

TRADITIONAL KNOWLEDGE OF LONG TERM CHANGES IN SALMON RUNS
IN THE COPPER RIVER

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ABSTRACT

In recent years the management of the Copper River has provided an abundance of salmon but there are indications that certain wild stocks of sockeye and Chinook salmon may have declined from historical levels. In particular local people have indicated that climate change, beaver dams, and human use have altered salmon runs on certain tributary streams of the Copper River. Collecting traditional knowledge about past and present runs and correlating that data from the natural and social sciences (e.g. biology, geography, geology, anthropology, and archaeology) would extend our temporal knowledge of the Copper River salmon fishery and supplement and validate indices of abundance for Chinook and sockeye salmon.

Key Wording Referencing: Copper River, Ahtna traditional knowledge of salmon, environmental change, Salmon stocks, Batzulnetas, Mentasta, Cheesh'na, Gulkana, Tazlina,

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INTRODUCTION

Ahtna oral tradition indicates that every 30 or 40 years the salmon runs on the Copper River failed (Reckord 1983) and there are Ahtna stories of starvation and hard times when people had to rely upon resources other than salmon support this claim. Today, there are indications that certain wild stocks of sockeye and Chinook salmon may have declined from historical levels. During earlier research (Simeone and Kari 2002), local people specifically indicated that climate change, beaver dams, and human use have altered salmon runs on tributary streams (particularly Sinona, Bone and Tanada Creeks) of the Copper River. Subsequently, people from the community of Mentasta have asserted that not enough salmon are reaching the upper Copper River and, as a result, they are not able to meet their subsistence needs. Managers respond by saying that salmon runs on the upper Copper River are peripheral and, therefore, highly variable and thus, there is no conservation concern. In sum, managers and users have two different views of the situation.

This project addresses the following subsistence fisheries monitoring issues and information needs as identified by the Southcentral Regional Advisory Council:

- Long Term Trends and Sources of Variation – Document traditional knowledge on streams pioneered by new salmon populations and on streams that had runs in the past but are no longer productive and
- Conduct interviews with knowledgeable Ahtna elders on inter-annual and intra-annual variation in salmon runs.

RESEARCH GOALS and OBJECTIVES

The overarching goal of this two year project is to combine traditional ecological knowledge with natural and social science data to develop a history of the Copper River ecosystem and salmon fishery. The objectives of this project are to:

1. Document traditional ecological knowledge of long-term variations in salmon runs, including local knowledge of salmon streams that are no longer productive (Note: long-term is defined as oral traditions concerning pre-contact and post-contact events.)

2. Document knowledge about specific environments or ecologies, such as Tanada Creek, Indian River, Gulkana River, or the Tonsina River;
3. Review existing sources of traditional ecological knowledge documenting environmental change;
4. Correlate, or triangulate, traditional ecological knowledge with data from the natural and social sciences;
5. Enhance information exchange between local people, the federally-recognized tribes of the Copper River basin, and agency biologists;
6. Provide a narrative outlining the environmental history of the Copper River basin which focuses on the salmon fishery.

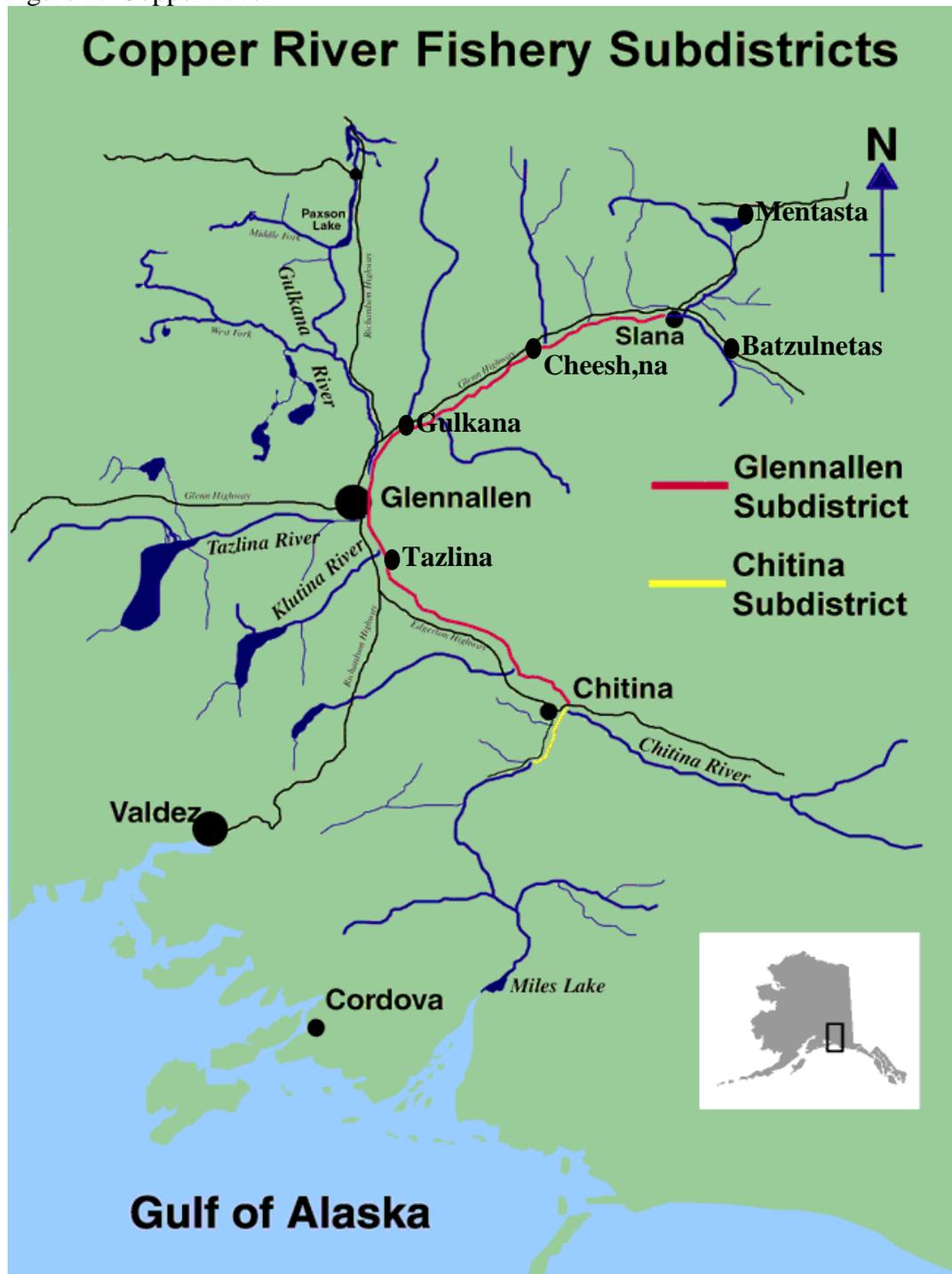
In collecting traditional ecological knowledge about past and present runs, and correlating that data with the natural and social sciences (i.e. biology, geography, geology, anthropology and archaeology), we will extend our temporal knowledge of the Copper River salmon subsistence fishery. This information will also supplement and validate indices of abundance for Chinook and sockeye salmon.

THE STUDY REGION

From its source in the Wrangell Mountains, the Copper River flows 287 miles south and drains an area of 24,000 square miles into the Gulf of Alaska near the town of Cordova (see Figure 1). Fed by glaciers, the river is laden with glacial silt and major tributaries include the Chitina, Tonsina, Klutina, Tazlina, Gulkana, Gakona, Sanford, Chistochina, and Slana rivers. The Gulkana River is the only tributary that is not glacial fed.

The Copper River Basin is surrounded on all sides by mountains; the Alaska Range rises on the north, the Chugach Mountains to the west and south, and the Wrangell Mountains to the east. Tundra, along with rock and ice, cover the mountains above 4000 feet. Below the tundra, grow dwarf birch and willow, which give way at lower elevations to forests of white and black spruce, balsam poplar, aspen, and birch. The climate of the Basin is characterized by great extremes in temperature, with cold, dry winters, and warm summers.

Figure 1. Copper River



Source: State of Alaska, 2004. *Copper River Salmon Personal Use and Subsistence Fisheries*, Alaska Department of Fish and Game, Sport Fish Division

The Nelchina and Mentasta caribou herds he northern and western foothills of the Basin and, in the mountains, Dall sheep and mountain goats are found. Moose, brown and black bear, boreal forest small game and furbearers are also present in the area. Beginning in June, sockeye (*Oncorhynchus nerka*) and Chinook salmon (*Oncorhynchus tshawytscha*) ascend the Copper River to spawn and, in August and September, small runs of coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*Onchorhynchus mykiss*) follow. Of these, sockeye salmon are the most abundant. Freshwater fish are also present in Basin rivers and these species include lakes include rainbow and lake trout, grayling, whitefish, and burbot (Simeone and Kari 2005).

In 2000, the total population of the Copper River Basin was approximately 3100 people. The major population centers are Glennallen and the area between Glennallen and Copper Center that includes the communities of Copperville, Tazlina and Silver Springs. Within the Copper River Basin there are eight Ahtna villages with a total population of 727 people (Alaska Community Database). The Federal Subsistence Board classifies all of the communities within the Basin as rural for subsistence purposes.

Archaeological evidence indicates that salmon have been harvested by the indigenous Ahtna Athabaskans since at least 1000 AD (Workman 1976). Today, the harvest of salmon for subsistence use is an important component of the mixed subsistence-cash economy throughout the Copper River basin. The subsistence salmon fishery in the region is one of the largest and most important in the state. Studies in the region, conducted by the ADF&G Division of Subsistence, indicate that salmon contribute up to 60 percent of the total annual subsistence harvest (Scott et al. 2001) (Table 1).

Table 1. Subsistence Salmon Harvests per Community, 1987

Community	Total Population	Total Subsistence Harvests, lbs.	Salmon Harvests, lbs.	Salmon Harvested per Capita, lbs. *	Percent of Total Harvest
Cheesh'na (Chistochina)	53	20,584	10,197	192	49%
Copper Center	492	85,895	51,006	103	59%
Gakona	208	19,916	6,074	29	30%
Gulkana	67	10,237	5,777	86	56%
Mentasta	77	9,672	2,736	35	28%
Chitina	34	11,925	8,337	239	69%
Tazlina	364	39,182	13,783	37	35%

* This figure complies all salmon harvests. One sockeye equals 4.1 lbs, one chinook equals 17.3 lbs, and one coho equals 5.3 lbs.

Source: Scott et al. 2001

Today, the Copper River supports multiple fisheries including federal subsistence fisheries in both the Glennallen and Chitina subdistricts (see Figure 1). Under federal regulations, all Copper Basin residents are qualified subsistence users of the Copper River salmon fisheries. Under the state fisheries management system, all Alaska residents may harvest subsistence salmon in the Glennallen subdistrict of the Upper Copper River. Allowable gear types in the Glennallen subdistrict include fishwheel and dip net (5 AAC 01).

Under state regulation residents of the cooperating communities (Tazlina, Gulkana, Cheesh'na and Mentasta) may subsistence fish in the Glennallen subdistrict of the Upper Copper River. Additionally, Mentasta residents may subsistence fish in the waters of the Copper River between the National Park Service regulatory markers located near the mouth of Tanada Creek, and approximately one-half mile downstream from that mouth and in Tanada Creek between the National Park Service regulatory markers identifying the open waters of the creek (Federal Subsistence Board 2004). Under the federal fisheries management system, cooperating community residents also have a federal customary and traditional use determination for subsistence salmon harvests in the Chitina and Glennallen Subdistricts of the Upper Copper River District. As under state management, Mentasta residents may also fish in the Batzulnetas fishery (36 CFR 242.24(a)(2); Federal Subsistence Board 2004). To subsistence fish under the federal regulations, a federal subsistence fishing permit is required and fish wheels, dip nets, and rod and reel are the allowable gear types. Additionally, spears are an allowable gear type in the Batzulnetas fishery.

METHODS

While developing the investigation plan, project investigators consulted with the eight Ahtna villages and requested partnerships in conducting the research. All Ahtna village councils approved this project and four village councils – Mentasta, Cheesh'na, Gulkana and Tazlina – requested partnerships in carrying out the project goals and objectives. Mentasta and Cheesh'na are located on the upper Copper River and Gulkana and Tazlina are located in the middle Copper River.

Phase I of this project commenced with a meeting of the community facilitators from Mentasta, Cheesh'na, Tazlina, and Gulkana. On 25 August 2004, the principal investigators and

representatives from the four collaborating communities met in Gulkana. At this time, it was decided not to hold a three-day meeting at the beginning of the project, as originally proposed in the investigation plan, but to hold a small one-day workshop in each of the collaborating communities. Community representatives agreed that smaller meetings held in their own communities would be more comfortable for the elders, and as a result, a schedule for hosting the community meetings was set-up.

Additionally, we discussed protocols for the disposition of data. Community representatives expressed concern over intellectual property rights and the sharing of proprietary information. Principal investigators, community representatives and project consultant (Siri Tuttle of the Alaska Native Language Center) explored numerous avenues such as villages editing interview transcripts and reports for sensitive information and returning original recordings to Village Councils. As of yet, a resolution to this issue has not been reached.

Also, in Phase I of this project, principal investigators explored existing literature and archival data concerning Ahtna history, culture, ecology and management practices and post-contact Copper River fishing history (i.e. biological data and historical catch data). Bibliographic research includes both published and gray literature sources and major literary sources include Gilbert's 1921 letter to Dr. H.M. Smith, Commissioner of Fisheries, November 19, 1921, Simeone and Kari's 2002 *Traditional Knowledge and Fishing Practices of the Ahtna of the Copper River, Alaska*, Thompson's 1964 manuscript *The Red Salmon (Onchorhynchus nerka) of Copper River Alaska*, and Workman's 1976 paper *A Late Prehistoric Ahtna Site near Gulkana, Alaska*. Archival data, including old maps, charts and photographs, were examined at the Anchorage Museum of History and Art, University of Alaska Anchorage Archives and Manuscripts Department, Wrangell St. Elias National Park and Preserve, and the Alaska State Library.

The community meetings took place during Phase II of the project. The goal of the meetings was to introduce the project to each community. Using images that illustrated changes in the environment, project investigators developed a PowerPoint presentation for each of the communities and asked questions about how environmental changes may have affected salmon

populations over time. Also, as a basis for comparing population estimates over time and quantities of past harvests, images of salmon spawning and historical photographs of salmon drying racks were incorporated into the PowerPoint presentations. As a result of the community meetings, a set of topics to be used in follow-up interviews and a list of potential interviewees were developed.

Additionally, in Phase II the performance report was written and a website was developed to post project related data and findings. The website was dispersed to project investigators, community representatives, and project consultants and is located at <http://www.teksalmonruns.com>.

Phase III of the project started on 12 April 2005 with the Copper River Salmon Workshop entitled, "*Elevating our collective knowledge to a common level.*" Principal investigators and Tazlina Village Council President, Gloria Stickwan, facilitated a panel of representatives from the Ahtna region to discuss the traditional ecological knowledge of Copper River salmon.

In addition, in Phase III interview schedules, locations and parameters for the interviews will be established, the interviews will be conducted, summarized and transcribed (as needed), and the interviewees will review and edit the transcriptions and summaries. Interviews shall occur in May, June and July 2005 and transcriptions, summaries and reviews will occur throughout the summer months.

Finally, Phase IV of the project will consist of report preparation by the principal investigators, report review by community representatives, and acceptance of the final draft. The project will be completed by December 2005.

Dr. William Simeone and Erica McCall Valentine are the co-principal investigators on this project. Principal investigators collaborated on project design, conducted literature reviews and archival searches, and prepared reports. With the assistance of the community representatives, project investigators developed the interview questions and interviewee lists. They will also conduct, summarize and transcribe the recorded interviews and review and edit the draft and final reports.

Angie David (Mentasta), Joe Neal Hicks (Cheesh'na), Marcy Ewan (Gulkana), Ruth Warden (Tazlina) are the community representatives that were hired by their respective village councils. The community representatives assisted with the community meetings and will assist in arranging interview times, locations and parameters and conducting, summarizing and transcribing the recorded interviews. They will review and edit the draft and final reports.

Dr. Siri Tuttle has served as a project consultant. Dr. Tuttle is assisting in developing protocols for the disposition of data disclosed as a result of this project and will be the Ahtna language translator.

RESULTS

Written documentation relating to Copper River salmon before 1900 is rare. Available information comes from explorer and prospector accounts such as Lt. Henry Allen (1885), Seton Karr (1887), Martin Bjornstad (1898), Joseph Bourke (1898), George Hazlett (1898), and William Treloar (1898). Some material relating to earlier history is available in archaeological reports such as Shinkwin (1979) and Workman (1976).

Early research on the Copper River salmon is related to the development of the commercial fishery at the mouth of the river. Between 1889 and 1905, a commercial fishery targeting Copper River stocks of salmon was developed on the Copper River delta (Thompson 1964). In 1915, the fishery expanded into the lower Copper River up to Baird Canyon, which produced an almost immediate effect on salmon abundance upriver (Bourke 1917, Gilbert 1921, Thompson 1964). Responding to complaints by Ahtna subsistence fishermen, the Bureau of Fisheries of the U.S. Department of Commerce sent an agent to investigate the situation during the summer of 1916 (Thompson 1964). As a result of these investigations, Congress passed the White Act in 1924, which prohibits commercial fishing in the main stem of the Copper River. In following up with the White Act, the federal government conducted periodic harvest surveys on the upper river and monitored escapement into the river (Thompson 1964, Fall and Simeone 1996).

Following statehood in 1959, the State of Alaska took over management of the Copper River salmon fishery. The Alaska State Constitution (Section 4, Article VIII) mandates that the Alaska

Department of Fish and Game (herein referred to as “the department”) manage fishery resources to maintain a maximum sustained yield. To this end, the department enumerates spawning and stock levels and estimates the salmon carrying capacity of freshwater rearing environments (Alaska Department of Fish and Game 2001). Research on the Copper River provides information about escapement in many different areas of the basin. Research tools include sonar at Miles Lake, mark and recapture programs at Baird Canyon and Canyon Creek, counting towers on the Gulkana River, weirs on index streams (such as the Gulkana River and Tanada Creek), and harvest monitoring. The strength of biological research is precision and breadth. For example, the radio telemetry project surgically implants radio transmitters into salmon, thus enabling researchers to track the movement of an individual fish.

In addition to biological research conducted by the department’s Sport Fish Division and the Division of Commercial Fisheries, the Division of Subsistence researches Ahtna traditional knowledge of salmon by collecting data on fish as a lexical domain in the Ahtna language, species distribution and life history, harvest technologies, processing techniques, and the Ahtna system of self-management (Simeone and Kari 2002).

Because traditional ecological knowledge has historical depth, it can provide information about long-term changes in ecosystems and sources of variation in the abundance of salmon. Ahtna oral tradition, for example, recounts periods of starvation which indicates that the salmon runs may have been much more variable than they are now. Ahtna elders also remark that climate change, the proliferation of beaver dams, and human use have altered salmon runs on a number of tributary streams in the Copper River basin.

Community Meetings

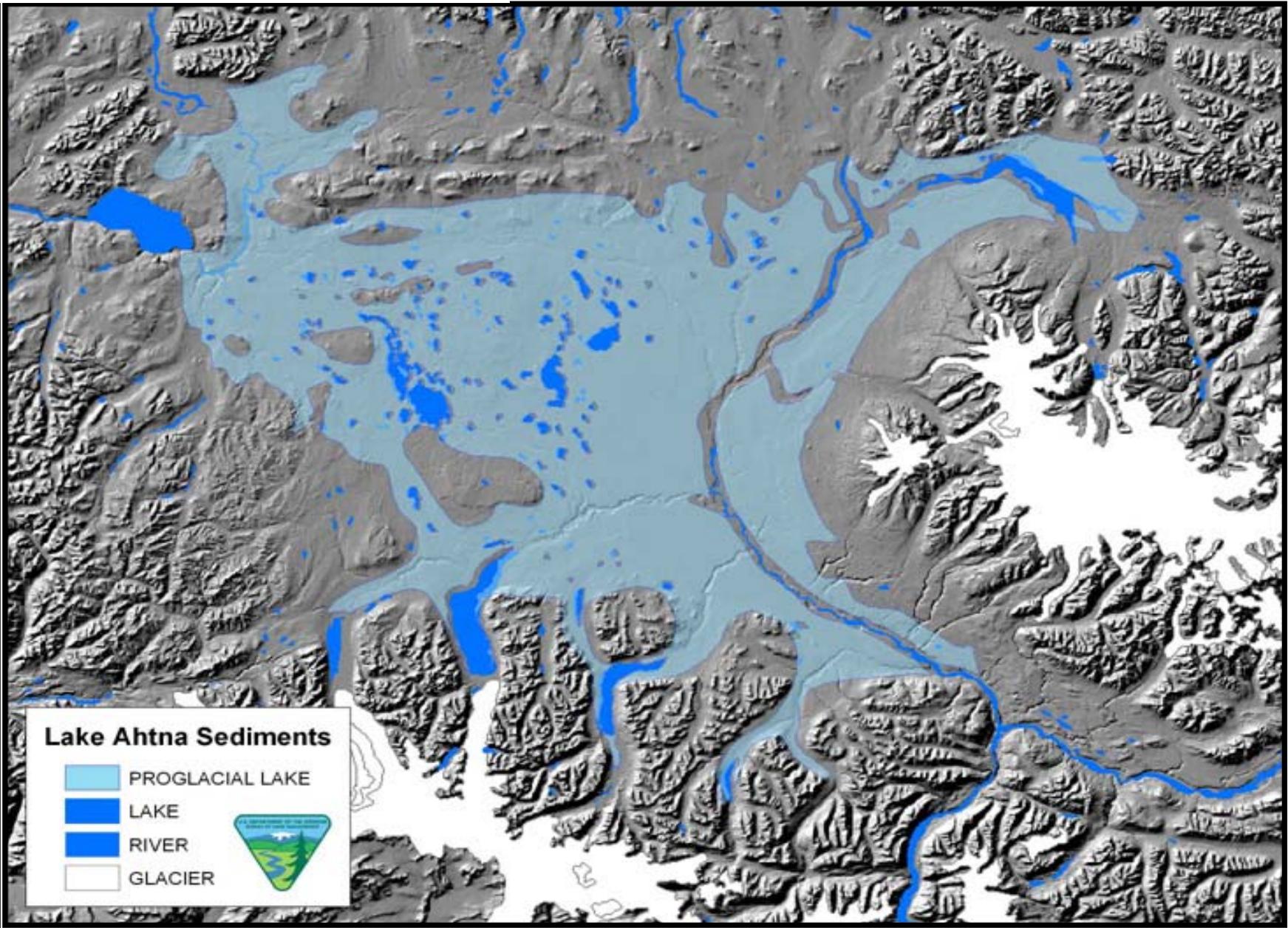
The following section provides a synopsis of issues brought out at community meetings and a panel on traditional knowledge organized for the Copper River Salmon Workshop entitled “*Elevating our collective knowledge to a common level.*” Community meetings were held in Gulkana, Tazlina and Mentasta in 2004 and the workshop was held in Anchorage in April 2005.

At the community meetings principal investigators provided an overview of the project using a PowerPoint presentation. Using visual images investigators attempted to stimulate memories and to provide a gauge for estimating amounts of salmon harvested. Each presentation was tailored to a particular community by using historical photographs of that community. The presentation began by asking, “Is the environment changing? Is the climate getting warmer? Are glaciers melting? Is the permafrost melting? Are beaver dams blocking salmon streams? And, have these changes affected the salmon?” Investigators showed a map of Lake Ahtna, a lake that existed about 10,000 years ago and covered most of the Copper River Basin (Figure 2). Investigators asked the elders if they had heard of any stories about this big lake or a large flood. Using photographs of large schools of salmon, investigators asked the communities, “How many salmon were there in the old days? And, do the salmon come earlier or later than they use to?” Using old photographs of fish racks laden with salmon, investigators asked the people to compare the pictures with how much salmon they used to dry.

The first community meeting was held in Gulkana on 23 September 2004. Gulkana community meeting attendees included Fred Ewan, Jeannie and Luke Maxim, Danny Ewan, Roy and Glenda Ewan, Nick Jackson, Joe Neal Hicks, Bob and Jody Browner, Marcia Ewan, Siri Tuttle, and Bill Simeone. Discussion focused on the effects of hatcheries on the wild stocks of salmon, concerns about the physical condition of salmon, the effects of warm, dry weather on spawning salmon, and the run timing of different stocks of salmon.

The second community meeting was held in Tazlina on 15 October 2004. Attendees included Virginia Pete, Elmer Marshall, Markel Pete, the students of the Tazlina Immersion Program, Siri Tuttle, and Bill Simeone. As in Gulkana, there was discussion on the affect of dry weather on spawning salmon, the physical condition of the salmon, and the comparison of past and present harvest levels. The Tazlina Immersion Program students were very enthusiastic about this project and asked project investigators and Tazlina elders many questions.

Figure 2. Ancient Lake Ahtna



In sum, the issues raised at the Gulkana and Tazlina community meetings included:

- Climate change is producing warm weather and low water. This is preventing the salmon from getting into the spawning grounds. The summer of 2004 was particularly warm and dry and the Gulkana River had very little water. Several participants at the meetings expressed concern as to what effect this would have on migrating salmon. No one could remember a time when the water in the Gulkana River was so low.
- Salmon returning in 2004 were of poor physical condition. Several people noted that the fish looked “beat up” and this was attributed to the low water. There was also a discussion about worms in the salmon and how the meat turned yellow after it dried.
- The need for the Gulkana hatchery is questionable and the hatchery negatively impacts the wild salmon stocks. Particularly, people wanted to know why the hatchery was created and what affects the hatchery was having on wild stocks.
- Different salmon stocks return at different times. There was a discussion about the run timing of different stocks of salmon and the vocabulary pertaining to salmon. In the Central Ahtna dialect, steelhead are called *xay lugge’* and silver salmon are called *dadzeli*. The word for late run salmon is *xata’ilaayi*. Participants noted that the *natael luugu’*, or Batzulentas fish, passes Gulkana in late-July or early-August.
- There are differences between historic and contemporary harvests. Elders discussed these differences. In the past, families harvested and processed more fish than they do now. Markel Pete, from Tazlina, said that when he was a boy his parents processed 635 salmon in one day. Virginia Pete, another elder from Tazlina, said that her parents sometimes harvested and processed about 1000 salmon in two days and that people used to work day and night to catch and process their fish.

After the 3 November 2004 cancellation of the Chistochina meeting, Mentasta and Chistochina decided to combine their meetings. On 23 November 2004, a joint meeting was held in Mentasta. Attendees included Cherry Nicolai, Ruby Sinyon, Joe Neal Hicks, Chanelle Pence, Angie David, Donna Pennington, Shawn Sanford, Ben John, Bill Simeone, and Erica McCall Valentine. This meeting was dominated by discussion about the environment and climate, salmon escapement in Tanada Creek, pollution in local waterways, and the physical condition of the salmon.

In sum, the issues raised at the Mentasta/Chistochina community meeting included:

- Environmental change is ruining spawning habitat. For Mentasta, a major environmental issue was the rerouting of Station Creek just after World War II. The creek used to flow into the Slana River, but the U.S. Army redirected it so that it now flows into Mentasta Lake. As a result, sediments were deposited into Mentasta Lake, the old village site flooded, and in 1954 the village moved to its present location. Also, as a result of the sedimentation, the lake is becoming shallower, the trees around the edge of the lake are falling into the water, and there are more aqueous weeds in the lake.
- Debris left by the U.S. Army is polluting Mentasta Lake. People are afraid that the earthquake in 2002 may have disturbed the debris and released pollutants. After the earthquake, a sheen was seen on the lake and no one knows if this is related to the U.S. Army debris. There is also concern that the earthquake may have increased the levels of arsenic in the groundwater.
- Water temperatures are increasing in Mentasta Lake and, subsequently, the longnose sucker (*Catostomus catostomus*) populations are increasing. Local residents and area biologists have observed large schools of longnose suckers in the lake and some local people believe that longnose sucker eat salmon eggs.
- The make-up of the plant, animal and insect populations are changing. People have noticed changes in wildlife populations with a decrease in the number of swallows, but an increase in the number of magpies and beavers. Additionally, local people are observing more wasps and fewer mosquitoes.
- Salmon look more “beat-up” and there is a gray-ish tinge to the flesh.

Copper River Salmon Workshop

On 12-14 April 2005, the Copper River Salmon Workshop entitled, *Elevating our collective knowledge to a common level*, was held at the Captain Cook Hotel in Anchorage. Two representatives from each of the Ahtna villages attended this meeting, as well as, state and federal fisheries biologists and managers.

On the first day of this meeting, project investigators and Tazlina Village Council President, Gloria Stickwan, facilitated a panel discussion of individuals representing the eight Ahtna

villages. The individuals who participated in the panel discussion were Katie John (Mentasta), Kathryn Martin (Mentasta), Joe Neal Hicks (Chistochina), Betty Tyone (Gakona), Nick Jackson (Gulkana), Pauly Jerue (Copper Center/Kluti-kaah), Markel Pete of Tazlina, and John Goodlataw of Tazlina.

Issues raised in the Ahtna panel included:

Katie John - Mentasta

- Salmon abundance is low in many of the Copper River tributaries. First, the community of Mentasta believes that there is not enough salmon reaching the upper Copper River and Tanada Creek (the location of the Mentasta fishwheels) and, secondly, several Ahtna named and identified salmon runs have either disappeared or have been substantially reduced. Ahtna elder Katie John says that the *natael luugu*, or ‘roasted salmon fish’, have been missing for over eight years. (Many Ahtna elders can visually identify the *natael luugu* and they describe them as a very silvery sockeye salmon in which the males are as big as the females.)
- Chinook and sockeye salmon runs in Bone Creek and Jack Creek (on the upper Slana River) have declined. There is concern that the non-local hunters on the Eagle Trail are crossing Bone Creek on all-terrain vehicles and disturbing spawning grounds.
- Fish are disappearing from Tanada and Copper Lakes. Katie John stated that the motor boats and landing airplanes are to blame. In the past, she saw a lot of dead, spawned out fish in and around Copper Lake and Tanada Lake, but the recent observations do not see that many dead fish. Also, for fear of disturbing the fish, outboard motors and landing airplanes are not allowed on Mentasta Lake.
- The number of Copper Lake sockeye salmon, described by Katie John as having a large hump (2004), has declined. Katie John’s father knew about the different runs of salmon.
- Harvests are declining. Katie John stated she used to put up 40 bales of fish (or about 1600 salmon). Now Katie relies on her granddaughter to harvest salmon at Batzulnetas. Record show that in 2003 164 sockeye salmon were harvested at Batzulnetas.

- Rules surrounding the harvest of animals and fish are not being taught to the children. According to Katie all animals have *engii*, something that is akin to luck or power.¹ Katie said that God created *engii* and all the animals. Fish are more *engii* than the animals that walk on land because they belong to the ocean - they start in freshwater go away for four years and then they come back and die. People need to take care of the animals, use all of the animal parts when the animal is harvested and do not waste. Bones are the only portion of a fish that you can throw away.

Kathryn Martin – Mentasta

- The arrival of birds indicates the start of salmon runs. When certain birds are heard, the salmon have arrived. Katie John’s father listened for a certain bird and the size of the run was determined upon the number of birds he could hear. For example, if a lot of birds could be heard, a lot of fish would return, but if not too many birds could be heard, then not too many fish would return.
- There are strict rules regarding Ahtna traditional fishing – no children, no menstruating women, no blood is allowed around the fish site.
- It is bad luck, or *engii*, to catch and release fish.
- Socioeconomic factors cause variations in salmon harvests. Kathryn states, “We need to work. We need a paycheck now. We have obligations for school and family. In the past, we were raised only on fish.”
- Environmental changes are causing changes in the salmon streams. Beaver dams are blocking Bone Creek. The vegetation is changing – there is more brush. Small lakes are drying up and some are coming back (refilling).

Joe Neal Hicks – Chistochina

- Territories designate who fishes where and when. Territories were respected and Families fished strategically along the river and children were taught the importance of respecting another family’s fish camp.

¹ According the Ahtna dictionary *engii* is defined as “taboo, forbidden, evil (Kari 1990:183). There are rules governing how people act and certain things are forbidden. For example, menstruating women are not allowed to process fish or go near a fish weir or dip net platform or to handle a dip net.

- People do not eat as much traditional foods and, subsequently there are more health problems. Today, children are dependent upon the television and video games and, as a result, they do not exercise or learn their traditional culture.
- Land status makes it hard to fish, to get to good fish camps, and to get to the traditional fishing grounds.
- Regulations and competition for the fishery resource affects subsistence fishing. There are not that many fish, but there is more demand.

Betty Tyone – Gakona

- Fishing sites near Gakona have been taken over by lodges.
- The river bank is changing; washing away.
- The catch per unit effort is changing. In the past, fishwheels were unloaded two or three times per day. Now, her son will only harvest five fish or no fish per day.
- The environment is changing. Lakes and creeks are drying up. Trails have become impassable because the amount of grasses and brush has increased.

Nick Jackson – Gulkana

- The catch per unit effort is changing. Nick Jackson used to catch 200 to 300 fish in one hour, but he cannot do that now. Only when he hits the run just right can he catch 20 or 30 in an hour.

Pauly Jerue – Copper Center/Kluti-kaah

- The river bank is eroding. Old fish camps are being washed away by erosion. After 1958, Pauly's family did not have a fish camp so they purchased fish from other people. Pauly made the point that not everyone fished – some did and other did not; fish could be purchased from other people (“from their relatives from Tazlina and Copper Center”). Also, the wakes of tourist boats cause the bank to erode. The wakes are very swift and undercut the bank. The boat wakes also bring down rocks and dirt that have an effect on salmon.
- The catch per unit effort is changing. In the past, it was common to put away 1500 fish. Pauly's grandfather had three caches full of fish, bales of salmon to feed the family.

- Methods of fishing are changing. Today, Pauly said she and her husband dip net in the Copper River instead of using a fishwheel. They fish in front of where her grandmother's fish camp used to be located. Instead of using a fish wheel, because a large sand bar has developed where the fish wheel used to be located, they stand in the water with a dip net. Jokingly she said that "federal fish" run on the right side of the river, "state fish" on the left. The first week of June produces the best fish – "The first run is the best." As the water temperatures increase the taste of fish changes. In early June, the water levels decrease and to fish, you must go out further. Smaller salmon are caught on the east (right) bank. Smaller salmon stay in the shallower water.
- As temperatures change, fishing changes. As it warms up, you don't get many fish on the east (right) side of the river. No one use to fish past July, but Pauly has discovered there is good fishing in August. It is also better to fish then because it is cooler and there are fewer bugs.

SUMMARY and DISCUSSION of MEETING POINTS

From the comments and discussions at the various meetings, project investigators have distilled five themes, or issues, related to the subject of long-term trends and sources of variation in salmon runs on the Copper River. These five themes are:

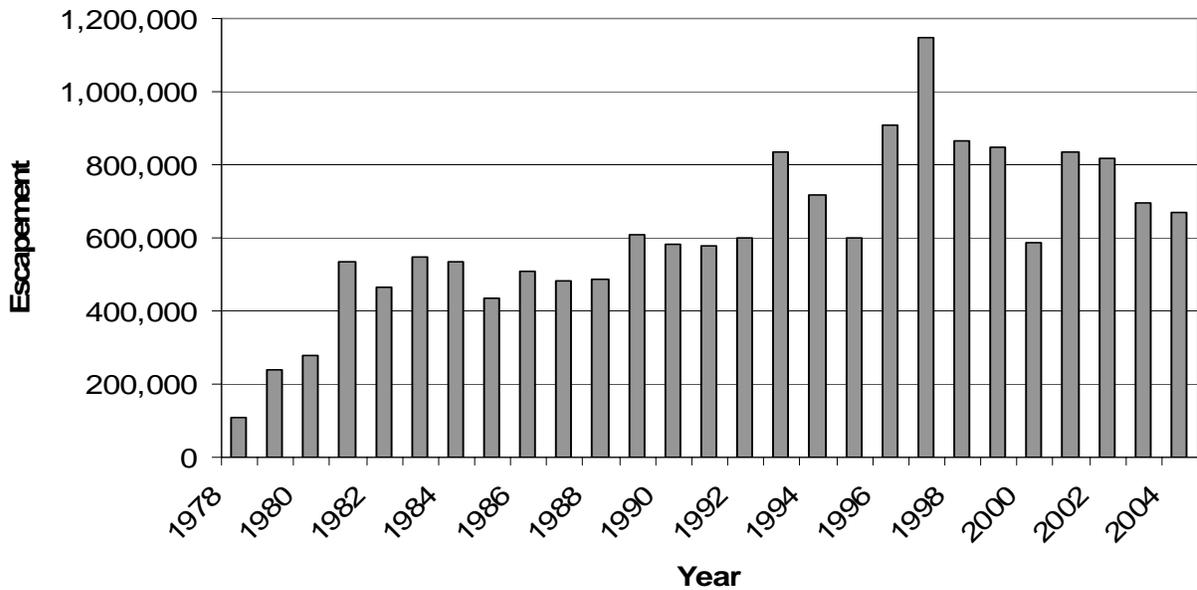
1. There is an overall decline in the number of salmon in the Copper River.
2. Specific stocks of salmon have declined or disappeared.
3. Residents of the Copper River are not meeting their subsistence needs.
4. Accessibility to good fishing sites and/or traditional fishing grounds is reduced because of changes in the river and/or private property restrictions.
5. Environmental change and pollution is taking place on a large-scale and is having an effect on the salmon.

1) Overall Decline in Salmon

In recent years, the management of the Copper River has provided an abundance of salmon and, in fact, it appears that managers have been able to iron out any cyclical variability in population abundance. Over the last decade, the productivity of the Copper River fishery has remained fairly constant. From 1994 to 2004, an average of 789,861 salmon passed through the Miles

Lake sonar (State of Alaska 2004b) (see Figure 3) and over the ten year period, 1992 –2001 the average commercial harvest was 1,891,577 fish (ADF&G Division of Commercial Fisheries 2003:46).

Figure 3. Miles Lake Sonar Counts, 1978 - 2004



Source: Source: State of Alaska 2004b. *Fish Count Data*, Alaska Department of Fish and Game, Sport Fish Division, Juneau, Alaska

In contrast, the Ahtna say that their harvests have declined. People remember harvesting hundreds, if not thousands, of fish per family in one season.

2) Disappearance or Decline in Specific Stocks of Salmon

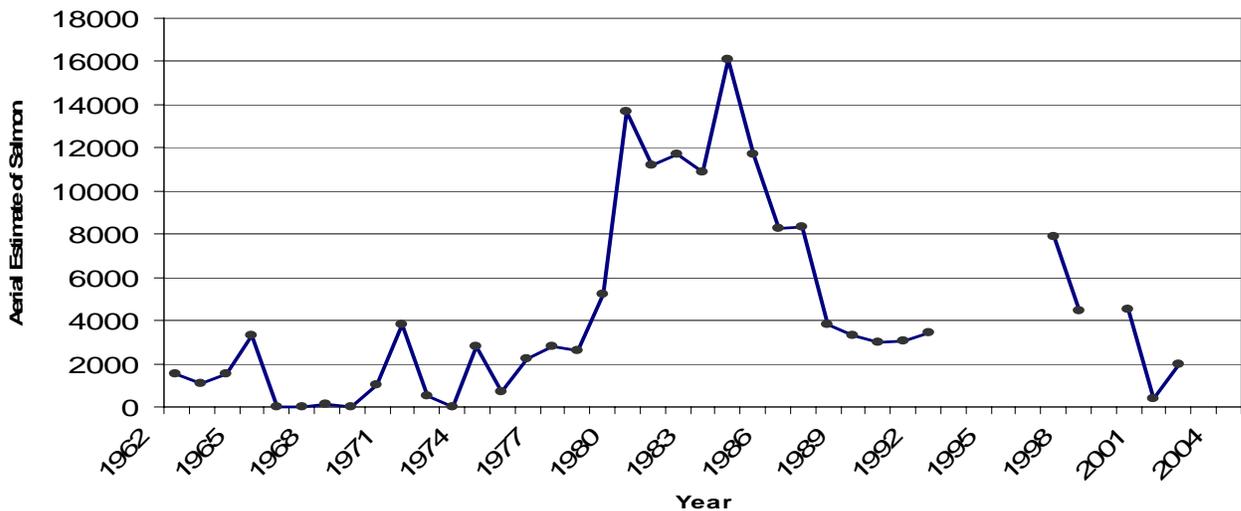
On the upper Copper River, above the mouth of Drop Creek, the Ahtna recognize 12 named fisheries including the *dzahnii luugu* ('rarely mentioned fish') that migrate to Copper Lake, the *natael luugu* ('roasted salmon place') that migrate to Tanada Lake via Tanada Creek, and the *sasluugu* ('sand sockeye') headed to Lake Suslota. According to Ahtna elders, these fish are distinctive in appearance. For example, the fish headed to Copper Lake have a hump, the sockeye headed to Tanada Lake are usually larger and silvery, and Suslota fish are smaller than any other Copper River sockeye. Ahtna elder, Katie John maintains that the *natael luugu* have disappeared. The fish that now migrate through Tanada Creek are not the large, silvery fish that

her parents caught when she was a child. She also maintains that salmon migrating to Copper Lake have declined in number.

Biologists do not acknowledge separate fish socks based upon phenotype, but instead recognize fish stocks based upon where they spawn. For example, fish biologists recognize two stocks of sockeye in Tanada Lake – not one like the Ahtna. However, when the biologist Seton Thompson (1964) visited the Copper River in 1933, he reported that the “natives at fish camps in the vicinity of Gakona, without hesitation segregate their catches into: ‘Batzulnetas fish’ and ‘Suslota fish.’” He also wrote that Tanada Lake fish [sockeye] are “exceptionally large at maturity” (Thompson 1964).

Presence/absence aerial surveys of Tanada Lake and Creek began in 1940 and aerial survey counts began in 1962 (Thompson 1964). Although the aerial survey escapement estimates are highly variable, they do provide an index of relative run strength from year to year (Wiswar 1997 in Veach 2001). Since the 1980s, there is a downward trend in the Tanada Lake sockeye salmon population (Figure 4).

Figure 4. Aerial Estimates of Sockeye Salmon in Tanada Lake and the Lake Outlet



Moreover, subsistence fishery managers have also intermittently operated a weir in Tanada Creek since 1975. The weir site is located about 920 meters upstream from the Copper River and approximately 160 meters downstream of the Batzulnetas village site (Veach 2003).

According to the Tanada Creek weir data, recent sockeye salmon returns remain substantially lower than the returning populations of 1997 and 1998 (Veach 2003).

Katie John's explanation for why there has been a change in upper Copper River stocks is that the fish have been disturbed by pollution and noise caused by people running boats and landing airplanes on Tanada and Copper Lakes. This ties in with her view that salmon "have more *engii*" than any other animal because they go away and come back to die. Ahtna believe that salmon are sentient beings that freely give themselves to humans, but only if the rules regarding their treatment are strictly observed. In essence, fishing is a moral act. Several Ahtna elders made this point when they referred to the strict taboos associated with fishing. When humans disturb animals and fish, the animals and fish then make themselves aloof or scarce.

Mentasta residents are also concerned about what they see as a decline in the run of Chinook salmon in Bone and Fish Creek on the upper Slana River. They are also concerned that the all-terrain vehicles crossing the creeks are destroying stream habitat. However, recent observations by department biologists conducting genetic studies of chinook in the Copper River collected 70 samples from 70 fish in Bone Creek, thus indicating to the department that the run is healthy (Alaska Department of Fish and Game, Division of Commercial Fisheries 2004).

3) Not Meeting Subsistence Needs

In recent years, Mentasta residents maintain that they have not been able to meet their subsistence needs for salmon from fishing on the upper Copper River. Currently, Mentasta residents have a fishwheel at the mouth of Tanada Creek close to the old village of *Nataelde* ('roasted salmon place' or Batzulnetas), but the diminished early run of salmon restricts them from harvesting enough salmon to meet their subsistence needs.

Batzulnetas, as it is more commonly referred to, is the most northern fish camp on the main stem of the Copper River. It is well known throughout the Copper River Basin as the preeminent salmon fishery of the upper Copper River. Seton Thompson wrote that Tanada Lake had, for many years, supported a "considerable native fishery near the village of Batzulnetas where barriers were constructed to impede the ascent of salmon to the spawning grounds and lead them

into crude but effective traps” (1964). In the summer of 1885, Lt. Henry Allen, the first non-Native to visit Batzulnetas², found both Ahtna and natives from the upper Tanana River waiting to fish (1900). Allen wrote that just prior to his departure on June 3rd he heard a series of shouts, “...proclaiming the first salmon of the season. It was rather a small silver salmon, which was placed in a conspicuous place on one of the spruce bough teepees, where all visited it with great singing and glee (1900).” What Allen seems to be describing is the “First Salmon Ceremony.”

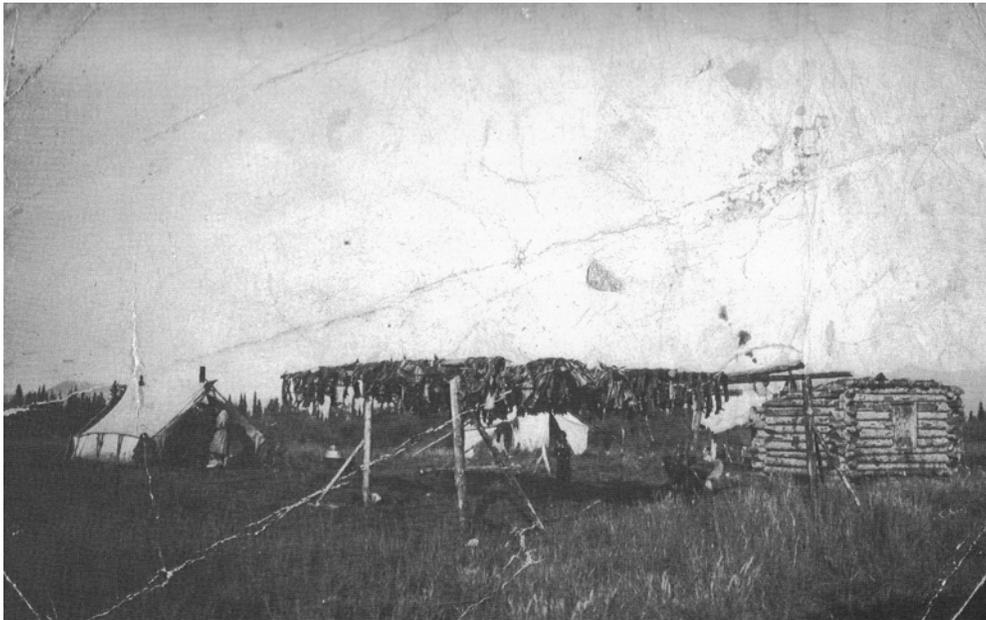
Sometime in the 1940s, Katie John’s father, Sanford Charlie, was told by a federal game warden that he could no longer use fish traps in Tanada Creek. Subsequently, Sanford Charlie left Batzulnetas and eventually people stopped fishing there (Simeone n.d.). After statehood, all of the tributaries, as well as the main stem of the Copper River above the mouth of the Slana River, were closed to subsistence fishing. No salmon fishing was allowed on Tanada Creek or at Batzulnetas. In the mid-1980s, Katie John and Doris Charles, a resident of Dot Lake who had been born and raised at Batzulnetas, sued the state of Alaska to reopen the fishery on Tanada Creek and, in 1987, an interim subsistence fishery was opened at Batzulnetas to settle to United States District Court Case of John versus Alaska. Today, the residents of Mentasta use a fishwheel located at the mouth of Tanada Creek to harvest salmon.

There are few written records of historic salmon harvests at Batzulnetas. In 1921, an agent of the Bureau of Fisheries investigated salmon escapement on the upper Copper River and reported that the Ahtna living at Mentasta, Batzulnetas, and Suslota had harvested between 14,000 and 15,000 salmon, mainly sockeye (Baker 1921) (see Table 2) and Thompson documented a harvest of 961 fish from Tanada Creek in the years 1933-1934. Note that these fish were harvested in August, and not in June, which was the more traditional period for fishing (Table 3).

One other piece of documentation is a photograph of Batzulnetas Billy’s fish camp taken at an unknown date (Plate 1). Batzulnetas Billy had a fish camp at Batzulnetas but fished in the main stem of the Copper River using a fishwheel (not in Tanada Creek). A rough estimate of the number of fish on the drying racks is 500.

² Allen named the village after the headman *Bets’ulii Ta* (‘Father of Someone Respects Him’) (Kari 1986).

Plate 1. Batzulnetas Billy's Fish Camp, date unknown.



Source: Ahtna Incorporated.

Table 2. Upper Copper River Fish Wheel Harvests, 1921

Location of Fishing	Number of Fish Wheel Operators	Number of Salmon Harvested			
		Sockeye	King	Coho	Total
Chitina	76	3,900	234	0	4,134
Mouth of Tonsina	1	360	80	40	480
Copper Center	31	3,932	1,408	0	5,340
Mouth of Tazlina	1	75	15	0	90
Mouth of Gulkana	3	461	182	0	643
Paxson Lake	2	565	225	0	790
Mentasta, Batzulnetas, Suslota, & Tanada	50-60	14,500 ^a			14,500
Totals	164-174	23,793	2,146	40	25,979
Per capita harvest ^b		195.6 lbs	76.0 lbs	0.5 lbs	272.1 lbs

^a Reported as 14,000 to 15,000 salmon, primarily sockeye.

^b Based on 1920 census estimate of Copper Basin population of 511

Source: Baker 1921

Table 3. Upper Copper River Fish Wheel Harvests, 1933-34

Week Ending	Chitina		Copper Center		Gulkana		Gakona		Chistochina	Slana	Batzulnetas
	1933	1934	1933	1934	1933	1934	1933	1934	1933	1933	1933
June											
7			21	2	5	10					
14	18	231	213	9	20	79	22				
21	42	237	130	360	23	283	53			73	
28	29	197	32	457	20	619	52	242	8	170	
July											
5	19	247	86	460	31	161	90	20	96	42	
12	162	258	228	361	30	313	138	510	201	*	
19	49	324	103	105	47	507	110	487	162		
26	25	165	104	23	111	136	77	304	78		194
August											
2	75	*	62	28	55	*	155	22	53		71
9	20		*	*	20		*	21	24		127
16	*				*			50	2		145
23								4	*		274
30								*			150

* Fish wheel removed

Source: Thompson 1964

At a minimum Katie John (Ahtna Tape 48)³ has said her family needed more than 50 bales (2000 sockeye) to sustain them through the winter. Her parents dried “probably a thousand” fish, although later on she indicates that they often dried up to eighty bales, or 3200 fish. This amount provided enough surplus to allow for some salmon to be exchanged for dried whitefish with Athabaskans living on the upper Tanana River. This total was in addition to the fresh fish consumed during the fishing season and fish fermented for later use.

Gene Henry (Ahtna Tape 119), who is Batzulnetas Billy’s son, said that he and his family caught harvested about 50 bales (2000 fish). Both Katie and Gene estimate that their respective families harvested a total of about 5000 fish annually. Neither mentions how many people were in their respective families or how many people lived at Batzulnetas at the time, but a group photograph taken in 1937 at Batzulnetas (Kari 1986:74) shows 19 people and another group photo (ibid. 103) taken in the same year at *C’ecaegge*, or ‘River Mouth’ at the confluence of Tanada Creek and the Copper River, shows an additional 18 people for a total of 37 residents. Using the above estimate, 140.5 fish per person or 562 pounds per capita were harvested. This includes dry fish

³ Most of the Ahtna oral history tapes have been given numbers by James Kari. These citations refer to that numbering system.

and not fresh or fermented salmon. Subsistence harvest data collected from Mentasta residents by the Division of Subsistence in 1982 and again in 1987 shows a harvest of 20.8 pounds and 35.5 pounds per capita respectively (Scott et al. 2001). Table 4 shows the number of permits issued and reported harvest for the Batzulnetas fishery from 1987 to 2002.

Table 4. Permits Issued and Reported Sockeye Harvest, Batzulnetas Subsistence Fishery

Date	Number of Permits Issued	Reported Sockeye Harvest
1987	8	22
1988-1992	No permits issued	0
1993	1	160
1994	5	997
1995	5	16
1996	No permits issued	0
1997	3	427
1998	1	582
1999	1	55
2000	1	55
2001	1	62
2002	1	208
2003	1	164

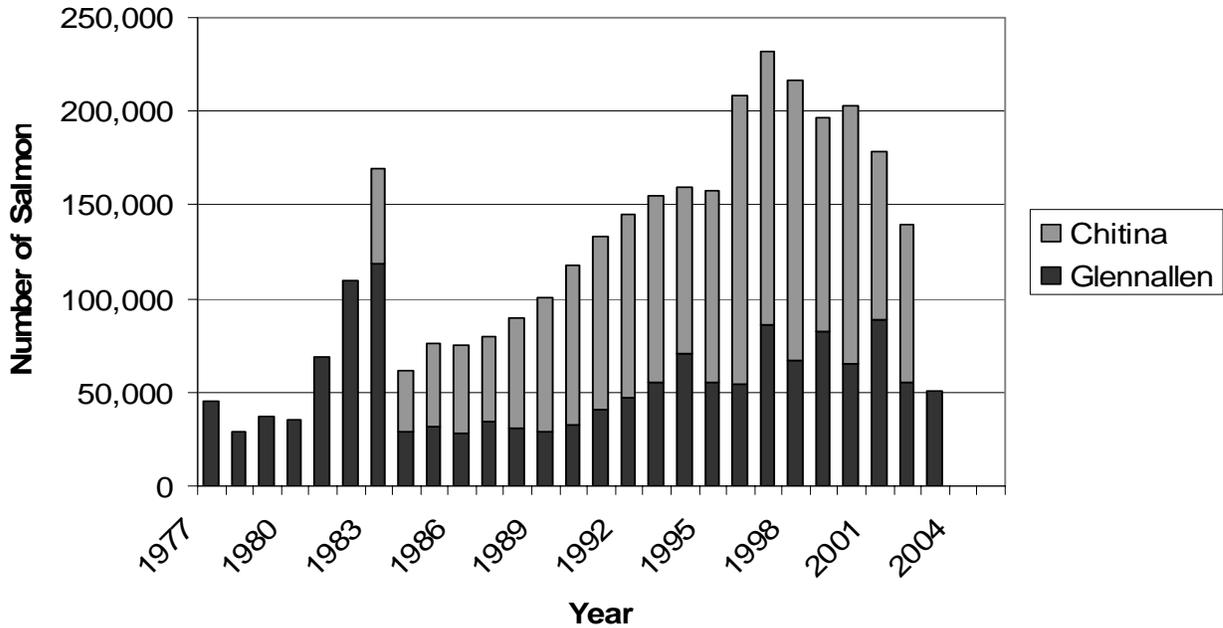
Source: ADF&G Division of Commercial Fisheries, 2003

While the Ahtna maintain that the upper river salmon stocks are in decline, managers argue that up river stocks are peripheral and highly variable. According to the Department there is no conservation concern. It should be noted that the State of Alaska has a formal process for determining “stocks of concern” and Copper River stocks have not reached the first level of concern. Some managers argue that if Mentasta residents want to catch more fish they should move their fishwheel.

Harvests in the Glennallen Subdistrict subsistence fishery have been estimated since 1965. Sockeye salmon dominant the harvest in this fishery, Chinook salmon comprise the second largest harvest, and coho a nominal third. From 1977 through 1988, harvests in the subsistence fishery averaged 49,777 salmon. From 1980 to 1983, the harvests rose rapidly with about 119,000 salmon being taken, on average. In revising the subsistence fishery management plan (and thus implementing a personal use fishery), harvests in the Glennallen subdistrict decreased

greatly with only about 29,000 salmon being harvested in 1984. From 1984 to present, subsistence harvests in the Glennallen Subdistrict have gradually increased (State of Alaska 2003) (Figure 3).

Figure 5. Estimated Subsistence Harvests in the Glennallen and Chitina Subdistricts, Copper River, 1977-2003



Source: State of Alaska, 2003b. *Copper River Salmon Subsistence Fisheries Harvest Summaries by District*, Alaska Department of Fish and Game, Sport Fish Division, Juneau, Alaska

4) Accessibility to Fishing Sites and Traditional Fishing Grounds

Accessibility to good fishing sites in the Copper Basin has been reduced for two reasons: 1) because almost all of the property on the west side of the Copper River is privately owned, there are very few public roads that lead to the river and the east side of the river is inaccessible, except near the Chitina/McCarthy Bridge. 2) Access has also been reduced because of erosion and changes in the river channels. The result has been a reduced harvest and changes in the way people fish. For example, conditions at the mouth of Tanada Creek have changed so that the Mentasta fish wheel is not as effective and the land around Batzulnetas and along the Copper River below the mouth of Tanada Creek is privately owned so it is hard to move the wheel.

5) Environmental Change and Pollution

Environmental change and pollution is taking place on a large scale and having an effect on the salmon. At all of the community meetings all of the participants talked about how the environment has changed in recent years. Small lakes have dried up, the brush is higher and thicker and it is not as cold. In Mentasta all major concerns discussed in this report are rooted in changes in the environment. More specifically, Mentasta residents are concerned about the re-routing of Station Creek and pollution left in their environment by the military. Many Ahtna are concerned that the fish are disturbed by pollution and will eventually refuse to come back or to be caught.

CONCLUSIONS

(Not necessary at this time)

RECOMMENDATIONS

(Not necessary at this time)

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