Nushagak River Watershed Traditional Use Area Conservation Plan

Appendices

A. Project Work Plan
B. Traditional Knowledge Interviews (Dillingham, Ekwok, Koliganek, New Stuyahok, and Aleknagik)
C. Progress in the First Five Years
D. Standards and Practices for Environmentally Responsible Mining in the Nushagak River Watershed
E. Recommended Best Management Practices for Native Corporation Lands in the Nushagak River Floodplain
F. Salmon Life Stages Occurring Near Private Lands
G. Place Names and Traditional Knowledge Maps
Appendix A: Project Work Plan

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- TNC will conduct a Traditional Ecological Knowledge study to document unpublished information held by residents and other users of the Nushagak River Watershed.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.
APPROACH TO TEK STUDY

The TUACP proposed by TNC contemplates a product that incorporates both scientific information and traditional ecological knowledge (TEK) 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.

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.

### 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.
TNC will also determine whether the Alaska Department of Fish and Game will be doing any subsistence harvest surveys or other field work 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.
Appendix B: Traditional Knowledge Interviews

The Nature Conservancy assembled an interview team to talk with individuals and selected community members about traditional use areas 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:


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 included 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 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
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 Respondents:
Daniel Chythlook, Chris Itumulia, 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.
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 included 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 Tungiung:** 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 included 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, there were 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.
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 Tungiuang:** 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.
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:
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 C: Progress in the First Five Years

Water Resources Conservation Management Plan

Strategic Action 1: Maintain Flow Regime

Tasks for the First Five Years – 2008 through 2012

Acquire Instream Flow Reservations Under Existing Law for Salmon in the Watershed

- Determine priority waterbodies for instream flow reservations
- Establish methods and procedures for gathering instream flow data
- File instream flow applications on the highest priority waterbodies
- Gather and submit supporting data for instream flow applications
- Secure funding to support instream flow application process

<table>
<thead>
<tr>
<th>ACQUIRE INSTREAM WATER FLOW RESERVATIONS UNDER EXISTING LAWS FOR SALMON IN WATERSHED</th>
<th>PLAN YEAR</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine priority waterbodies for instream flow reservations</td>
<td>2009</td>
<td>Complete</td>
</tr>
<tr>
<td>Establish method and procedure for gathering instream flow data</td>
<td>2009</td>
<td>Complete</td>
</tr>
<tr>
<td>File instream flow applications on highest priority waterbodies</td>
<td>2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Gather and submit supporting data for instream flow applications</td>
<td>2009 – 2014</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Secure funding to support instream flow application process</td>
<td>2009 - 2010</td>
<td>Complete</td>
</tr>
</tbody>
</table>

Alaska law permits the filing of applications with the Department of Natural Resources to reserve water in a stream, river or lake to protect fish. The application once filed establishes a priority date for the reservation. However, each waterbody must be gauged and flow data collected for a period of 5 years to perfect the application and secure a legal right to the water for the protection of fish. Development activities, like mining, often require large water withdrawals. A reservation that has been filed will have priority use over any application for water withdrawal. Water reservations are a way to assure that development does not use more water than what fish need to survive.

Mulchatna and Stuyahok and Kaktuli Rivers targeted for Instream Flow Reservation because these are rivers within watershed most likely to be affected by mining in the future.

BBNA gathering information on Kaktuli through contract with Cathy Flanagan. TNC and New Stuyahok Tribal Council gathering information on Mulchatna and Stuyahok through contract with USGS.

Mulchatna and Stuyahok and Kaktuli Rivers targeted for Instream Flow Reservation because these are rivers within watershed most likely to be affected by mining in the future.

BBNA gathering information on Kaktuli through contract with Cathy Flanagan. TNC and New Stuyahok Tribal Council gathering information on Mulchatna and Stuyahok through contract with USGS.

Kaktuli River near completion with funding through BBNA. TNC secured funding through USFWS and NSTC has funding from USFWS Tribal Wildlife Grant and BIA grants to complete this project. Will cost about $600,000 to complete reservations on Stuyahok and Mulchatna. Reservations will not be ready for perfection until late 2014.

The following table summarizes the status of these tasks as of January 1, 2012:

The Watershed Council also supported an effort spearheaded by The Nature Conservancy, Trout Unlimited, EcoTrust and United Fisherman of Alaska in 2009 to draft and prepare legislation to create automatic instream flow reservations for fish. An automatic reservation would replace the costly and lengthy system currently available under Alaska. The effort is ongoing.
The Mulchatna River combines with the Nushagak to form one of Southwest Alaska’s great river systems serving as a primary transportation route for both fish and the people of the region. The Mulchatna flows over 200 miles before combining with the Nushagak River and continuing another 112 miles to Nushagak Bay, an extension of Bristol Bay.

This reservation covers two reaches which collectively stretch 30 miles upstream from the Nushagak confluence to a point about three miles upriver from the the Stuyahok confluence. Much of the river’s 4300 square mile watershed is general state land, with only 14% under permanent conservation management within the Lake Clark National Park. This instream flow reservation is a legal means to protect fish and wildlife habitat, migration, and propagation.

STATUS: In progress
The Southwest Alaska Salmon Habitat Partnership submitted the instream flow reservation application in June 2009 with substantial support from the Alaska Department of Fish & Game. The Nature Conservancy continues to provide financial support to the US Geological Survey (USGS) to maintain the gaging station and collect flow data.

**STATUS**
The Instream Flow Reservation application is partially complete and has been accepted at the Alaska Department of Natural Resources (DNR) while additional years of water flow data are collected. This application's initial status date is June 15th, 2009 and DNR lists the current status as Application Received: LAS 27309. Due to its status date, this application has priority over subsequently filed water use claims on the Mulchatna River.

**FISH**
The Mulchatna River supports significant spawning populations of chum, coho, king, pink and sockeye salmon. The Nushagak/Mulchatna system historically hosts Alaska’s fourth largest king salmon run as well as one of the world’s largest sockeye runs. Additionally, the river’s tributaries contain numerous resident fish species including arctic char, grayling, round whitefish, lamprey, rainbow trout, and sculpin. Collectively these fish populations supply subsistence, commercial, and sport fishing communities.

**DETAILS**
The application uses data from USGS gage 15302300 which has been functioning since June 2009. This station is about 1 river mile upstream from the confluence with the Stuyahok River. This work has been funded by The Nature Conservancy and its conservation partners.

<table>
<thead>
<tr>
<th>Data</th>
<th>Application</th>
<th>Funded</th>
<th>Adjudicated</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing, 2 years of data collected, 3 more years needed (as of June 2011)</td>
<td>Initial application accepted by AK Dept. of Natural Resources</td>
<td>Yes, gage is funded by The Nature Conservancy</td>
<td>No, awaiting ADNR action upon final submittal (“perfection date”)</td>
<td>This reservation has priority over subsequent water rights applications</td>
</tr>
</tbody>
</table>

The Nature Conservancy
715 L Street, Anchorage, AK 99501
(907) 276-3133
nature.org/alaska
email: alaska@tnc.org
The Stuyahok River flows approximately 71 miles before emptying into the Mulchatna River. Stuyahok’s original village existed on the river before eventually moving downriver to New Stuyahok’s present location on the Nushagak. This reservation covers one reach flowing over 6.5 miles of the lower river to its confluence with the Mulchatna. Portions of the Stuyahok watershed have been claimed for mining with staking activity and exploration accelerating rapidly during the past three years. These actions have occurred in the headwaters with the potential to impact aquatic life throughout the system without adequate flows.

This instream flow reservation is a legal means to protect fish and wildlife habitat, migration, and propagation.

**STATUS:** In progress
The Southwest Alaska Salmon Habitat Partnership submitted the instream flow reservation application in June 2009 with substantial support from the Alaska Department of Fish & Game. The Nature Conservancy continues to provide financial support to the US Geological Survey (USGS) to maintain the gaging station and collect flow data.

**STATUS**
The Instream Flow Reservation application is partially complete and has been accepted at the Alaska Department of Natural Resources (DNR) while additional years of water flow data are collected. This application's initial status date is June 15th, 2009 and DNR lists the current status as Application Received: LAS 27310. Due to its status date, this application has priority over subsequently filed water use claims on the Stuyahok River.

**FISH**
The Stuyahok River supports spawning populations of chum, coho, king, pink and sockeye salmon. Additionally, the river’s tributaries contain numerous resident fish species including arctic char, grayling, round whitefish, lamprey, rainbow trout, and sculpin. Collectively these fish populations supply subsistence, commercial, and sport fishing communities.

**DETAILS**
The application uses data from USGS gage 15302320 which has been functioning since June 2009. This station is about 1.5 river miles upstream from the confluence with the Mulchatna River. This work has been funded by The Nature Conservancy and its conservation partners.

<table>
<thead>
<tr>
<th>Data</th>
<th>Application</th>
<th>Funded</th>
<th>Adjudicated</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing, 2 years of data collected, 3</td>
<td>Initial application accepted by AK</td>
<td>Yes, gage is funded by The Nature Consorvancy</td>
<td>No, awaiting ADNR action</td>
<td>This reservation has priority over</td>
</tr>
<tr>
<td>more years needed (as of June 2011)</td>
<td>Dept. of Natural Resources</td>
<td></td>
<td>upon final submittal</td>
<td>subsequent water rights applications.</td>
</tr>
</tbody>
</table>

The Nature Conservancy
715 L Street  Anchorage, AK 99501
(907) 276-3133
nature.org/alaska
call: alaska@tnc.org
Strategic Action 2: Monitor Water Quality

Tasks for the First Five Years – 2008 through 2012

The Plan outlined several tasks for implementing an instream flow strategy for the years 2008 through 2012. These tasks are:

Acquire Instream Flow Reservations Under Existing Law for Salmon in the Watershed

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

The following table summarizes the status of these tasks as of December 30, 2012:

<table>
<thead>
<tr>
<th>Monitor Water Quality Standards that Protect Wild Salmon and Other Fish</th>
<th>PLAN YEAR</th>
<th>STATUS</th>
<th>Progress from November 2008 through December 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify and prioritize sites in the watershed that need to be sampled so that existing or potential sources of contamination can be located</td>
<td>2009</td>
<td>In Progress</td>
<td>Identification of sites and baseline water quality sampling, macro-invertebrate sampling, algae sampling and fish sampling undertaken at strategic sites around Pebble claim and other mining claims</td>
</tr>
<tr>
<td>Collect and analyze baseline water quality data from identified sites and implement monitoring program</td>
<td>2010 - 2013</td>
<td>In Progress</td>
<td>Baseline water quality sampling, macro-invertebrate sampling, algae sampling and fish sampling undertaken at strategic sites around Pebble claim by various partner organizations</td>
</tr>
<tr>
<td>Develop and implement tissue sampling program to monitor heavy metals in salmonids and other key subsistence or commercial species</td>
<td>2010 - 2013</td>
<td>No Progress</td>
<td></td>
</tr>
</tbody>
</table>

During the period 2008 through 2012 water quality monitoring tasks primarily focused on establishing baseline conditions for waters and aquatic resources in the Koktuli drainage because the Koktuli would be the first waterbody affected by the mining of the Pebble Prospect. Sampling was conducted and continues to be conducted by several organizations, including The Nature Conservancy (fish distribution, hydrology, copper toxicity, water quality and chemistry in the Koktuli drainage), the Environmental and Natural Resources Institute at the University of Alaska (Macro-invertebrates and diatoms in the Pebble Prospect and throughout the Nushagak River Watershed) and the Center for Science and Public Participation (water quality and chemistry) and Fisheries Research Consultants (salmon genetics on Koktuli River). The Pebble Partnership has also been conducting its own research program.

A routine water quality monitoring program at sites within the watershed was not implemented.

No progress was made, nor a need established, for implementing a fish tissue sampling program to detect heavy metals. This task is deferred for future consideration.
Strategic Action 3: Document Fish Distribution Throughout the Watershed

The Anadromous Fish Act (AS 16.05.871) is the key State of Alaska statutory protection for freshwater habitats of fish in Alaska. The act requires the Alaska Department of Fish and Game to "specify the various rivers, lakes and streams or parts of them" of the state that are important to the spawning, rearing or migration of anadromous fishes. The Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes (AWC) and its associated Atlas are the media used to fulfill this directive, and are adopted as regulation under 5 AAC 95.011. Once included in the AWC, a person cannot “use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream” without prior notice to and a permit from the Alaska Department of Fish and Game.

Tasks for the First Five Years - 2008 through 2012

Documenting fish distribution was not a task specifically addressed for implementation during the first five years. However, the task became a specific focus of several partner organizations, in particular The Nature Conservancy and the Nushagak-Mulchatna / Wood-Tikchik Land Trust (Land Trust), largely as a means for securing greater protection under the Anadromous Fish Act for streams passing through mineral claims areas. In an effort spanning three years, The Nature Conservancy added over 100 miles of headwater streams to the AWC in the vicinity of the Pebble Prospect. Many of these streams were tributaries of the Koktuli and Stuyahok Rivers. In another project, The Nature Conservancy, with funding provided through the Southwest Alaska Salmon Habitat Partnership and in cooperation with the University of Washington and the U.S. Geological Survey, added 62 miles to the AWC in 2010 in the vicinity of the Tikchik Lakes. The Land Trust nominated 68 miles to the AWC in 2011 in response to exploratory activity in the Millrock Resources claim in the vicinity of Kemuk Mountain. The following maps show sample locations and streams where salmon were documented and nominations made to the AWC.

Left top – rainbow trout, left bottom – coho salmon; right – arctic grayling
Fish Survey Results - August 2011
Nushagak/ Nuyakuk River Tributaries - Kemuk Mountain Area
Findings from Stream Surveys completed in 2008, 2009 and 2010 suggest that in the Nushakak River Watershed at least 70% of headwater streams are likely to be anadromous and 98% of streams have fish.
Land Resources Conservation Management Plan

Strategic Action 4: Maintain Vegetative Complex Within and Adjacent to 100 Year Floodplain

Tasks for the First Five Years – 2008 through 2012 – Private Lands Protection

The first task in the effort to provide conservation protection for private lands, primarily Native corporation lands in the watershed, was to develop a method identify lands that were likely to be important for subsistence use and for the habitat that supports that subsistence use. The method selected, though imperfect and arguably too broad, does provide a mechanism for thinking about and identifying areas for conservation protection now and focusing more specific efforts in the future.

Virtually all of the Native corporation lands in the watershed remain unsurveyed and undeveloped. For this reason land is most often described by using the one mile square, 640 acre topographical section. For the purpose of identifying areas for protection the topographical section is used in this plan as the basic conservation unit for Native corporation lands. Our method scores each topographic section of Native corporation land within the 100 year floodplain of the Nushagak River watershed.

To score each section within the flood plain we combined data from difference sources. The first source was the traditional ecological knowledge (TEK) database developed from the interviews conducted in the region for this plan between 2005 and 2007. If a section contained an area or place identified from the TEK database it was highlighted.

The second source was digital data supplied by the Riverscape Analysis Project (RAP) of the University of Montana, Flathead Lake Biological Station that was applied to the Nushagak River Watershed. http://www.umt.edu/flbs/Research/RAP.aspx. The RAP is a tool for measuring the capacity of a riversystem to produce wild salmon. A common characteristic of a healthy river system that produces salmon is channel complexity. The more a river moves within a floodplane creating back channels, sloughs, ponds, bends and cutbanks the more likely it is to be a good home for wild salmon. The Nushagak is one of the healthiest wild salmon river systems on earth, and it exhibits many of these characteristics. The river channel complexity of each topographical section was analyzed and a score given for each section based upon the river features that fell within that section.

Finally, each section was further highlighted if it contained wetlands.
Scientific Understanding of Salmon Habitat
University of Montana Riverscape Analysis

River Complexity - example

Koliganek

Scoring Criteria
- Main Channel
- Secondary Channel
- Tertiary Channel
- Cutbank into trees
- Wetlands
- Spring head
- Spring brook
- Eddy
- Back water
- Confluence w/ tributary
- Island
Wetlands and Floodplain

Scoring Formula

**River Features**
- Backwater
- Channels
- Confluence
- Eddy
- Island

**Traditional Knowledge**
- Villages
- Fishing
- Hunting
- Historic Sites

**Wetlands**
- percentage

**Floodplain**
- percentage

**Scored Sections**
- Very High
- High
- Medium
- Low
For this reason the following tables summarize the status of these tasks as of January 1, 2012:

<table>
<thead>
<tr>
<th>Private Lands Protection:</th>
<th>Native Corporation lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify areas of high biological value for traditional use</td>
<td>2008</td>
</tr>
<tr>
<td>Prepare maps of high biological value areas</td>
<td>2009</td>
</tr>
<tr>
<td>Review and recommend land management practices for Native corporation</td>
<td>2010 - 2013</td>
</tr>
<tr>
<td>MOUs with Native corporations</td>
<td>2010 - 2012</td>
</tr>
<tr>
<td>Secure conservation protections on Native Corporation lands</td>
<td>2009 - 2013</td>
</tr>
</tbody>
</table>
Nushagak

Mul chat na

Kvichak

Klutuk

Stuyahok

Nuyakuk

Portage Creek

Ekwok

New Stuyahok

Koliganek

Portage Creek

Miles
<table>
<thead>
<tr>
<th>Private Lands Protection:</th>
<th>Small Parcels and Native Allotments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquire conservation protections for priority parcels</td>
<td>2009 - 2013 ongoing * Acquired two 40 acre parcels surrounded by KNL lands. Parcel at Harris Creek was high priority. $120,000 purchase price. $40,000 contributed by KNL; $5,000 from Tikchik Narrows Lodge; $10,000 from The Conservation Fund; $8,000 from Land Trust; $55,000 from National fish and Wildlife Foundation. *Land Trust had earnest money contract for Freddy Hurley's Native allotment at the mouth of Old Man Creek, but could not raise the required money.</td>
</tr>
</tbody>
</table>

Figure 13. Native allotment Total Scores.

Figure 6. Native allotment Fish Species Diversity scores.

Figure 7. Native allotment Biological Diversity scores.

Figure 8. Native allotment Fish Harvest Diversity scores.

Figure 9. Native allotment Public Use scores.

Figure 12. Native allotment Development Potential classes.
Salmon Life Stages 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

<table>
<thead>
<tr>
<th>Stream</th>
<th>Known or Suspected Salmon Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chichitnok River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>McGeary Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing.</td>
</tr>
<tr>
<td>King Salmon River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Klutuspak Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing.</td>
</tr>
<tr>
<td>Harris Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing.</td>
</tr>
<tr>
<td>Nuyakuk River</td>
<td>Chinook spawning and rearing, sockeye spawning, pink spawning.</td>
</tr>
<tr>
<td>Little King Salmon River</td>
<td>Chinook spawning and rearing, coho spawning and rearing.</td>
</tr>
<tr>
<td>Tikchik River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning, pink spawning.</td>
</tr>
<tr>
<td>Koneruk Creek</td>
<td>Sockeye spawning.</td>
</tr>
<tr>
<td>Napotoli Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Klutuk Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Kokwok River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning, pink spawning.</td>
</tr>
<tr>
<td>Koklong Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Lower Klutuk Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Iowithla River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning, pink spawning.</td>
</tr>
<tr>
<td>Little Muklung River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning, pink spawning.</td>
</tr>
<tr>
<td>Nunachuak Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Stuyahok River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Old Man Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Pike Creek</td>
<td>coho spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Koktuli River</td>
<td>Chinook spawning and rearing, coho spawning and rearing, sockeye spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Ethel Creek</td>
<td>Chum spawning (Chinook and coho spawning and rearing?)</td>
</tr>
<tr>
<td>Keefer Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, chum spawning.</td>
</tr>
<tr>
<td>Mosquito Creek</td>
<td>Chinook spawning and rearing, coho spawning and rearing, chum spawning.</td>
</tr>
</tbody>
</table>
Land Trust boardmember Luki Akelkok on site of Native allotment purchased on the Mulchatna River

**Public Lands Protection**

**Tasks for the First Five Years – 2008 through 2012**

<table>
<thead>
<tr>
<th>Public Lands Protection</th>
<th>Year</th>
<th>Status</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquire conservation protections on small parcel inholdings on public lands</td>
<td>2009 - 2013</td>
<td>ongoing</td>
<td>The Conservation Fund continues to work with State Parks to pursue priority allotments within the Wood-Tikchik State Park and the Tojidak NWR</td>
</tr>
<tr>
<td>Achieve statutory protection for state managed lands</td>
<td>2013</td>
<td>No Progress</td>
<td>Not a realistic goal in the short-term. Bills were introduced in Alaska legislature to create a Bristol Bay refuge that would have included the Nushagak River Watershed. Bill's have faltered.</td>
</tr>
<tr>
<td>Achieve statutory presumption for anadromous waters</td>
<td>2013</td>
<td>No Progress</td>
<td>Not a realistic goal in the short-term. However, the anadromous fish modelling work that Ekwok Tribal Council, TNC and the SW Alaska Salmon Habitat Partnership have funded may help support the argument in favor of presumptions in the future.</td>
</tr>
<tr>
<td>Achieve statutory protection for BLM managed lands</td>
<td>2013</td>
<td>No Progress</td>
<td>TNC and other have requested BLM to not lift the D1 restrictions on lands within the watershed.</td>
</tr>
</tbody>
</table>
Strategic Action #5: Prevent Habitat Damage that Could be Caused by Mining

Tasks for the First Five Years – 2008 through 2012

The following table summarizes the status of these tasks as of December 30, 2012:

<table>
<thead>
<tr>
<th>Prevent Habitat Damage Resulting from Mining</th>
<th>PLAN YEARS</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine risk factors associated with the Pebble prospect and the most likely pathways for risks to manifest themselves</td>
<td>2009 - 2013</td>
<td>Completed</td>
</tr>
<tr>
<td>TNC published An Assessment of Ecological Risk to Wild Salmon Systems from Large-scale Mining in the Nushagak and Kvichak Watersheds of the Bristol Bay Basin, Ecology &amp; Environment, (October, 2010).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop or adopt environmental standards that will address the risks and pathways that can be used to evaluate the adequacy of proposed mining plans</td>
<td>2009 - 2010</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Draft Standards prepared for discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advocate for rigorous mine permitting standards</td>
<td>2009 - 2013</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Secure science supported comment, input and evaluation of material submitted in support of mining permit requests</td>
<td>2009 - 2013</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Science team available, but funding needed to cover costs of keeping them engaged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advocate for solid financial assurances from mining companies</td>
<td>2009 - 2013</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
Appendix D

STANDARDS AND PRACTICES FOR ENVIRONMENTALLY RESPONSIBLE MINING IN THE NUSHAGAK RIVER WATERSHED

A POLICY STATEMENT OF THE NUSHAGAK – MULCHATNA WATERSHED COUNCIL
2011
INTRODUCTION

The Nushagak-Mulchatna Watershed Council (Council) was formed in 1998. The Council is an association of tribes, local governments and landowners who have joined together to protect the quality of the waters of the Nushagak River Watershed. In 2005 the Council undertook a process to develop a land and water conservation plan focusing primarily on the protection of habitat for salmon and other resources important for the subsistence needs of watershed residents. The process was completed and the Council approved and published the Nushagak River Watershed Traditional Use Area Conservation Plan in November of 2007 (Conservation Plan). The Conservation Plan incorporates a baseline of traditional ecological information gathered from the communities and indigenous residents of the watershed.

The Conservation Plan identified potential threats to habitat within the watershed and outlined a series of strategic actions to address those threats. One of the potential threats identified was mining, in particular, the potential development of large scale open pit gold and copper mines in the watershed. To address the potential impacts that mining could have on the habitat in the watershed the Council determined that a key strategic action would be to undertake an assessment of the risks to salmon posed by the development of large scale gold and copper mining in the headwater streams of the watershed. Such a risk assessment was undertaken by The Nature Conservancy in 2008 and completed in 2010. The report entitled An Assessment of Ecological Risk to Wild Salmon Systems from Large-scale Mining in the Nushagak and Kvichak Watersheds of the Bristol Bay Basin, Ecology & Environment was published in October of 2010.

Upon completion of the risk assessment the next strategic action identified in the Conservation Plan is to address the risks identified in the assessment through the development of a framework for responsible mining in the watershed.

The Nushagak-Mulchatna Watershed Council adopts the following standards and practices as a framework for environmentally responsible mining to guide owners of property considering mineral development, and the mining industry in the exploration and development of mineral resources. These standards are also designed to assist state, federal and local government agencies in the permitting and oversight of such activities within the Nushagak River watershed. These standards and practices are adapted from the Ten Principles of Sustainable Development Framework adopted by the International Council on Mining and Minerals, http://www.icmm.com/our-work/sustainable-development-framework/10-principles; and A Framework for Responsible Mining: A Guide to Evolving Standards, Marta Miranda, David Chambers, and Catherine Coumans (October 19, 2005).

http://www.csp2.org/reports/Framework%20for%20Responsible%20Mining.pdf In addition some of the standards and practices are derived from the results and observations of research projects undertaken to fulfill the strategic actions outlined in The Conservation Plan, see e.g. Woody and O’Neal, Fish Surveys in Headwater Streams of the Nushagak and Kvichak River Drainages, Bristol Bay, Alaska 2008 – 2010, The Nature Conservancy (2011), and to address the risks identified in An Assessment of Ecological Risk to Wild Salmon Systems from Large-scale Mining in the Nushagak and Kvichak Watersheds of the Bristol Bay Basin, Ecology & Environment, (October, 2010).

These standards and practices have also been developed with an awareness of the scientific literature regarding the resilience and vulnerability of wild salmon and the growing understanding of the role freshwater habitat plays in the development of sustainable wild salmon populations, particularly in Southwest Alaska, see e.g. Schindler, et. al. Population Diversity and the Portfolio Effect in an Exploited Species, Nature, pp 609 – 612 (June 3, 2010).

Accordingly, the people of the Nushagak River Watershed and the organizations that represent and serve them may refuse to give their consent, which includes the denial of permission to use their lands and resources, to any mineral development organization, mining company or enterprise that fails to conduct their activities in accordance with the standards and practices set forth in this document.
I. Standards and Practices for Free, Prior and Informed Consent


Free, Prior and Informed Consent is defined as follows:

- **Free** – people are able to freely make decisions without coercion, intimidation or manipulation;
- **Prior** – sufficient time is allocated for people to be involved in the decision-making process before key project decisions are made and impacts occur;
- **Informed** – people are fully informed about the project and its potential impacts and benefits, and the various perspectives regarding the project (both positive and negative);
- **Consent** – there are effective processes for affected indigenous peoples to approve or withhold their consent, consistent with their decision-making processes, and that their decisions are respected and upheld.
Commitment #3 of the Position Statement of the International Council on Mining and Metals provides:

Engagement will be based on honest and open provision of information, and in a form that is accessible to Indigenous Peoples. Engagement will begin at the earliest possible stage of potential mining activities, prior to substantive on-the-ground exploration. Engagement, wherever possible, will be undertaken through traditional authorities within communities and with respect for traditional decision-making structures and processes.

Commitment #9 of the Position Statement of the International Council on Mining and Metals provides:

ICMM members recognize that, following consultation with local people and relevant authorities, a decision may sometimes be made not to proceed with development or exploration even if this is legally permitted.

COMMENT: Most of the indigenous residents of the Nushagak River Watershed are represented by Federally recognized tribal governments. The indigenous residents of the watershed also have interests that are represented by village and regional corporations established under the Alaska Native Claims Settlement Act of 1971. The indigenous and non-indigenous residents of the watershed may also have interests represented by local governments organized under the laws of the State of Alaska. All of these organizations should be informed of mineral exploration and development activities within the watershed and engaged in the process of consent. References in this document to residents or communities of the watershed include these organizations.

Residents of the watershed should be afforded sufficient time to understand the information provided by a mining company. Sufficient time should be a measure of the time it took a mining company to generate the information for exploration or a proposed mine in relation to the time it can reasonably be expected for residents to seek and engage their own experts to independently evaluate, verify and express opinions on the adequacy and accuracy of information provided by a mining company, especially as that information relates to environmental baseline studies and the potential impact of exploration or proposed mining activity on the water quality and quantity, and the habitat of the watershed.

Information should be provided in a format that takes advantage of modern technology. Paper reports or the equivalent need to be provided but alone are insufficient. Information should be released in a digital format (tabular databases, GIS files, metadata, etc.) that can be easily searched, analyzed and independently evaluated particularly as that information relates to potentially impacted public and private resources such as land, air, water, fish, and wildlife.

II. Standards and Practices for Exploration Activities

A. No permit for exploration, including Temporary Water Use Permits issued by the Alaska Department of Natural Resources (ADNR), should be issued without actual notice to the communities and residents of the watershed, a ninety day comment period and at least one public hearing in Dillingham and one public hearing in the community closest to the proposed exploratory activity.

COMMENT: The details of any mineral exploration project and the potential impacts of that activity should be made publically available before exploration begins.

B. Exploration activities should only be permitted, including the issuance of Temporary Water Use Permits by ADNR, upon a finding by the Commissioner of the Alaska Department of Fish and Game (ADF&G) that no significant harm will result to anadromous streams within the area proposed for exploration.
COMMENT: For the purpose of such a finding the Commissioner of ADG&G should assume that any stream reach within the area of exploration with a 10% gradient or less in one of the red shaded sixth level hydrologic units on the following map should be presumed to be an anadromous stream that produces salmon. Dolly Varden in the watershed may also be anadromous and may rear in streams up to 14% gradient.

Salmon producing 6th level basins within the Nushagak River watershed

C. During the exploration phase mining companies should conduct fish distribution surveys of all waterbodies that could be affected by eventual mine development and associated activities. Until such time as more accurate tools are available for predicting the location of anadromous steams, mining companies should survey all stream reaches within the footprint of the potential mine and all stream reaches within one mile of any planned development. Fish distribution surveys should comply with protocols developed by ADF&G and reports of surveys should be provided to ADF&G and nominations made to the Anadromous Waters Catalog at the end of each survey season for any waterbody in which anadromous fish were documented.

D. During the exploration phase mining companies should not file water withdrawal applications with the Alaska Department of Natural Resources for water to be used in the development, operation and closure of a mine. Such applications should only be filed upon completion of the mine plan that will be submitted for permitting.
Priority for water use within all waters of the Nushagak River Watershed should be accorded to the fish that inhabit these waters. Mining companies should provide the Nushagak-Mulchanta Watershed Council with sufficient funds to file and perfect instream flow reservations under Alaska law to protect minimum flows required for fish for any waterbodies that may be affected by water withdrawals for mine development, operation and closure.

E. Mining companies should provide adequate financial assurances to pay for prompt cleanup, reclamation and long term monitoring and maintenance that could result from exploration activities.

COMMENT: Self-bonding or corporate guarantees should not be permitted. Escrowed Funds or surety bonds provided by independent highly rated surety agencies are acceptable forms of guarantees.

III. Standards and Practices for Mine Development and Operation

A. No mine should be permitted within the Nushagak River Watershed that will require active management in perpetuity to avoid environmental contamination. Before any mine is permitted in the Nushagak River Watershed an independent qualified professional shall certify that active management will not be required in perpetuity.

COMMENT: Mines in this watershed should not pose an eternal threat of environmental contamination. Such a threat is deemed to exist if active measures like water treatment, groundwater pumping or other means of mechanical, chemical or human intervention will be necessary in perpetuity to prevent toxic effluents from escaping beyond the boundary of the mine. Such measures are considered active management and are distinguished from more passive activities like monitoring, occasional inspection, and the incidental maintenance that would still be necessary for a closed and sealed mine.

B. No mine should be permitted within the Nushagak River Watershed that destroys or impairs habitat that supports a life phase of a particular anadromous or resident fish species if the sustained abundance or genetic diversity of that species may be significantly compromised.

C. The Commissioner of ADF&G should not consider issuing a permit for the destruction, relocation or removal of an anadromous water body within the Nushagak River watershed without sufficient notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the waterbody proposed for destruction or removal. The Commissioner of ADF&G should not issue a permit for the destruction, relocation or removal of an anadromous water body without clear and convincing evidence that the destruction or removal will not result in a significant loss to the sustained abundance or genetic diversity of any salmon species.

D. No mine should be permitted within the Nushagak River watershed that will require water withdrawals that may exceed ecological flow needs for salmon and other fish.

E. The Commissioner of the Alaska Department of Natural Resources (ADNR) should not consider issuing a permit for the withdrawal of water to support the development and operation of a mine from any waterbody in the Nushagak River Watershed until an instream flow reservation as provided in Alaska Law to protect fish has been filed and perfected by ADF&G, the Nushagak-Mulchatna Watershed Council or a partner organization. The Commissioner of Natural Resources should not reduce an instream flow reservation to protect fish without clear and convincing evidence that the reduction of instream flow will not destroy or impair habitat that supports a life phase of a particular salmon species if the sustained abundance or genetic diversity of that species may be compromised.
F. The Commissioner of ADNR shall not reduce an instream flow reservation for fish without sufficient notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the waterbody affected.

G. No mine should be permitted within the Nushagak River watershed that will require mixing zones.

H. No mine should be permitted within the Nushagak River watershed without a plan to control and monitor dust emissions during construction and operation that has been tested and demonstrated to be effective for the conditions to be encountered on location.

I. No mine should be permitted within the Nushagak River Watershed that could result in acid mine drainage during operation or after closure unless the risk of such drainage can be eliminated by methods proven to be effective at mines of comparable size, scale and location.

J. No mine should be permitted in areas of the Nushagak River watershed that are or were subject to mineral closing orders.

COMMENT: Acid mine drainage is a risk associated with sulfide mines that has contributed to the impairment of wild fish populations in other parts of the world. Mining companies should conduct adequate pre-mining sampling and analysis for acid-producing minerals, based on accepted practices and appropriately documented, site-specific professional judgment. Sampling and analysis should be conducted in accordance with the best available practices and techniques.
The Nushagak River watershed is not a place to experiment with untested methods for controlling acid mine drainage. The Nushagak River watershed is characterized by extensive wetlands, moderate precipitation, numerous small streams, interconnections between ground and surface water, a high water table, and over geological formations that are susceptible to ground water movement. A method shown to be effective for controlling acid mine drainage in a drier climate is not sufficient. Any method proposed for controlling acid mine drainage should be proven effective in a watershed with similar characteristics to the Nushagak River Watershed.

K. No mine should be permitted within the Nushagak River Watershed that requires shallow-water submarine waste disposal.

**COMMENT:** The rivers and tributary streams, shallow lakes and ponds of the watershed should not be used for the disposal of mine waste.

L. No mine should be permitted within the Nushagak River Watershed that requires deep-water submarine waste disposal unless such waste disposal will be environmentally benign. No regulatory authority should consider issuing a permit for deep-water waste disposal within the Nushagak River Watershed without actual notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the waterbody proposed for deep water waste disposal. A permit for deep-water submarine waste disposal should not be issued unless there is clear and convincing evidence that the disposal will not compromise the sustained abundance or genetic diversity of any anadromous or resident fish species within the waterbody proposed for deep water waste disposal.

M. No mine should be permitted within the Nushagak River Watershed that requires the use of cyanide unless the mine operator is a signatory to the *International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold*, [http://www.cyanidecode.org/](http://www.cyanidecode.org/).

N. Tailings impoundments and waste rock dumps should be constructed in a manner that as a first priority eliminates the release of contaminants by installing liners if seepage could result in groundwater contamination. In addition, waste facilities should have adequate monitoring and seepage collection systems to detect and collect any contaminants released in the immediate vicinity.

O. Mine dewatering should be designed in a manner that as a first priority eliminates impacts on ground and surface waters, including seeps and springs.

P. Mining companies should prepare detailed plans for preventing and responding to low risk but high impact events. The plan should regularly be revised and updated to incorporate improvements in prevention and response practices and technology, and to account for changes in operation that occur over the life of the mine. Response technology should be proven effective in similar locales and during all seasons. At a minimum such plans must be revised every five years or concurrently with regulatory approval of changes to the design or operation of the mine. Revised plans should not be approved without sufficient notice to the communities and residents of the watershed, a 60 day comment period, and at least one public hearing in Dillingham and one public hearing in the community most likely to be the first to suffer impacts from an incident (e.g. community immediately downstream of a tailings dam).

**COMMENT:** Some incidents associated with mines, like slurry pipeline breaks or tailings dam failures, may be very unlikely, but if they occur the impacts are potentially large. Mining companies should be required to develop detailed prevention and response contingency plans for such low probability but high impact events as well as provide funds in escrow or independent financial assurances for the payment of costs associated with response to the incident and rehabilitation of the environment damaged.
Q. If permit violations occur, mining companies must commit to rapidly implementing corrections.

R. The environmental performance of any mine in the watershed and the effectiveness of the regulatory agencies responsible for regulating mines should be addressed in an independent environmental audit. These audits should be conducted every three years or immediately after any permit violation or pollution event, and the results should be made immediately available to residents and communities of the watershed. Recommendations made in the audit must be implemented within a reasonable time.

S. The residents, communities and representative bodies of the Nushagak River Watershed should have the right to independent monitoring and oversight of the environmental performance of a mine. Mining companies should cover the reasonable costs of such oversight in an annual minimum amount paid to the Nushagak-Mulchatna Watershed Council to be determined prior to mine operation.

IV. Standards and Practices for Reclamation and Closure

A. Mining companies should develop a reclamation and closure plan before operations begin that includes detailed cost estimates, plus ten percent, with consideration for inflation. Reclamation and closure plans should address post-closure monitoring and maintenance of all mine facilities, including surface and underground mine workings, tailings, and waste disposal facilities.

The plan should be periodically revised and updated to incorporate improvements in reclamation practices and technology, to account for changes in operation that occur over the life of the mine, and to take into account potential increases in reclamation and closure costs (but not potential decreases). The residents and communities of the Nushagak River Watershed should have the right to comment on the adequacy of the reclamation and closure plan. A decision to approve a reclamation and closure plan should not be made prior to actual notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the mine.

B. Mining companies should restore to the greatest extent physically possible all disturbed areas to pre-mine conditions, including, but not limited to topographic and hydrologic features.

C. Mining companies should re-contour and stabilize disturbed areas. This should include the salvage, storage, and replacement of topsoil or other acceptable growth medium. Material from the mine site should be tested for contaminants before being used for reclamation. Quantitative standards should
D. be established for re-vegetation in the reclamation plan—and clear mitigation measures should be defined and implemented if these standards are not met. Native vegetation should be used in reclamation.

E. Where subsidence is possible, mining companies should backfill underground mine workings to prevent such subsidence.

F. Underground mine workings and pits should be backfilled to minimize the size of waste and tailings disposal facilities.

G. Underground mine workings should be tested and regularly monitored for contamination.

Comment: Financial expense or economic burden should not be a consideration as to whether restoration is possible. Rather the question to be resolved with respect to restoration is whether it is possible to engineer restoration to pre-mine conditions without causing more environmental damage.

V. Standards and Practices for Financial Guarantees

A. Financial sureties should be reviewed and upgraded every two years by the ADNR and the results of the review should be publicly disclosed.

B. The residents and communities of the Nushagak River Watershed should have the right to comment on the adequacy of the financial surety, and completion of reclamation activities prior to release of the financial surety.

C. Financial surety instruments should be independently guaranteed, reliable, and readily liquid. Sureties should be regularly evaluated by independent analysts using accepted accounting methods. Self-bonding or corporate guarantees should not be permitted for financial surety.

D. Financial sureties should not be released until reclamation and closure are complete, all impacts have been mitigated, and cleanup has been shown to be effective for a sufficient period of time, but no less than ten years, after mine closure. Sureties should not be released without sufficient notice to the communities and residents of the watershed, a 90 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the mine.

VI. Standards and Practices for Post-Closure and Post-Closure Monitoring.

A. Mining companies should endow an independent fund from which the cost of monitoring and maintenance of the closed mine can be paid. The adequacy of the fund should be reviewed by an independent auditor periodically and no less than every three years during mine operation to determine whether the fund is keeping pace with inflation and changes in reclamation and closure that may result from changes in mine operation. To the extent the fund is determined by the auditor to be insufficient to meet the future costs of monitoring and maintenance the mine operator shall pay into the fund the amount recommended by the auditor.
VII. The Principle of Precaution Shall Be Applied to Mineral Exploration and Development Activities in the Nushagak River Watershed

A. Within the Nushagak River Watershed there should be no presumption in favor of mineral exploration or development. Where there is scientific uncertainty concerning the impacts of a proposed mineral exploration or development activity on the water quality, aquatic and subsistence resources of the watershed it should not be assumed that such activities can proceed until and unless there is clear evidence the activities are harmful. Rather, such activities should not proceed unless there is clear and convincing evidence the activities are environmentally safe. The burden shall be on the proponent of mineral exploration or development to demonstrate the activities will not result in significant impact to the water quality or the sustained abundance or genetic diversity of any anadromous or resident fish species that may be affected by the activity.

COMMENT: The livelihood and culture of the people of the Nushagak River Watershed are intimately tied to the water and aquatic resources of the watershed, in particular the wild salmon and resident fish species like whitefish, trout and Dolly Varden. The preservation of wild fish species and the clean water upon which they depend is the mission of the Nushagak-Mulchatna Watershed Council.

In the face of potential mineral development activity, the people of the watershed should not be placed in the impossible position of proving a proposed mineral development activity will harm fish or pollute the water. Rather, the burden shall be with the proponents to prove to the satisfaction of the people of the watershed, as they are represented by the organizations mentioned in the comment to Standard I, that the proposed activities are safe and will not pollute the water or cause significant harm to the fish species and other subsistence resources of the watershed. Failure to do so may result in the people of the watershed withholding their consent to mineral development and refusing permission to use their lands and other resources.

PASSED AND APPROVED by the Nushagak-Mulchatna Watershed Council on October 25, 2011.

__________________
Luki Akelkok, Chairman
Appendix E:

TEN RECOMMENDED BEST MANAGEMENT PRACTICES FOR NATIVE CORPORATION LANDS IN THE NUSHAGAK RIVER FLOODPLAIN

1. A 100 ft riparian setback for habitat protection for all salmon bearing waters on corporate lands. The following activities, with the exception of activities specifically provided for herein, should be prohibited within the riparian setback: major land or vegetation clearing, excavation, filling, building construction, or any other activity that may cause significant erosion or damage to riparian habitat or results in pollution of surface or groundwater;

2. Commercially operated camps for sport hunting and fishing on corporate lands may be allowed but should not be placed within 100 feet of a known salmon spawning area or within 100 feet of the mouth of a tributary stream. Whenever practicable commercial camps should be placed beyond the 100 foot riparian setback;

3. Subsistence cabins, drying racks, smokehouses and the like may be allowed on corporate lands but should not be placed within 100 feet of a known salmon spawning area or within 100 feet of the mouth of a tributary stream;

4. Extraction of gravel from a salmon bearing stream either for community development or export shall, to the greatest extent possible, be conducted in such places and at such times as to have the least possible impact on salmon and salmon habitat;

5. Hard rock or mineral mining should be prohibited on corporate lands within one mile of any salmon bearing waterbody. Fish distribution surveys and salmon life stages should be fully documented before hard rock or mineral mining occurs on corporate lands;

6. Instream flow reservations protecting water levels necessary to protect salmon should be filed under Alaska law before any hard rock or mineral mining occurs on corporate lands where such activities may adversely affect salmon bearing waterbodies;

7. The commercial harvest of trees should not be allowed within 300 feet of the bank of a salmon bearing waterbody. This restriction would not apply to the local harvest of wood for personal use;

8. Fuel storage or storage of hazardous substances within the 100 foot riparian setback should have proper containment and otherwise comply with all federal and state regulations;

9. Corporate lands should not be used for the construction of dams or other artificial measures that may result in obstruction of salmon passage;

10. A shareholder or descendent of a shareholder of any ANCSA village corporation within the Bristol Bay Native Corporation region may, without charge, have permission to hunt, fish, collect edible and medicinal plants, or otherwise respectfully use the lands of any village corporation lands within the watershed provided the same privileges are reciprocated.
## Appendix F: Fish Species of the Nushagak River Watershed

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Yup’ik Name</th>
<th>Scientific Name</th>
<th>Life History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctic lamprey</td>
<td>Lampetra camtschatica</td>
<td>anadromous</td>
<td></td>
</tr>
<tr>
<td>Alaskan brook lamprey</td>
<td>Lampetra alaskense</td>
<td>resident</td>
<td></td>
</tr>
<tr>
<td>Pacific lamprey</td>
<td>cungartak</td>
<td>Lampeatra tridentata</td>
<td>anadromous</td>
</tr>
<tr>
<td>longnose sucker</td>
<td>cuukvak</td>
<td>Catostomus catostomus</td>
<td>resident</td>
</tr>
<tr>
<td>northern pike</td>
<td>cuukvak</td>
<td>Esox lucius</td>
<td>resident</td>
</tr>
<tr>
<td>Alaska blackfish</td>
<td>can’giq</td>
<td>Dallia pectoralis</td>
<td>resident</td>
</tr>
<tr>
<td>rainbow smelt</td>
<td>cimigliq/iqalluaq</td>
<td>Osmerus mordax</td>
<td>anadromous</td>
</tr>
<tr>
<td>pond smelt</td>
<td>cimigliq/iqalluaq</td>
<td>Hypomesus olidus</td>
<td>resident</td>
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<tr>
<td>eulachon</td>
<td>Thaleichthys pacificus</td>
<td>anadromous</td>
<td></td>
</tr>
<tr>
<td>Bering cisco</td>
<td>cavirrtnaq</td>
<td>Coregus laurettae</td>
<td>anadromous (resident?)</td>
</tr>
<tr>
<td>least cisco</td>
<td>cavirrtnaq</td>
<td>Coregus sardinella</td>
<td>anadromous (resident?)</td>
</tr>
<tr>
<td>humpback whitefish</td>
<td>uraruq</td>
<td>Coregus pidschian</td>
<td>anadromous</td>
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<tr>
<td>pygmy whitefish</td>
<td>uraruq</td>
<td>Prosopium couleri</td>
<td>resident</td>
</tr>
<tr>
<td>round whitefish</td>
<td>uraruq</td>
<td>Prosopium cylindraceum</td>
<td>resident</td>
</tr>
<tr>
<td>coho (silver) salmon</td>
<td>qakiiyaq</td>
<td>Oncorhynchus kisutch</td>
<td>anadromous</td>
</tr>
<tr>
<td>Chinook (king) salmon</td>
<td>taryaqvak</td>
<td>Oncorhynchus tshawytscha</td>
<td>anadromous</td>
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<tr>
<td>sockeye (red) salmon</td>
<td>sayak</td>
<td>Oncorhynchus nerka</td>
<td>anadromous</td>
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<tr>
<td>chum (dog) salmon</td>
<td>amaqayak</td>
<td>Oncorhynchus gorbuscha</td>
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<tr>
<td>Arctic grayling</td>
<td>Culugpak/Nakrullingpak</td>
<td>Thymallus arcticus</td>
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<td>rainbow trout</td>
<td>talaariq</td>
<td>Oncorhynchus mykiss</td>
<td>resident</td>
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<tr>
<td>Arctic char</td>
<td>Yugaq</td>
<td>Salvelinus alpinus</td>
<td>resident</td>
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<tr>
<td>Dolly Varden</td>
<td>Yugaq</td>
<td>Salvelinus malma</td>
<td>anadromous and resident</td>
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<td>lake trout</td>
<td>anerrluaq</td>
<td>Salvelinus namaycush</td>
<td>resident</td>
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<td>burbot</td>
<td>manignaq/atgiaq</td>
<td>Lota lota</td>
<td>resident</td>
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<td>Pacific cod</td>
<td>Ceturrnaq</td>
<td>Gadus macrocephalus</td>
<td>marine/estuarine</td>
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<td>saffron cod</td>
<td>Ceturrnaq</td>
<td>Eleginus gracilis</td>
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<td>three spine stickleback</td>
<td>quarruuk</td>
<td>Gasterosteus aculeatus</td>
<td>resident (anadromous?)</td>
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<tr>
<td>ninespine stickleback</td>
<td>quarruuk</td>
<td>Pungitius pungitius</td>
<td>resident</td>
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<td>coastrange sculpin</td>
<td>kayutak</td>
<td>Cottus aleuticus</td>
<td>resident</td>
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<td>slimy sculpin</td>
<td>kayutak</td>
<td>Cottus cognatus</td>
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<tr>
<td>Arctic flounder</td>
<td>naternaq/ uraluq</td>
<td>Pleuronectes glacialis</td>
<td>marine/estuarine</td>
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<tr>
<td>starry flounder</td>
<td>naternaq/ uraluq</td>
<td>Platichty stellatus</td>
<td>marine/estuarine</td>
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</table>
## Appendix G: Place Names and Traditional Knowledge

### Traditional Use Areas

<table>
<thead>
<tr>
<th>YUPIK NAME</th>
<th>English Name</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aksekak Lake</td>
<td>Kayaanguslyvaayaaq</td>
<td>Qayaruaryaraq</td>
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<td>Kitngpartuli Island</td>
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<td>Quipnerpak</td>
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<td>Meqsurhari</td>
<td>Qukaqcaruucet</td>
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<td>Qulk</td>
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<td>Nacayuitnguq nanuua</td>
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</tbody>
</table>

- **Acorn Peak, Amaaq**  
  (Like a Breast)  
- **Ingrinyaagaaq**  
  (Small Mountain)  
- **Gnarled Mountain, Ingria**  
  (Their Mountain)  
- **Sogatiler**  
  (Tall Mountain or One that is Noticeably Tall)
Traditional Use Places

YUPIK NAME

Agagvik
Agayuugtalk (place where there was a church)
Agayuuktalek
Agivak (Wrong Location)
Akerpak (Slough)
Akerpak (White fish, Pike)
Aksekaruaq
Aaluku’a’ar
Alaqanaqmiut
Alululcaar
Amaan
Anguq
Aqesqoq River
Aqitluguq (lake)
Arivak - Where two women quarreled over a fishing hold.
Ataanerpak or Atanvagmiut
Atayaan enii
Atsalugpiarculeq
Augilnguq
Aveggutek
Ayagvik
Ayimtacuar

Emarayaq
Enyaartulit
Igyararmuit
Ilirayaq
Iliryaraq
Ilyuuget mountains
Ingrisak
Ingriyaagaq
Iqallugtuli
Iqmk
Iqmiyagaq
Itel’ngunaq
Ivgaq Island
Kanaaneq
Kangjucugpak
Kangtuneq

Penguaraat
Petmik
Pumyuq
Puyuraq
Qakiyarculek
Qakiyartuliar
Qamanek
Qamiliquirreluit
Qaneraq
Qanganarcurvilc
Qanret
Qapuuqap and Qapuk lakes
Qaqerluq
Qarvik
Qasayaartalek Creek
Qasqerrmeq

Tunumikuyak
Tunurcurvik
Tuqnarliq
Tuqnarliq-qulliq
Uarugyaraatuli
Ungaktalet
Urarsuulleg
Urasqamrlut
Utnulngut
Uuravik
Urayaagaaq
Vegtuli
Yaaqsiguaq
Yuutnalluukiit
Inriiluqaq
qulicuar
tsikiineq

Iquaq
Iqu
Isaangaq’s Slough
Itelnuqnamek
Iternerpak
Kaignalnguq
Kanenepak
Kanileq
Kaviyagaat
Kayaanuleq or Kitlertaleq
Keggiarpak
Kenirrninaqvak
Kepsaram Kuiga
Kiimakuciq Creek
Kitaaleq
Kiturtsiagalenguq
Kuuvalegtalek
Manaalleg
Mayuuvik
Meqirrviq
Meqsugnarii
Muklarr
Nacayuilnguq
Nacetarturyaraq

Boulder Mountain, Qiaruti
(Cliff Mountain) – the highest mountain in the range
Nanraq teksiu  Qipacuk (Another name for Kokwok)  Tsingiqluaq
Nanvaillra  Quiik  Tuklung Mountain
Naulugculleq  Quissiik  Tuklung River
Necuaq  Quukaqcaruucet  Tunuguuyq
Necuaq (ice fishing)  Qukaqlicuar  Tuning River
Neqcaq  Quittircaraq  Tunurcurvik
Nullulngunaq  Quugniilingvormiut  Tutsarturviq
Paluqtaq Mountain  Saguyaq  Uksumarli
Papluq  Sayiitleq  Ukviiqeggliq ?
Pitegcirvik  Sengtak  Ungaktalgem Kuiga
Putilekaaq Island  Tatliguk  Ungakultelg
Puyurtuutaam Kuiga  Teginegaaq  Unglurpak (Island)
Qaquaruaq  Tengluigaq  Urasaq
Qataggeq and/or Qataggniret  Teqaat  Uurarulusleq
Qayaanusuryaraq  Tivcativaq  Uurayaagaaq
Qelutarpak  Tsatsiviag  Yaasiigut
Qengarriagmiut  Tsingiqgaq  Yuut Nalluukiiit Kuiga
Qertun Kaultun  Tsingigpaq

Traditional Use Lines

YUPIK NAME  Ituraq Creek  Quicuar
Aguluraq  Kilaaleq  Quukat Mountains
Ikamaryaraq  Qirneq  Quulliik Creek
Ikumraryarupiatek  Quiliaaq  Tivyaruq, Tivyaraliq

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 Igvararmiut (people located at the throat). It is believed the Igvararmiut 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).
Appendix H: Traditional Ecological Maps

Salmon

The Nature Conservancy
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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 (A laq'aq) on the Mulchatna River, circa 1947. **Photo Credit:** Dillingham Senior Center