anchorage based commercial photographer with extensive experience working in rural Alaska. Clark was engaged to photograph the village and participants in the interview sessions. The photographs in this summary are his work.

**Delores Johnson:** A resident of Koliganek who is engaged as an intern for the BBNA. Delores was responsible for coordination in Koliganek and for videotaping all interview sessions.

**Corinne Smith:** Corinne is a conservation planner for The Nature Conservancy and coordinated the Bristol Bay Ecoregional Assessment for the Conservancy.

### Key Respondents:

Oxenia McCarr, Effikia Ishnook, Pelescovia Johnson, Elia Ishnook, Sally Tungiung, Gust Tungiung, Herman Nelson Sr., Jennie Tungiung, Gust Tungiung, Jr.

### Interview Format:

Interviews for Koliganek were scheduled on November 14 to November 16, 2005. The community was asked to provide a group of six to eight informants for group interview and mapping sessions. BBNA Intern Delores Johnson, along with the help of BBNA employee Frances Nelson, selected the group. Interviews were conducted in a group session with six elders on November 14. Although the session was productive, it was dominated by a few individuals to whom the group generally deferred. Ms. Fienup-Riordan suggested smaller group interviews the second day with men and women in separate locations. On November 15, two of the elder women were joined by a younger woman to do place mapping; and one elder man was joined by two active hunters to do place mapping. The second day sessions were far more productive. One particular advantage was that one of the younger hunters, Gust Tungiung, Jr. was able to translate and transcribe, as well as be a participant. This allowed Francisca to work directly with the women. Bad weather set in on the evening of November 15 and lasted until the 17th, making it possible for the team to conduct some follow-up interviews.



**Information Obtained:**

The team was able to collect extensive traditional use and place name information for the Nuyakuk River, the Tikchik lakes, and the Upper Nushagak from the mouth of the Mulchatna river to the “big bend” of the Nushagak. A preliminary list of locations is attached.









## New Stuyahok Traditional Knowledge Interviews

**Dates:** March 2 and 3, 2006

### **Background:**

New Stuyahok is the largest village on the Nushagak River with a population of about 470 people, most of whom are Yup'ik. The Nature Conservancy assembled an interview team to talk with selected community members about traditional use areas identified by the Nushagak-Mulchatna Watershed Council. These areas include habitat important for all five species of Pacific salmon, moose, caribou, whitefish, waterfowl, as well as locations for winter fishing through the ice and areas used for the harvest of plants. In addition to focusing on traditional use areas, the team also collected traditional place names.



### **Interview Team:**

**Tim Troll:** Southwest Alaska Program Director for The Nature Conservancy with overall responsibility for the Nushagak Traditional Use Area Conservation Project.

**Francisca Yanez:** Translator and Transcriber. Francisca works in the Land Department of the Bristol Bay Native Corporation (BBNC). She is responsible for the collection and presentation of information for the Bristol Bay Place Names Project, a cooperative venture between the Bristol Bay Native Association (BBNA) and the BBNC.

**Clark James Mishler:** Anchorage based commercial photographer with extensive experience working in rural Alaska. Clark was engaged to photograph the village and participants in the interview sessions. The photographs in this summary are his work.

**Sara Tungjung:** A resident of Koliganek who is engaged as an intern for BBNA. Sara was responsible for videotaping all interview sessions.

### **Key Respondents:**

Moxie Andrew Sr., Charles M. Gumlickpak, Nick Gumlickpak, Donald Apokedak, Wassily Hanson, Sr., Tim Wonhola, Sr., Sacally Wanhola, Sr.

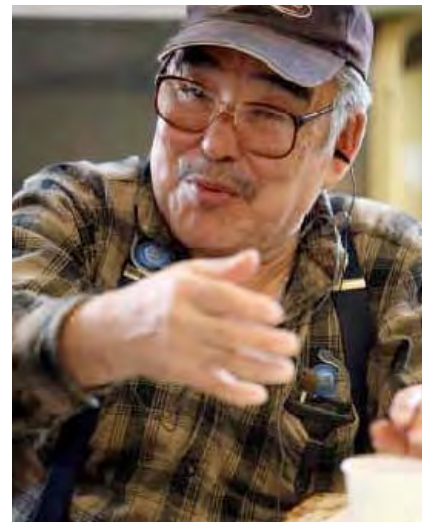


**Interview Format:**

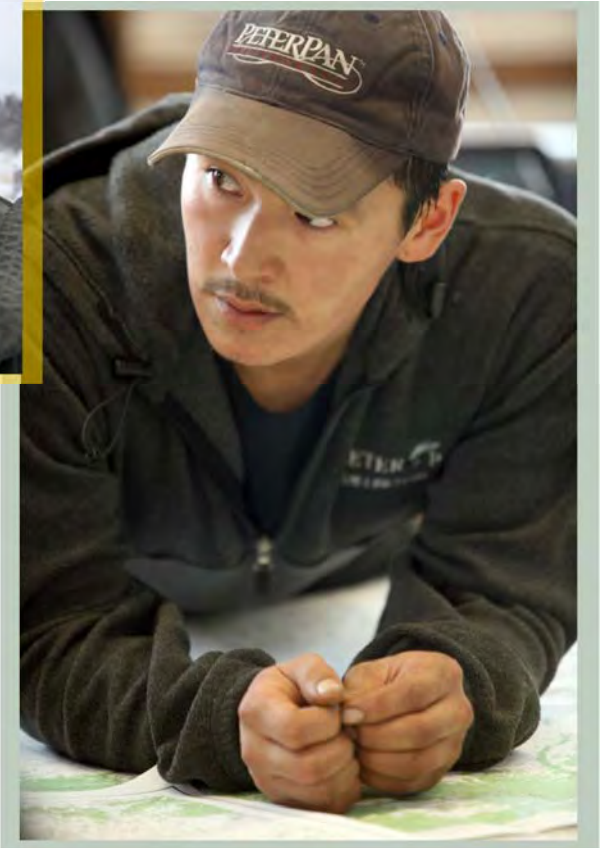
Interviews for New Stuyahok were scheduled on March 1 and 2, 2006. The community was asked to provide a group of six to eight informants for group interview and mapping sessions. Tim Wonhola, a member of the Nushagak-Mulchatna Watershed Council and part of the project Steering Committee arranged the group for interviews. A group of seven men from the village with a mix of elders and current hunters were selected. Interviews were conducted in a group session over two days.

**Information Obtained:**

The team was able to collect extensive traditional use and place name information for the Mulchatna River and tributaries, the Nushagak River, and tributaries from the mouth of the Mulchatna to the mouth of the Wood River near Dillingham.







Appendix C: Traditional Knowledge Interviews



## Aleknagik Traditional Knowledge Interviews

**Dates:** December 12 to 16, 2005

### Background:

Aleknagik is the only community located in the Wood River Lakes system. Aleknagik has a population of about 240 people, most of whom are Yup'ik. The Nature Conservancy assembled an interview team to talk with selected community members about traditional use areas identified by the Nushagak-Mulchatna Watershed Council. These areas include habitat important for all five species of Pacific salmon, moose, caribou, whitefish, waterfowl, as well as locations for winter fishing through the ice and areas used for the harvest of plants. In addition to focusing on traditional use areas, the team also collected traditional place names.



### Interview Team:

**Tim Troll:** Southwest Alaska Program Director for The Nature Conservancy with overall responsibility for the Nushagak Traditional Use Area Conservation Project.

**Molly Chythlook:** Molly at the time was a Specialist with the Subsistence Division of the Alaska Department of Fish and Game in Dillingham. She is a Native of Aleknagik. Molly provided translation and transcription services for the interviews and was also a key respondent. Her time was an in-kind contribution of the Alaska Department of Fish and Game to the project. Molly has since retired from her position with the State and now works as the Natural Resources Director for the Bristol Bay Native Association.

### Key Respondents:

Molly Chythlook, Wassillie Etuckmelria, Raymond Andrews, Wassilie Ilutsik, Benjamin Tinker, Adam Chythlook and Moses Chythlook.



**Interview Format:**

Interviews for Aleknagik were scheduled on December 13, 2005. The community was asked to provide a group of informants for interview and mapping sessions. A group of four men and one woman from the village with a mix of ages were selected. Interviews were conducted with Molly Chythlook individually and in a group with Wassillie Etuckmelria, Raymond Andrews, Wassilie Ilutsik and Benjamin Tinker. On December 14, Moses Chythlook was interviewed individually, and on December 16, Adam Chythlook was interviewed individually. Both men reviewed and added to the information obtained during the group interview.



**Information Obtained:** The team was able to collect extensive traditional use and place name information for the Wood River and the Wood-River lake system. Some information was obtained for Tikchik Lake system.





# Appendix D: Strategic Actions Timeline

Within the Nushagak River Watershed there is no single entity that can implement all of the strategic actions necessary for the conservation action plan because land ownership and regulatory authority within the traditional use area is shared among many different private and public organizations. Further, these organizations, many of whom are partners in this traditional use area conservation planning effort, have different policy imperatives that will drive their priorities. The tables below summarize which entities may be best suited to undertake suggested actions. A timeline is also provided.

## Strategic Action 1: Maintain Flow Regime

MAINTAIN FLOW REGIME	NMWC	BBNA	BBSRI	TNC	TCF	LAND TRUST	VILLAGE CORPS	BBNC	State of Alaska	Federal Government
	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years
<b>Reserve adequate in-stream water flow for salmon and other fish in the Nushagak River</b>										
Determine appropriate waterbodies for in-stream flow reservations	1			1						
Establish method and procedure for gathering in-stream flow data	1		1	1						
File in-stream flow applications on highest priority waterbodies	2,3,4,5									
Gather and submit supporting data for in-stream flow applications	2,3,4,5		2,3,4,5							
Secure funding to support in-stream flow application process	1,2			1,2						
<b>Promote legislation establishing automatic in-stream flow reservations for anadromous streams in the watershed</b>										
Legislation Drafted		1		1		1			1	
Legislation Introduced									2	
Legislation Enacted									5	

## Strategic Action 2: Maintain Vegetative Complex that Supports Moose, Fish and Other Species Within and Adjacent to the Floodplain

MAINTAIN VEGETATIVE COMPLEX WITHIN AND ADJACENT TO THE FLOODPLAIN	NMWC	BBNA	BBSRI	TNC	TCF	LAND TRUST	VILLAGE CORPS	BBNC	State of Alaska	Federal Government
	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years
<b>Private Lands Protection: Alaska Native Corporation Lands</b>										
Identify areas of high biological value for traditional use	Done			Done						
Prepare maps of high biological value areas	1		1	1						
Review and recommend land management practices for Native corporation	2,3,4,5									
MOUs with Native corporations				1,2		1,2	1,2	1,2		
Secure conservation protections on Native Corporation lands				2,3,4,5		2,3,4,5	2,3,4,5	2,3,4,5		
<b>Private Lands Protection: Small Parcels</b>										
Develop sensitivity criteria for evaluating and prioritizing for protection	1			1		1			1	
Acquire conservation protections for priority parcels				1,2,3,4,5		1,2,3,4,5			2	
<b>Public Lands and Waters Protection</b>									1	
Acquire conservation protections on small parcel inholdings on public lands					1,2,3,4,5	1,2,3,4,5				
Achieve statutory protection for state managed lands	5			5					5	
Achieve statutory presumption for anadromous waters	5			5					5	
Achieve statutory protection for BLM managed lands	5			5						5

### Strategic Action 3: Maintain Water Quality Standards that Protect Wild Salmon and Other Fish

MONITOR WATER QUALITY STANDARDS THAT PROTECT WILD SALMON AND OTHER FISH	NMWC	BBNA	BBSRI	TNC	TCF	LAND TRUST	VILLAGE CORPS	BBNC	State of Alaska	Federal Government
	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years
Identify and prioritize sites in the watershed that need to be sampled so that existing or potential sources of contamination can be located	1			1						
Collect baseline water quality data from identified sites and implement monitoring program	2,3,4,5		2,3,4,5							
Develop and implement tissue sampling program to monitor heavy metals in salmonids and other key subsistence or commercial species	2,3,4,5		2,3,4,5	1						

### Strategic Action 4: Prevent Habitat Damage that Could Result from Mining

PREVENT HABITAT DAMAGE THAT COULD RESULT FROM MINING	NMWC	BBNA	BBSRI	TNC	TCF	LAND TRUST	VILLAGE CORPS	BBNC	State of Alaska	Federal Government
	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years	plan years
Determine risk factors associated with the Pebble prospect and the most likely pathways for risks to manifest themselves	1,2,3,4,5	1,2,3,4,5		1,2,3,4,5					1,2,3,4,5	
Develop or adopt environmental standards that will address the risks and pathways that can be used to evaluate the adequacy of proposed mining plans	1,2	1,2		1,2						
Advocate for rigorous mine permitting standards	1,2,3,4,5	1,2,3,4,5		1,2,3,4,5		1,2,3,4,5				
Secure science supported comment, input and evaluation of material submitted in support of mining permit requests	1,2,3,4,5	1,2,3,4,5		1,2,3,4,5		1,2,3,4,5				
Advocate for solid financial assurances from mining companies	1,2,3,4,5	1,2,3,4,5		1,2,3,4,5		1,2,3,4,5				

NMWC – Nushagak-Mulchatna Watershed Council

BBNA – Bristol Bay Native Association

BBSRI – Bristol Bay Science and Research Institute

TNC – The Nature Conservancy

TCF – The Conservation Fund

Land Trust – The Nushagak-Mulchatna Wood-Tikchik Land Trust

BBNC – Bristol Bay Native Corporation

1 = 2008

2 = 2009

3 = 2010

4 = 2011

5 = 2012



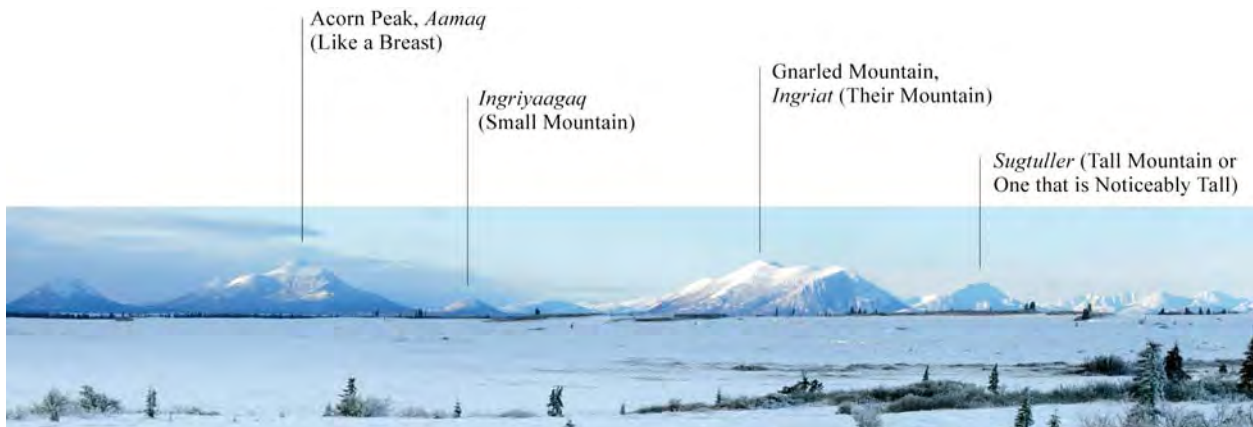
# Appendix E: Place Names List

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## Traditional Use Areas

### YUPIK NAME

Aksekak Lake	Kayaanguslvyaag	Qayaruaryaraq
Aksekaruaq	Kayangusurvik	Qeciklluq
Aksukaq	Kayangusuryaraq	Qecikluk
Akuliqisit	Keggiarpak	Qeckluk
Akuliqutat Mountain	Kenercitak	Qelutvak
Akulugam Akiana	Kenercitaq	Qerarkarcaraq Creek
Akulugpak River	Kiimaq	Qiartgarat Mountains
Akuluraq	Kitngpartuli Island	Qigiq
Akulurarmuit	Kitugciingluq	Qipnerpacuar
Amakar	Klutag Creek	Qiurluk Mountain
Anaaqivik	Maqaryialnguq	Quarvik
Anaq Mountain	Mayuyuilkait	Quipnerpak
Angriyaagam Ingria	Meqsurharli	Qukaqcaruucet
Angvanek Lake	Nacayuilnguq	Qulik
Anualleq / Akerpallermi	Nacayuitnguq nanuaa	Qupurvik Creek
Aquriilleq	Nanvarluq Lake	Qutiircaraq
Aryaq Mountains	Nanviraneq	Quukat
Cangirngalria	Napatak Creek	Quuyak
Canignelq Mountain	Nelliq	Quyacuar
Caraiyagtuli	Nequllercuryaraq	Quyaq
Caurciciarr	Nukalpiartuli	Sayarculiq
Cavekaituli	Nunvam	Sivangaaq Creek
Ceturuarcurvik	Nunvarluq Creek	Taryaqvagtuliar
Cikignaq Lake	Nunvaurlum Igmiumara	Tegenraq River
Cikutuli	Nunvayaraq	Teksik Lake
Culungung	Nuusiqaq	Tenglugaq Creek
Cungaqtarculleq	Nuuteqallerr	Tertuli
Cungartuli	Nuyakaq	Tuluugaruuyaq
Cunyucuk	Pacuayaalek	Tunertuli - Qulliq
Cururvik	Pallcatnircaraq	Tunertuli
Egmiumanek	Paluqtaq Mountain	Tunertuliruaq
Ekllelalek Creek	Paraalug	Tunglituli
Ellimirat	Penaryalkaar	Tuntuvak Creek
Ellitek Mountain	Penaryukaar	Tunumekulik



Emarayaq  
 Enyaartulit  
 Igyararmuit  
 Iilrayaq  
 Iiryaraq  
 Iiyuugut mountains  
 Ingrisak  
 Ingriyaagaq  
 Ingvirali  
 Iqallugtuli  
 Iqmik  
 Iqmiyagaq  
 Itel'ngunaq  
 Ivgaq Island  
 Kanaaneq  
 Kangiucugpak  
 Kangtuneq

Penguarat  
 Petmik  
 Pomyuq  
 Puyuraq  
 Qakiiyarculek  
 Qakiyartular  
 Qamanek  
 Qamiiquiraguulit ?  
 Qaneruaq  
 Qanganarcurlilc  
 Qanret  
 Qapuugpak and Qapuk lakes ?  
 Qaqerluq  
 Qarvik  
 Qasayaartalek Creek  
 Qasqaneq (Kaskanak?)  
 Qasqerrneq

Tunumikuyak  
 Tunurcurvik  
 Tuqunarliq  
 Tuqunarliq-qulliq  
 Uarugyaraatuli  
 Ungaktalek  
 Urarusuulleq  
 Urasqarmlut  
 Utngulngut  
 Uravik  
 Urayaagaq  
 Vegtuli  
 Yaaqsiguuq  
 Yuutnalluukiit  
 inriiluqaq  
 qulicuar  
 tsikiineq

## Traditional Use Places

### YUPIK NAME

Agagvik  
 Agayuigtalek (place where there was a church)  
 Agayuvigtalek  
 Agivavik (Wrong Location)  
 Akerpak (Slough)  
 Akerpak (White fish, Pike)  
 Aksekaruaq  
 Alailuka'ar  
 Alaqanaqirmiut  
 Aluilulcaar  
 Amaan  
 Anguq  
 Aqesqaq River  
 Aqlitluggpaq creek  
 Arivavik - Where two women quarreled over a fishing hold.  
 Ataanerpak or Atanvagmiut  
 Atayaan enii  
 Atsalugpiarculeq (lake)  
 Atsalugpiarculleq  
 Augilnguq  
 Avegutek  
 Ayagvik  
 Ayimtacuar

Ayimtacuar (White fish & Pike)  
 Ayurilleq  
 Carvanerpak  
 Casguller  
 Casquller  
 Cikucilleq  
 Ciukak ?  
 Cungagtarculleq  
 Curyung  
 Cuukvaq  
 Ecuilinguar  
 Eeyuusiiq River  
 En'arpak  
 Equq  
 Ertung  
 Ertung Creek (Ertung is name for Koklong Creek)  
 Eunginnur ?  
 Igmiumantleq  
 Iggminmeneq  
 Igyaraq  
 Illingqirrtak  
 Illingut Creek  
 Ingluilnguq  
 Ingrirraq

Iquaq  
 Iquq  
 Isaangaq's Slough  
 Itelnugnamek  
 Iternerpak  
 Kaignailnguq  
 Kananerpak  
 Kaniileq  
 Kaviayagaat  
 Kayaanuleq or Kitlertaleq  
 Keggiarpak  
 Kenirrminaqvak  
 Kepsaram Kuiga  
 Kiimakuciq Creek  
 Kitaaleq  
 Kiturrtsiigalenguq  
 Kuuyalegtalek  
 Manaalleq  
 Mayuurvik  
 Meqirrvik ?  
 Meqsugnarli  
 Muklarr  
 Nacayuilnguq  
 Nacetarturyaraq



Boulder Mountain, *Qiurtuli* (Cliff Mountain) – the highest mountain in the range



Nanraq teksiu  
 Nanvaillra  
 Naulugculleq  
 Necuaq  
 Necuaq (ice fishing)  
 Neqcaq  
 Nullulngunaq  
 Paluqtaq Mountain  
 Papluq  
 Pitegcirvik  
 Putilekaa Island  
 Puyurtuutaam Kuiga  
 Qaquaruaq  
 Qataggneq and/or Qataggniret  
 Qayaanusuryaraq  
 Qelutarpak  
 Qengarriagmiut  
 Qertun Kauktun

Qipacuk (Another name for Kokwok)  
 Quiik  
 Quiisiik  
 Qukaqcaruucet  
 Qukaqlicuar  
 Qutiircaraq  
 Quugniinglvormiut  
 Saguyaq  
 Sayiitleq  
 Sengtak  
 Tatliiguk  
 Teginegaq  
 Tengluigaq  
 Teqaat  
 Tivcativaq  
 Tsartsiviaq  
 Tsingiigaq  
 Tsingiigpaq

Tsinigqluaq  
 Tuklung Mountain  
 Tuklung River  
 Tunguuyuq  
 Tunuing River  
 Tunurcurvik  
 Tutsarturvik  
 Uksurnarli  
 Ukviiqeggliq ?  
 Ungaktalgem Kuiga  
 Ungaktulget  
 Unglurpak (Island)  
 Urasqaq  
 Uurusulleq  
 Urayaagaq  
 Yaasiiguat  
 Yuut Nalluukiit Kuiga

## Traditional Use Lines

### YUPIK NAME

Aguluraq  
 Ikamaryaraq  
 Ikumraryarupiatek

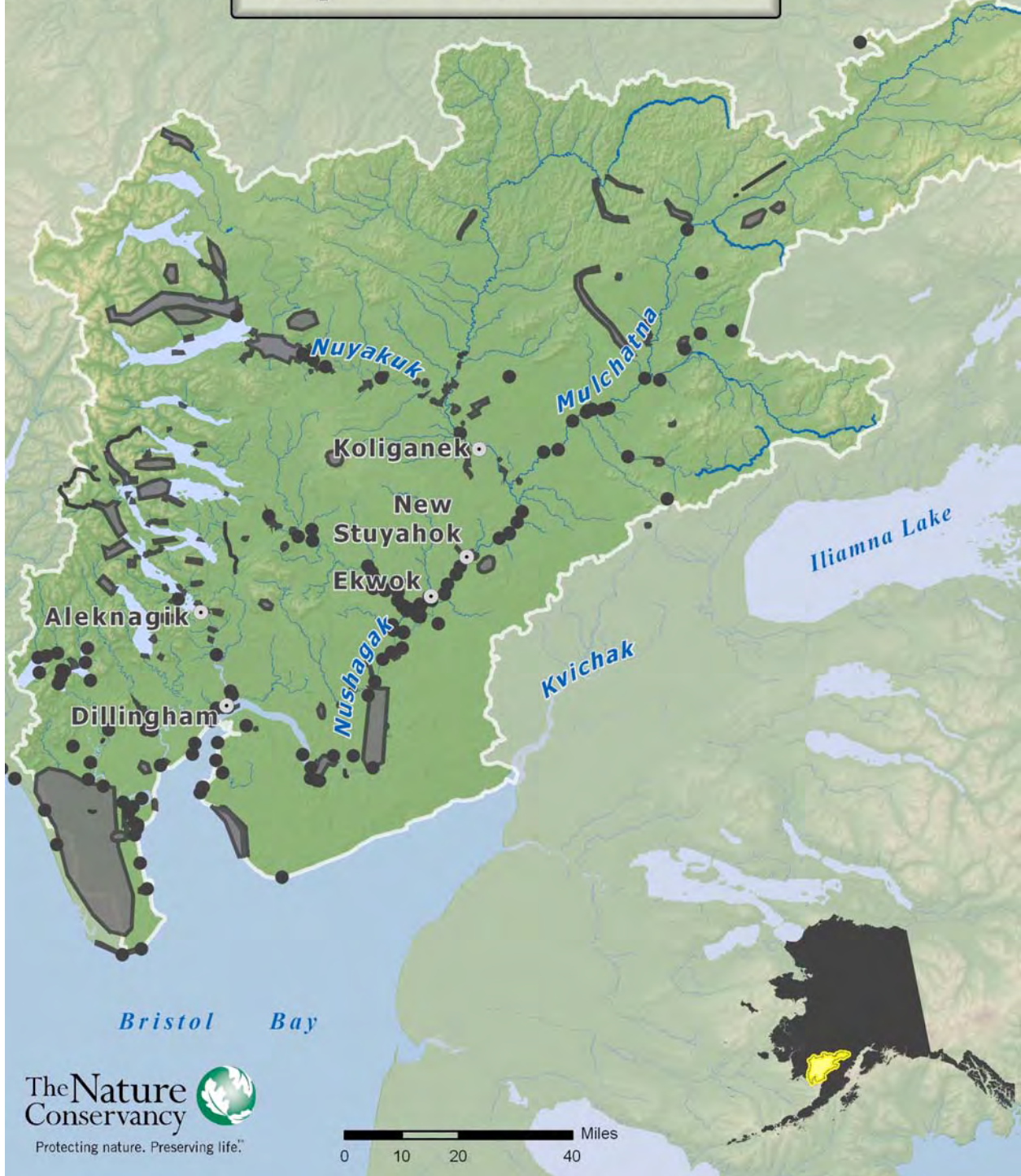
Ituraq Creek  
 Kilaaleq  
 Qirneq  
 Quilliaq

Qulicuar  
 Quukat Mountains  
 Quullik Creek  
 Tivyaruq, Tivyarialiq

Photo taken by Ales Hrdicka in 1931 at the headwaters of the Wood River. The Yup'ik name for the river is *Alaangakim Kuigra* (wrong way river). This photo shows the location of present day Mission Lodge (on the right shore) which is near the site of the old village of *Igyararmiut* (people located at the throat). It is believed the Igyararmiut were virtually wiped out by the 1919 Influenza Epidemic. Just beyond in the center of the photo is Smith Landing and Mosquito Point; the Yup'ik name is *Quyaq* (place where it narrows). Looming in the center of the photo is Mable Mountain named for Mable Smith whose family moved to the lake during the depression. The Yup'ik name for the mountain is *Qanganarcugvik* (place to trap parka squirrels).



# Yup'ik Place Names



# Appendix F: Fish Species of the Nushagak Watershed

## Fish Species Known to be Distributed within the Nushagak River Drainage Study Area

Species	Yup'ik Name	Scientific Name	Life History
Arctic lamprey		<i>Lampetra camtschatica</i>	anadromous
Alaskan brook lamprey		<i>Lampetra alaskense</i>	resident
Pacific lamprey		<i>Lampetra tridentata</i>	anadromous
longnose sucker	<i>cungartak</i>	<i>Catostomus catostomus</i>	resident
northern pike	<i>cuukvak</i>	<i>Esox lucius</i>	resident
Alaska blackfish	<i>can'giiq</i>	<i>Dallia pectoralis</i>	resident
rainbow smelt	<i>cimigliq/iqalluaq</i>	<i>Osmerus mordax</i>	anadromous
pond smelt	<i>cimigliq/iqalluaq</i>	<i>Hypomesus olidus</i>	resident
eulachon		<i>Thaleichthys pacificus</i>	anadromous
Bering cisco	<i>cavirrtaq</i>	<i>Coregonus laurettae</i>	anadromous (resident?)
least cisco	<i>cavirrtaq</i>	<i>Coregonus sardinella</i>	anadromous (resident?)
humpback whitefish	<i>uraruq</i>	<i>Coregonus pidschian</i>	anadromous
pygmy whitefish		<i>Prosopium coulteri</i>	resident
round whitefish	<i>uraruq</i>	<i>Prosopium cylindraceum</i>	resident
coho (silver) salmon	<i>qakiiyaq</i>	<i>Oncorhynchus kisutch</i>	anadromous
Chinook (king) salmon	<i>taryaqvak</i>	<i>Oncorhynchus tshawytscha</i>	anadromous
sockeye (red) salmon	<i>sayak</i>	<i>Oncorhynchus nerka</i>	anadromous
chum (dog) salmon	<i>kangitneq</i>	<i>Oncorhynchus keta</i>	anadromous
pink (humpy) salmon	<i>amaqaayak</i>	<i>Oncorhynchus gorbuscha</i>	anadromous
Arctic grayling	<i>Culugpauk/Nakrullngpak</i>	<i>Thymallus arcticus</i>	resident
rainbow trout	<i>talaariq</i>	<i>Oncorhynchus mykiss</i>	resident
Arctic char	<i>Yugyak</i>	<i>Salvelinus alpinus</i>	resident
Dolly Varden	<i>Yugyaq</i>	<i>Salvelinus malma</i>	anadromous and resident
lake trout	<i>anerrluaq</i>	<i>Salvelinus namaycush</i>	resident
burbot	<i>manignaqa/atgiaq</i>	<i>Lota lota</i>	resident
Pacific cod	<i>Ceturtnaq</i>	<i>Gadus macrocephalus</i>	marine/estuarine
saffron cod	<i>Ceturtnaq</i>	<i>Eleginus gracilis</i>	marine/esuarine
threespine stickleback	<i>quarruuk</i>	<i>Gasterosteus aculeatus</i>	resident (anadromous?)
ninespine stickleback	<i>quarruuk</i>	<i>Pungitius pungitius</i>	resident
coastrange sculpin	<i>kayutak</i>	<i>Cottus aleuticus</i>	resident
slimy sculpin	<i>kayutak</i>	<i>Cottus cognatus</i>	resident
Arctic flounder	<i>naternaq/uraluq</i>	<i>Pleuronectes glacialis</i>	marine/estuarine
starry flounder	<i>naternaq/uraluq</i>	<i>Platichthys stellatus</i>	marine/estuarine





# Appendix G: Salmon Life Stages Occurring Near Private Lands

## Selected Streams Flowing Through Village Corporation Lands or Adjacent to Allotments and the Major Salmon Species They are Known or Suspected to Support

Stream	Known or Suspected Salmon Occurrence
Chichitnok River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.
McGeary Creek	Chinook spawning and rearing, coho spawning and rearing.
King Salmon River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.
Klutuspak Creek	Chinook spawning and rearing, coho spawning and rearing.
Harris Creek	Chinook spawning and rearing, coho spawning and rearing.
Nuyakuk River	Chinook spawning and rearing, sockeye spawning, pink spawning.
Little King Salmon River	Chinook spawning and rearing, coho spawning and rearing.
Tikchik River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning, chum spawning, pink spawning.
Koneruk Creek	Sockeye spawning.
Napotoli Creek	Chinook spawning and rearing, coho spawning and rearing, chum spawning.
Klutuk Creek	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.
Kokwok River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning, pink spawning.
Koklong Creek	Chinook spawning and rearing, coho spawning and rearing, chum spawning.
Lower Klutuk Creek	Chinook spawning and rearing, coho spawning and rearing, chum spawning.
Iowithla River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning, pink spawning.
Little Muklung River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning, pink spawning.
Nunachuak Creek	Chinook spawning and rearing, coho spawning and rearing, chum spawning.
Stuyahok River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.
Old Man Creek	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.
Pike Creek	coho spawning and rearing, chum spawning
Koktuli River	Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.
Ethel Creek	Chum spawning (Chinook and coho spawning and rearing?)
Keefer Creek	Chinook spawning and rearing, coho spawning and rearing, chum spawning.
Mosquito Creek	Chinook spawning and rearing, coho spawning and rearing, chum spawning.





## Appendix H: Traditional Ecological Maps

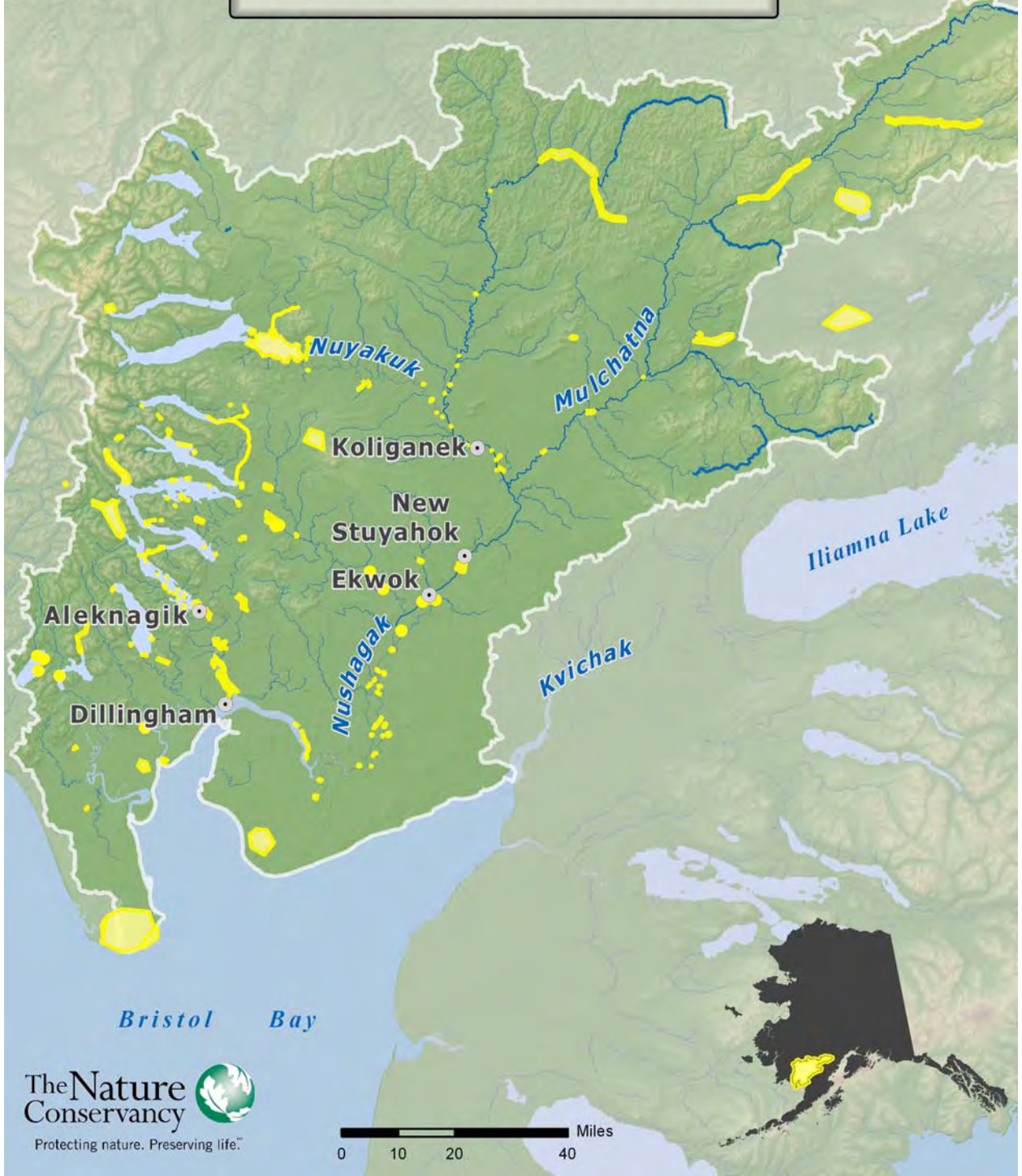


# Caribou and Moose

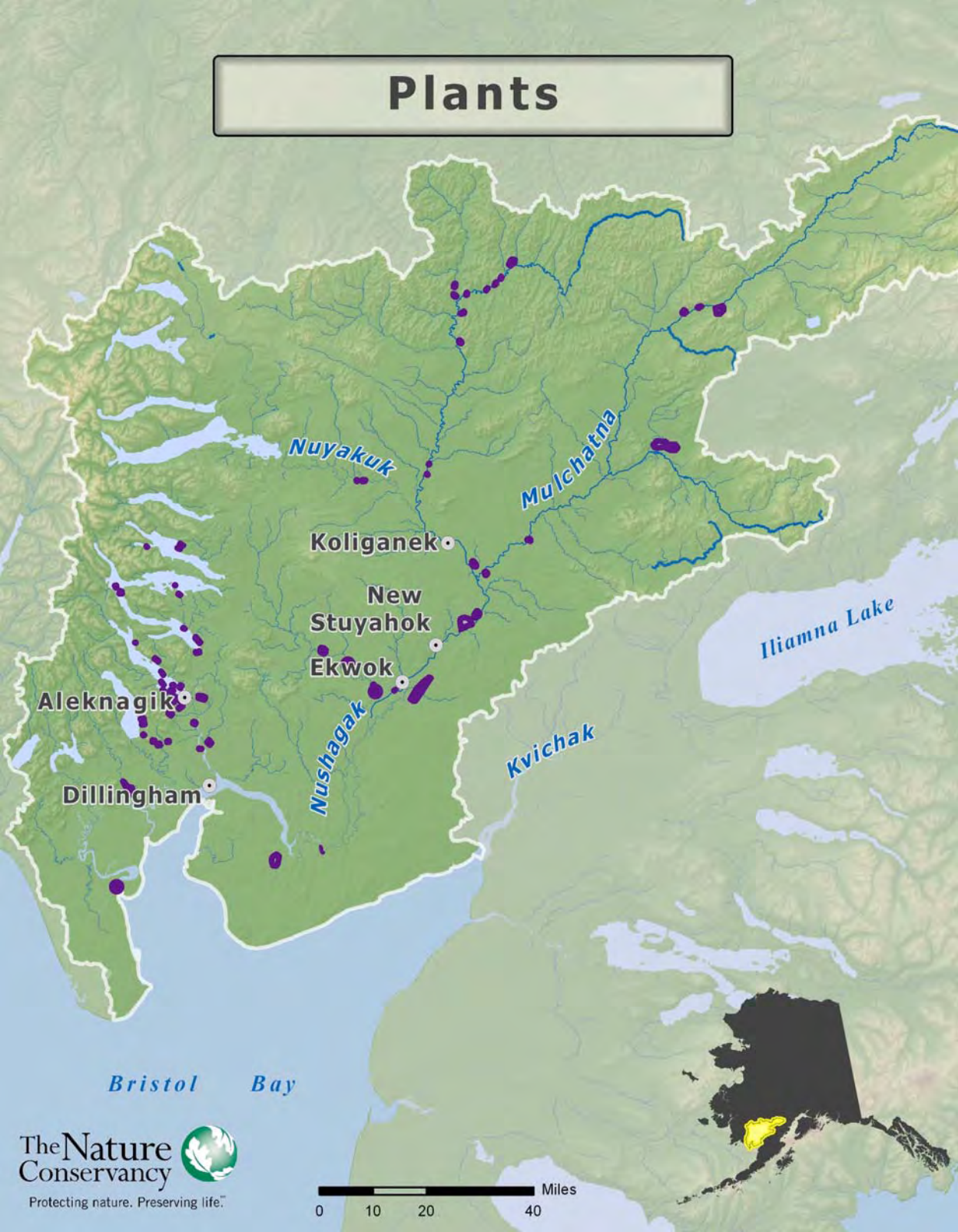




# Freshwater Fish

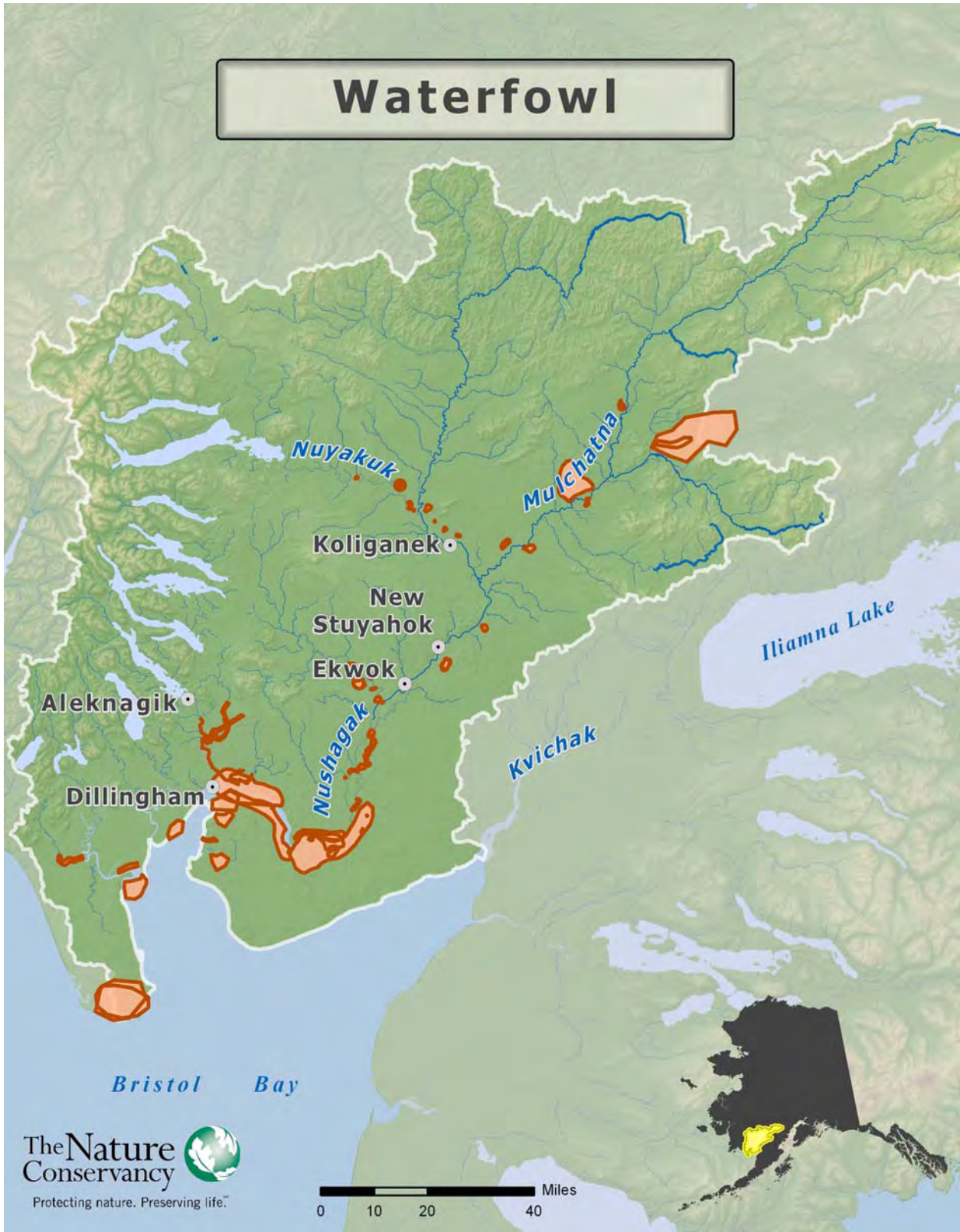






Appendix H: Traditional Ecological Maps

# Waterfowl







## QIGCIKLUKU NUNAMTA ATULLERKAA

In 1983, Elders from the Bristol Bay Region affirmed eleven basic values of the Yup'ik people of this region. The very first value is "Have respect for our land and its resources."



Prospector Butch Smith and wife Ole (Alaq'aq) on the Mulchatna River, circa 1947. **Photo Credit:** Dillingham Senior Center

