WATANA HYDROELECTRIC PROJECT
SUBSISTENCE DATA GAP ANALYSIS

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1.0 INTRODUCTION

This report documents efforts to examine existing information describing the state of knowledge about subsistence uses of resources that may be affected by construction and operation of the proposed Watana Hydroelectric Project (Project). The Project, as proposed by the Alaska Energy Authority (AEA) is located in the upper Susitna River Basin. Potential "gaps" in the existing data are identified that help inform the National Environmental Policy Act (NEPA) scoping and study planning activities conducted as part of the Federal Energy Regulatory Commission (FERC) licensing process for the proposed Project. The purpose of this data gap analysis is to evaluate available information for its relevance and applicability to the proposed Project. Actual information needs will be determined when a more refined description of Project facilities, operations, and construction activities is developed. The data reviewed for this analysis are contained in selected documents developed as part of the original Susitna Project licensing effort in the early 1980s, along with more recent, readily available reports. The documents reviewed are listed in the References section.

The purpose of a data gap analysis is to identify and evaluate existing baseline information and to determine what additional data may be required to describe baseline conditions and assess possible impacts of a proposed action. A data gap report is a review of existing information about a topic—in this case, subsistence—and an assessment of the adequacy of that information to describe potential impacts and satisfy known licensing requirements—in this case, to prepare an EIS for the Watana Hydroelectric Project that satisfies FERC licensing requirements. If existing information is inadequate to describe baseline conditions and assess impacts, a data gap is identified. The data gaps ultimately determined to be worthy of future study are identified by permitting needs and the needs of the applicable regulatory process for the proposed project.

Key steps to obtain high quality data for assessment of potential project-related impacts include

1) define study area boundaries,
2) identify the time period of interest for data review (older historical investigations may be limited by antiquated methods or reporting on ephemeral conditions),
3) clearly define potential issues concerning specific resources of interest (in this case, subsistence),
4) identify information sources and gather existing data and historical knowledge, including interviews and mapping of resource details in the study area,
5) evaluate the data acquired to assure that only quality data are used (for example, standardized methods and ADF&G subsistence research protocols, questionnaires, and modern verifiable mapping methods), and
6) identify any data deficiencies and outline the steps needed to fill identified data gaps.

(adapted from: Toward Cleanup at Santa Susana-A Guide to the Draft Data Gap Analysis Report. Environmental Impact Statement for Remediation of Area IV-The Santa Susana Field Laboratory. U.S. Department of Energy(DOE), June 2008.) (reviewed July 22, 2011 at http://www.etec.energy.gov/EIS/Documents/Data_Gap_Study_Guide.pdf)

1.1 Communities

This document describes potential data gaps identified for the following communities in southcentral Alaska.

Susitna River Basin:

- Wasilla
- Willow
- Palmer
- Talkeetna
- Trapper Creek
- Parks Highway dispersed households
- Petersville Road dispersed households
- Cantwell
- Chase
- Gold Creek/Chulitna
- Hurricane/Broad Pass
- Denali Highway households and lodges

Copper River Basin:

- Paxson
- Mentasta
- Slana
- Chistochina
- Gulkana
- Gakona
- Glennallen/Copperville
- Tazlina
- Silver Springs
- Copper Center
- Chisna
- McCarthy

1.2 Subsistence Overview

Definitions

In Alaska, subsistence generally refers to the practice of taking fish, wildlife or other wild resources for one's sustenance—for food, shelter, or other personal or family needs. Defined in Alaska state law as the "noncommercial customary and traditional uses" of fish and wildlife, subsistence uses include the following:

- Food
- Sharing
- Homes and other buildings

- Fuel
- Clothing
- Tools and home goods
- Transportation
- Handicrafts

As noted above, subsistence under State law is defined as the customary and traditional use of fish and wildlife. State law protects customary and traditional uses of fish and game resources and the State must provide for those uses before providing for recreational or commercial uses. To decide if a fish stock or game population is associated with customary and traditional uses, state regulation 5 AAC 99.010 directs the Board of Game and the Board of Fish to look at eight factors, called the Eight Criteria[1]. The Eight Criteria measure the following factors:

- the length and consistency of use of the resource
- use that occurs on a regular seasonal basis
- a pattern of use that is characterized by efficiency and economy of effort and cost
- a pattern that occurs in the same geographical area
- traditional methods of handling, preparing, preserving, and storing used in the past
- a pattern that includes the handing down of knowledge, skills, and values and lore
- traditional patterns of distribution and exchange including customary trade, barter, and gift-giving
- a pattern that include the use of a wide variety of wild resources that provides substantial economic, cultural, social, and nutritional elements of the subsistence way of life.

Under Federal law, "subsistence" is defined as the customary and traditional uses of fish and wildlife and other renewable resources for food, clothing, shelter, and handicrafts[2]. Like State law, Federal law defines the subsistence use of fish and wildlife resources as customary and traditional use. The Federal Subsistence Board determines which fish stocks and wildlife populations have been customarily and traditionally used for subsistence. These determinations identify a specific community's or area's use of specific fish stocks and wildlife populations. For areas managed by the National Park Service where subsistence uses are allowed, the determinations may be made on an individual basis. Like the State, the Federal Subsistence program uses eight factors to determine customary and traditional use. These Federal Eight Factors are very similar to the Eight Criteria used by the State.

Having outlined governmental definitions of subsistence it should then be pointed out that many Alaska Natives do not like the term subsistence, feeling that it does not adequately describe the importance of wild foods to Alaska Native culture. As the anthropologist Richard Nelson (1982:229) observes

> ….Aside from the economics, there are other very important dimensions that reinforce the Native people's dependency upon subsistence. Our studies of

[1] 5 AAC 99.010 Boards of fisheries and game subsistence procedures (AAC-Alaska Administrative Code).
[2] §803 Definitions in ANILCA P.L. 96-487 (ANILCA-Alaska National Interest Lands Conservation Act, as amended)

> Koyukuk villages find that food from the land provides much more that subsistence alone – indeed it is the focal point of Koyukon culture. Native food is a source of psychological well being, it comprises a matrix of social and ceremonial events and it is a vital component in traditional religious practices.

Subsistence Statewide Summary

The Alaska Department of Fish and Game, Division of Subsistence undertakes research about subsistence uses of wildlife resources. Research results consistently demonstrate that hunting and fishing provide a large share of the food supply in rural Alaska. Approximately 44 million pounds of wild foods are taken annually by residents of rural Alaska, or about 375 pounds per person per year. This compares to 22 pounds per year harvested by Alaska's urban residents. Fish comprise 60 percent of subsistence foods taken annually. Ninety-five percent of rural households consume subsistence-caught fish (Wolfe and Bosworth 1994). The Division is currently preparing an updated statewide summary, expected to be available in the third quarter of 2011 (fall p.c.). A distinguishing feature of the subsistence economy is that, while cash and current technologies (firearms, boats, motors, etc.) are utilized for harvesting and processing, there is a primary economic, social, and cultural reliance on fish and game resources which is integrated into the community's economic and social fabric in a mutually supportive fashion.

Historical Background

Hunting, fishing and gathering were the primary economic activities for all Alaska Natives up until the middle of the 20th century. At statehood in 1959, the State of Alaska took over responsibility for managing subsistence from the Federal government when it gained authority for managing fish and wildlife. State control of fish and wildlife was a leading argument for statehood because Federal management was viewed by many Alaskans as favoring outside interests and being unresponsive to local needs (Cooley 1963; Hunt 1976). The Alaska Constitution established that fish and wildlife "are reserved to the people for common use" and that "no exclusive right or special privilege of fishery shall be created or authorized" (Alaska Constitution, Article 8, sections 3 and 15)

Since before statehood, Alaska's regulatory system had managed subsistence separately from recreational and commercial harvesting. In 1978 the State legislature established its first subsistence laws that defined subsistence as "customary and traditional uses" [AS 16.05.940 (33)] of fish and wildlife, thereby highlighting the continuing role of subsistence fishing and hunting in sustaining long-established ways of life in the State. Under this law, subsistence was established as the priority consumptive use of fish and wildlife resources (now AS 16.05.258). Subsistence surfaced as an issue for the United States Federal government in 1971 when Congress was drafting the Alaska Native Claims Settlement Act (ANCSA). The act addressed Native land claims that had obstructed transfer of Federal lands to State jurisdiction and halted construction of the Trans-Alaska Oil Pipeline. ANCSA extinguished aboriginal hunting and fishing rights in Alaska in exchange for almost $1 billion in cash and 44 million acres of land transferred to Alaska Native Corporations.

While ANCSA extinguished aboriginal hunting and fishing rights, Congress intended to protect the subsistence activities of Alaska Natives. Congress fulfilled that promise in 1980, when it passed the Alaska National Interest Lands Conservation Act (ANILCA). Besides creating new national wildlife refuges, parks, and public recreation lands, ANILCA mandated that the State maintain subsistence hunting and fishing preference for rural residents on Federal public lands or forfeit its management of subsistence uses there. Title VIII of ANILCA contains the rural preference provision (Code of Federal Regulations Title 36, Part 242 or Title 50, Part 100 (36CFR242.1 or 50CFR100.1).

The State took note of the discrepancy between the various laws and amended State law in 1986 to match ANILCA by limiting subsistence uses to rural residents. However, this solution did not last long. In 1989, the Alaska Supreme Court ruled in McDowell v. Alaska (785 P.2d 1 (Alaska 1989)) that the rural preference violated Alaska Constitution, including its "common use" provisions regarding use of fish and wildlife. This meant that the State could not give a priority to a person based on where they lived. In essence, the Alaska Supreme Court's decision meant that subsistence hunting and fishing was open to all Alaska residents.

Because Alaska law no longer provided for a "rural" priority in conformance with Federal law, the Federal government moved to take over management of subsistence on Federal public lands. Several attempts by the State to reconcile the two laws by amending the Alaska Constitution failed when supporters could not muster enough votes in the Alaska Legislature to send a constitutional amendment to the state's voters for ratification. Federal managers took over authority for subsistence hunting on Federal lands on July 1, 1990.

The situation regarding management of subsistence fishing was complicated by a separate question involving navigable waterways. The title to these waters was guaranteed to the State of Alaska in ANILCA. The State would not guarantee the traditional fishing rights of Natives on Alaska's rivers. The Federal government had protected the Native fishing right, but stopped doing so after the special legislative session in 1992. This prompted Natives to file suit in U.S. District Court (Katie John, et al. v United States), claiming that ANILCA's term "public lands" included navigable waters. The state of Alaska countersued (State of Alaska v Babbitt), claiming that ANILCA gives the Federal Secretaries of Agriculture and the Interior no power of direct management on any lands or waters of Alaska. The State suit was later withdrawn when it became clear that it would fail in the courts. On March 30, 1994, the U.S. District Court ruled in favor of the Native plaintiffs, holding that all navigable waters were under Title VIII's protections. This meant that under ANILCA the federal government has jurisdiction over navigable waterways traditionally used by Natives for subsistence harvest. An appeal to the Ninth Circuit Court limited Federal jurisdiction to "reserved" navigable waters only.

State program

Two boards make regulations for all hunting and fishing, including subsistence, the Board of Game (BOG) and the Board of Fish (BOF). Each Board consists of seven members serving three-year terms. Members are appointed by the Governor and the appointments approved by

the State Legislature. Proposals to change subsistence regulations may come from members of the public, the Department of Fish and Game, or the Boards themselves. About 80 Local Fish and Game Advisory Committees statewide advise the Boards. The Division of Subsistence, which was created under the 1978 subsistence law, has the responsibility of providing the Boards with information about subsistence activities. Core services of the Division of Subsistence are to:

- Research, quantify, and disseminate information to the public about customary and traditional uses by Alaskans of fish and wildlife resources.
- Provide scientifically based information for fisheries and wildlife management programs to the Board of Fisheries and Board of Game for their use to evaluate reasonable opportunities for customary and traditional uses.

Fish and game management in Alaska is organized by geographic areas. There are 26 Game Management Units (GMUs) in the state with numerous subunits, and special management areas, controlled use, and closed areas. Fisheries management is organized by regions and areas, districts, and subdistricts within the districts, depending upon whether there is commercial, sport, or subsistence and personal use management. The federal management system has largely adopted the geographically based GMUs and fisheries designations. Most of the project study area is within GMU 13, 14A, 14B, and 16B and the Southcentral and Prince William Sound fisheries management regions.

Federal program

Under federal management, subsistence regulations are created by the six-member Federal Subsistence Board. The Board is comprised of leaders of five federal agencies in Alaska (U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, Bureau of Land Management and Bureau of Indian Affairs) plus a voting chair appointed by the U.S. Secretary of Interior. The Board receives recommendations on regulations from 10 statewide Regional Advisory Councils. The Board can reject regional Advisory Council recommendations only if they are damaging to subsistence, damaging to the resource, or not supported by evidence. Proposals to change regulations may be made by Federal staff, members of the public, Regional Advisory Councils or by the Board itself.

Tier II

Both Federal and State governments have a mechanism for establishing preferences among subsistence users when a fish or wildlife population is not large enough to support harvest by all those who are eligible for subsistence uses. Under the Federal program, this narrowing process is based on: 1) customary and direct dependence upon the populations as the mainstay of livelihood, 2) local residency, and 3) availability of alternative resources. This is sometimes called a “Section 804” process, named for the section of ANILCA’s Title VIII that establishes it as a means of reducing the number of eligible subsistence users.

Under State management, this is called the "Tier II" process. Tier II is an allocation system to distinguish and identify those individuals most dependent on a particular fish stock or wildlife population among all subsistence users. Tier II gives priority to users based on: 1) customary dependence and 2) availability of alternative resources. Because all residents of the state are eligible for subsistence, the State has had to manage moose and caribou in Game Management Unit 13 under Tier II.

In Game Management Unit 13 the state has made customary and traditional use findings for all major resources: salmon, non-salmon fish, Dall sheep (*Ovis dalli dalli*), black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos*), caribou (*Rangifer tarandus granti*), and moose (*Alces alces*). This means that all of these resources are classified as subsistence resources. Of these resources, caribou and moose are the most popular. Because the State's rural priority was deemed unconstitutional in 1990 all Alaska residents are eligible to participate in subsistence hunts. In 1990 over 6,000 people obtained a permit to hunt caribou and this pool of hunters achieved the allowable harvest in 3 days (Fall and Simeone 2010:9). Consequently, in 1991 the State instituted a Tier II hunt to limit the number of hunters and prevent over harvest.

Non-subsistence areas

The Joint Board of Fisheries and Game is required to identify non-subsistence areas, which are defined as areas where dependence upon subsistence is not a principal characteristic of the economy, culture, and way of life (AS 16.05.258(c)). In non-subsistence areas, the subsistence priority does not apply and the state cannot authorize subsistence fisheries or subsistence hunts in non-subsistence areas. Areas around Anchorage, Wasilla, Willow, Palmer, and Talkeetna, Fairbanks and Juneau have been designated non-subsistence areas. While residents of these communities live in non-subsistence areas, they are, under state law, able to participate in subsistence activities in other parts of the state were subsistence is a priority. So, for example, residents of all these communities may apply for a subsistence permit to hunt Nelchina caribou or fish for salmon in the upper Copper River.

1.3 Changes in Subsistence Management and Research, 1979–1985 to Present

The previous section described changes in the legal system statutory and regulatory environment that manages subsistence harvests in Alaska. The core issue in the legal and management struggle in the State of Alaska's management system (Boards of Fish and Game, Department of Fish and Game staff, local advisory boards, and the public) is allocating wildlife resources among urban and rural Alaska residents, without introducing a management preference based on race or ethnicity (Alaska Native American people such as Yup'ik and Iñupiat Eskimo, Aleuts, and Indians; and non-Native people). On the one hand, a fish and game management preference on state controlled lands and waters based on race or ethnicity is not legal under the Alaska State constitution. On the other hand, a fish and game management preference favoring rural Alaska Natives would be legal on Federal lands or waters in Alaska. The previous section described some of the major legal challenges to various fish and game management systems implemented by the State of Alaska since Statehood. The result is a fish and game management system for all classes of users (subsistence, sport, commercial, personal use, non-consumptive) that is constantly changing. The changes in regulations (users, seasons, harvest limits, methods and means, etc.) come in response to not only the biological health of species populations but also in response to legal interpretations of state and federal statutes.

At the time of the original Susitna Hydroelectric project studies, 1979–1985, the issue of subsistence management was coming into public and judicial view. Indeed, while subsistence hunting, fishing, and gathering had been a cornerstone of Alaska Native historical existence for thousands of years, it has fast developed into one of the thorniest and difficult public policy issues over the last 30 years. In Alaska, the subsistence regulatory framework at both the state and federal level emphasizes the rural use of fish and wildlife resources, not Alaska Native use. Wheeler and Thornton (2005) present an overview of subsistence public policy and research changes over the past three decades.

Research into subsistence in Alaska certainly predates the period of the first Susitna dam studies in 1979–1985. For example, Osgood (1937 [reprinted 1966]) described the social, material, and

spiritual culture of the Dena'ina[3] Indians of southcentral Alaska. James Fall's dissertation research focused on patterns of Dena'ina leadership. Some of those changes were influenced by changes in the socioeconomic roles of leaders for subsistence purposes during historical changes in the economy of southcentral Alaska (Fall 1981, 1986). James Kari's research into Dena'ina linguistics, placenames, and social anthropology resulted in a large body of knowledge about historic and contemporary lifeways (Kari and Kari 1982, Kari and Fall 1987, 2003). The topic of subsistence was barely addressed specifically for Susitna dam during the 1979–1985 period Occasional references to subsistence harvests are found scattered in Susitna environmental reports addressing the biology and wildlife management of various species, or as a paragraph in reports dealing with the socioeconomic baseline information for communities in and surrounding the Susitna Basin (Terrestrial Environmental Specialists 1980, 1981).

Changes in the predominant research methodologies, analytical methods, and subject areas have evolved over the past three decades since the original Susitna dam studies. Subsistence research at the community level is the norm. In larger communities, statistically significant representative household samples are used. Household harvest calendars are collected, typically for at least a 12-month period to provide a full year's seasonal round worth of harvest effort, harvest success, and patterns of processing, sharing, and distribution. The use of fish and wildlife resources for barter, sale, and trade has emerged as a research topic, following challenges to the use of subsistence-harvested products in what some view as the "cash economy".

The contemporary use of ArcMap ® GIS (Geographic Information Systems) computer software[4] for data consolidation, analysis, and presentation has revolutionized the quality of subsistence mapped information compared to the 1979–1985 period. Subsistence mapping techniques and the digitized conversion of older, "legacy" data to GIS allows for comparisons and analyses of changes in subsistence use areas over time. Land use patterns for subsistence may be viewed at the community, household, or individual user level for all resources, or broken down into species and the last 12 months use area, last 10 years use area, or the user's lifetime use area. Stratton and Georgette (1985) described the subsistence mapping methodology, as it was practices in the early 1980s. A good example of contemporary collected subsistence map data and conversion of previously collected data for comparative purposes for Tyonek and Beluga is found in Stanek, Holen, and Wassillie (2007). No subsistence mapping information is known to exist from the 1979–1985 era Susitna studies in the immediate vicinity of the Watana hydroelectric project site and impoundment area.

1.4 Traditional Ecological Knowledge (TEK)

Traditional Ecological Knowledge, TEK has emerged as a topic of study and concern over the past 30 years in the arctic and other parts of the world. The concept emerged from the recognition that scientists trained in western scientific principles and procedures could learn from

[3] The spelling for the Dena'ina Athapascans was Tanaina until modern orthography entered common usage.
[4] The use of brand trade names in this document is not meant to provide endorsement or promotion of any particular manufacturer or product.

aboriginal peoples who had accumulated knowledge about their environment through a lifetime of experiences in, and observations of that environment, and making a living from the land and sea and its resources. The study of TEK was also encouraged, at times even demanded, by Natives and native organizations. They insisted that their accumulated knowledge of the lands in which they lived, of the plants and animals that they harvested, and of the physical environment and changes therein should be recognized as equally valid to that knowledge gained through western scientific methods. Requirements to study environmental impacts of development in the north, and numerous regional, national, and international bodies brought TEK to the forefront for consideration in the decision-making process. A major challenge to researchers and decision-makers now, is how to integrate the two sources of knowledge in a meaningful and productive way (Huntington 1998).

Over the last decade, considerable effort has been made to document the local traditional knowledge (LTK) of Alaska Natives (Huntington 1998; Huntington 1999; Wheeler and Craver 2005; Brelsford 2009), and a number of strategies have been employed to collect and make LTK available to a broader audience. These strategies include compiling databases of existing information (Burwell 2001; see also Coiley-Kenner et al. 2003 and Mishler 1999), convening regional workshops attended by managers and LTK holders (Huntington et al. 2002; Ecotrust 2005, 2006), and conducting ethnographic research to document LTK (Andersen and Fleener 2001; Simeone and Kari 2002; Brown et al. 2005; Langdon 2006).

Definitions of TEK abound. Similar terms with nearly the same meaning include local knowledge (LK), indigenous knowledge (IK), local traditional knowledge (LTK), or local ecological knowledge (LEK). Huntington (1998:237) states that "TEK is the system of experiential knowledge gained by continual observation and transmitted among members of a community." Nadasdy (1999:2), writing on the challenges of integrating TEK and western science notes that "in contrast to traditional knowledge, which is assumed to be qualitative, intuitive, holistic, and oral, science is seen as quantitative, analytical, reductionist, and literate." Berkes (1999:8), writing on the challenges of integrating TEK with sustainable resource management practices defines TEK as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and their environments."

Resource managers have started to gather and integrate TEK into research programs and co-management plans and partnerships. An early Alaskan example is the development of the Alaska Eskimo Whaling Commission and North Slope Borough support for gathering TEK from Alaskan Native whalers. Their knowledge was needed to counter the data on low bowhead whale numbers that was moving the International Whaling Commission (IWC) towards a complete ban on subsistence whaling. Data presented to the IWC in 1978 led to a quota of allowed strikes and harvests. Historical information justified the cultural and subsistence need. Rigorous bowhead whale census and other biological and behavioral studies were combined with the TEK of whalers showing that more bowheads were present than previously believed. The result has been a steady increase in the number of AEWC member communities, and an increase in allowed harvests (Bockstoce 1977, 1978, 1980; Braund and Moorehead 2009). The utility of

TEK is that it adds knowledge, perspective, and meaningful participation by the people most affected by resource management and development plans.

Some points about traditional knowledge include the following:

- Traditional knowledge is inherently local, focused on finding food and other resources in specific environments.
- Observations of very specific localities, over a long period of time, may detect changes or phenomena that are not statistically relevant and so not noted or appreciated by scientists, but they often influence local people's views of their environment.
- Unlike western science, which develops precise categories of study, traditional knowledge is cumulative. That is, a local person's view of their environment is frequently shaped by a wide variety of factors, including the circumstances of competition over resources, regulation, and history.
- Like western science, traditional knowledge is set within a paradigm of the human/environmental relationship. In general, Alaska Native traditions emphasize that everything in nature is sentient or possess awareness. All things, animate or inanimate posses power or a spiritual potency.
- Animals and fish are considered sentient beings and no distinction is made between humans and animals as to their humanness. Humans and animals are considered human and nonhuman persons possessing awareness and meriting respect (Feinup-Riordan 2000). Animals and humans have a reciprocal relationship. Animals give themselves freely to humans so that humans may live, and in return humans must treat animals with respect.

1.5 Place Names

Place names provide the most useful geographical reference system in the world. They provide insight into land use patterns and the way humans relate to the natural world. Athabascan place names are a "shared, memorized verbally transmitted geographic system that is congruent across language and dialect boundaries" (Kari 2008:1). Place names describe the natural environment, with an emphasis on natural history. For example, 75% of Ahtna place names pertain to natural history, such a hydrology, land forms, vegetation, and fauna, while another 15% reference human activities and weather phenomena (Kari 2008:26). Unlike western naming conventions, which are generally less descriptive, and include the use of personal names, there are very few Ahtna or Dena'ina places that are named for individuals.

Ahtna and Dena'ina place names follow strict conventions which enable the traveler to locate themselves within the landscape. Athabascan place names typically have a two part structure (Kari and Fall 2003:35–38). The first word is specific term, either a verb or noun; the second a generic term for an identifiable type of feature. Table 1 presents an abbreviated list of generic terms that appear regularly in Dena'ina and Ahtna place names.

Table 1. Geographic terms in Dena'ina and Ahtna languages.

Geographic Term	Dena'ina	Ahtna
stream	*tnu*	*na'*
stream mouth	*kaq'*	*caeq'e*
lake	*ben/bena*	*ben/bene*
lake mouth stream	*q'estnu*	*k'ese*
mountain	*dghelay/dghelaya'*	*dghelaay/dghelaaye'*
plain	*ken/kena'*	*cen/cene'*
Source: Adapted from Kari and Fall 2003:35 by Northern Land Use Research, Inc.		

Place names often occur in clusters. For example the name in Ahtna for Marmot Mountain, which is located on the upper Nenana River, is *Kuyxi Dghelaay*, while the name for the base of Marmot Mountain is *Kuyxi Dghelaay Cene*, and a creek flowing off Marmot Mountain is *Kuyxi Dghelaay Na'* (Kari 2008:141).

The proposed project area is located near the traditional boundary of the Ahtna and Dena'ina people. On the main Susitna River the boundary was Devil Canyon, which has both a Dena'ina place name, *Nutughił'ut* and Ahtna place name, *Nataghił'aade* – both mean 'Where current flows down' (Kari and Fall 2003:219). Below the canyon all place names are in the Dena'ina language while those above the canyon place names are mainly Ahtna, although a few have both Dena'ina and Ahtna names. For example, the Oshetna River is called *Q'usatnu* in Dena'ina and *K'aasin Na'* in Ahtna. Over 350 Ahtna place names have been documented within the vicinity of the proposed project area (Kari and Fall 2003:216). Many of these names were known by both Ahtna and Dena'ina speakers.

2.0 PROJECT HISTORY

The Susitna River was identified as potential large hydropower site in the 1940s by the Bureau of Reclamation. In a 1976 report to Congress, the U.S. Army Corps of Engineers (Corps) proposed a two-dam scheme capable of producing 7,300 Gigawatt hours (GWh) of hydropower (Harza Ebasco 1987). This concept was adopted by the Alaska Power Authority (APA), which began managing the project in 1980, and contracted with Acres America to review economic and environmental feasibility and file a FERC license application. Later Harza-Ebasco was contracted to update the license application and perform final design. The 1980s APA Project consisted of two dams: the first located in Watana canyon at approximately river mile (RM) 184 and a second located at Devils Canyon (referred to as the Devil Canyon site in most earlier studies) (RM 152). The 1980s APA Project effort culminated in the development of a license application filed with FERC in 1983, and an amended license application prepared in 1985.

The State of Alaska cancelled the project in early 1986 in the face of declining oil revenues. In support of the 1983 and 1985 FERC license applications, the APA conducted comprehensive baseline environmental studies throughout the Basin. However, research into the subsistence uses of fish and wildlife resources was in its infancy at this time in the early 1980s. The Subsistence Section, later the Division of Subsistence in the Alaska Department of Fish and Game was only established in the late 1970s. The management of fish and game resources for subsistence purposes was a new approach in wildlife management. Harza-Ebasco (1987) cataloged a library of more than 3,500 project-related reference documents at the conclusion of the 1980s APA project. Of those 3,500, only a handful dealt with the topic of subsistence, which was often included under sport or commercial harvests of fish and game, or as a minor economic topic (Alaska Power Authority 1988a, 1988b).

The current Watana Hydroelectric Project being evaluated by the AEA is located approximately halfway between Anchorage and Fairbanks in the upper Susitna Basin. It would create a single dam on the Susitna River at RM 184 in the vicinity of Watana canyon. The approximately 700-foot-high dam would have an approximate 557-foot difference between tail water and maximum pond elevation, with a maximum pond approximately at the 2,014-foot elevation (AEA 2010). Watana Reservoir would be 39 miles long and a maximum of 2 miles wide. The dam's installed capacity would be around 600 megawatts (MW) with the average annual generation estimated to be 2,600 GWh (AEA 2010). The AEA is currently studying design considerations in order to formulate a decision regarding the type of dam or powerhouse (underground or surface) that would be used or the actual final maximum reservoir level. At this time, the actual operation characteristics of the project are not known, but the current concept is that the project would provide peaking operations using the reservoir storage to meet daily instream flow and power needs.

3.0 DATA GAP ANALYSIS

The licensing effort of the 1980s APA Project generated a substantial body of literature, some of which might be used to support future licensing. To evaluate potential impacts and protect wildlife and their habitats, the 1980s study effort sought to describe baseline conditions at a level of reliability necessary to detect and explain possible future changes caused by the proposed hydroelectric development as it was configured at that time (ADF&G 1985a). As noted above, research specifically focused on investigating subsistence uses of fish and wildlife resources was not a significant research component of the 1980s studies. Additional reports related to subsistence resources have been published since the mid-1980s that are relevant to the present data gap study.

3.1 Methodology Approach

The existing information was evaluated in terms of its potential relevance and completeness, and whether the methods used produced information that could be applicable to the anticipated environmental analysis for the proposed Project. Other sources of information used in the analysis included that derived from contacts with agency project leaders and database searches. If information was determined to be likely insufficient for satisfying environmental analysis requirements, a potential data gap was identified.

Hunting, fishing, and gathering have been a vital component of the Alaska's culture and economy for many millennia. These activities, now referred to as subsistence, are still important and have been given prominence in both state and federal law. A number of small communities in which subsistence plays an important role surround the upper Susitna River drainage, the project study area. Many of these communities have been the subject of studies describing the harvest and use of wild resources and the importance of these resources to the local economy and culture. The purpose of this Data Gap Analysis is to provide information on these studies and to indicate gaps in the data.

The upper Susitna is relatively remote. There are no communities directly within the project study area. We cast a wide net for this data gap study and included all communities in the surrounding area. There are three subsets of communities based on geographic location: the rural communities of the upper Susitna drainage, rural communities of the upper Copper River drainage, and the Matanuska-Susitna valley communities, which are more urban. We included the Matanuska-Susitna communities of Wasilla, Willow, and Palmer because residents of those communities hunt and fish in the Copper River and Susitna River drainages. In the rural areas of the upper Susitna and upper Copper Rivers there are discrete communities, such as Cantwell, Glennallen, and Copper Center, and dispersed highway communities, such as Chase or Nelchina.

The subsistence literature documents reviewed for this data gap report were selected from several repositories of information. Three sources provided the majority of the documents. First, the two Susitna Hydroelectric project document indexes prepared in 1988 were reviewed (indexed by author, and by APA document number) (APA 1988a, 1988b). Second, NLUR examined the State of Alaska's CSIS website. All Division of Subsistence Technical Papers

relevant to the communities listed in section 1 were downloaded for review and analysis. Third, the Federal U.S. Fish and Wildlife Service Office of Subsistence Management website was examined. Documents relevant to the listed communities were downloaded for review and analysis. This method resulted in a total of 18 documents for examination as to their relevance, completeness, and applicability

3.2 Data Sources - Subsistence

The following sources of subsistence data were reviewed for the preparation of this data gap report.

- Documents listed in the 1988 Susitna Hydroelectric Project document indexes which were coded as subsistence, socioeconomics, or fish and game harvests.
- ADF&G Division of Subsistence Technical Paper series for Copper Basin and upper Susitna River communities. These reports are available from the ADF&G website. Some of the research has been supported by the U.S. Fish and Wildlife, Office of Subsistence Management, Fisheries Information Service and those reports can found on that website.
- ADF&G Division of Subsistence Special Publication Series includes reports to the Board of Game and Board of Fish.
- Community Subsistence Harvest Information System (CSIS) is the repository of the Alaska community harvest information gathered by the by the Alaska Department of Fish and Game, Division of Subsistence. These data can be accessed by community, resource by category, resource by region, or state or federal subsistence region. The data covers resources harvested, used and shared, information on the local wage economy, such as sources of income, and demographics. Harvest data are provided by individual animals or fish harvested, estimated pounds of usable resource, per capita harvest. The CSIS can be accessed at http://www.adfg.alaska.gov/sb/CSIS.
- Info Net is a repository of harvest data maintained by the Alaska Department of Fish and Game, Division of Wildlife Conservation. It is not available to the general public.
- U.S. Department of the Interior, Fish and Wildlife Service, Office of Subsistence Management website of publications.

3.3 Data Sources and Available Information - TEK

As noted above, the proposed project area is located near what was once the traditional boundary of the Ahtna and the Dena'ina. Sometime in eighteenth century, the Western Ahtna *Hwt'anwene*" or "Little Tree People", made incursions into the upper Susitna drainage so that now much of the area is considered Ahtna Territory (Kari and Fall 2003; Kari 2008). This discussion of sources on TEK is organized by Native ethnic group.

3.3.1 Ahtna

A number of publications hold information on Ahtna traditional knowledge, but there are no Ahtna traditional knowledge studies that focus specifically on the proposed project area. Frederica de Laguna (1969–70) provided a general overview of the Ahtna perspective of the relationship between humans and animals. Limited information on Ahtna knowledge of big game species is in Simeone (2006). Scattered references to Ahtna traditional knowledge on a wide variety of subsistence resources are found in the various Alaska Department of Fish and Game Subsistence Division technical papers listed in the reference section of this report. Unpublished sources of Ahtna traditional knowledge are interviews recorded with Ahtna elders. Recordings, and in some cases transcripts, of these recordings are located at the Alaska Native Language Center at the University of Alaska in Fairbanks and the Ahtna Heritage Foundation in Copper Center.

Ahtna traditional knowledge of salmon and non-salmon fish species is the most thoroughly documented. Information on Ahtna knowledge of salmon is in Simeone and Kari (2002); Simeone and Valentine (2007), and Simeone et al. (2010). The first of these reports provides information on Ahtna linguistic terminology of salmon and other fish species; Ahtna knowledge of salmon life history and distribution; the Ahtna management system; the harvest and preparation of salmon, and oral traditions about salmon. The second report combined Ahtna TEK with data from the biological and social sciences to document changes in the upper Copper River salmon fishery over the last 100 years. An assessment of the similarities and differences between TEK and scientific knowledge of Pacific salmon returning to the Copper River is presented in Simeone et al. (2010). Ahtna knowledge of non-salmon fish species is documented in Simeone and Kari (2004) and includes Ahtna knowledge of the life history, distribution, and abundance of various species of whitefish, arctic grayling, and species of trout indigenous to the Copper River watershed.

3.3.2 Dena'ina

There are no studies of Dena'ina TEK specific to the proposed project area. Dena'ina perspectives on the upper Susitna River drainage and local subsistence resources are found throughout the place names reported in Kari and Fall (2003). For general discussions of Dena'ina traditional knowledge, including beliefs about the relationship between humans and animals, see Osgood (1937, reprint 1976), and Fall (1987). A Dena'ina perspective on the human/animal relationship is well presented in Alexan (1965). Information on Dena'ina plant lore is available in P. Kari (1991). Unpublished sources of Dena'ina traditional knowledge are interviews recorded with Dena'ina elders. Recordings, and in some cases transcripts, of some of these recordings can be found in the Alaska Native Language Center at the University of Alaska in Fairbanks.

3.4 Data Sources and Available Information - Placenames

As noted above, sometime in the nineteenth century western Ahtna moved into the upper Susitna River drainage from their base on the Tyone River (Kari and Fall 2003:215). Most of the place names for the proposed project area (above Devil Canyon) are Ahtna place names, although

there are a few Dena'ina names, reflecting the fact that the area was once Dena'ina territory. This discussion of sources is arranged by cultural group.

3.4.1 Ahtna

Ahtna is the most comprehensive geographic place name data set for any Alaska Native language, with a list of over 2200 names (Kari 2008). The most recent list is Dr. James Kari's compilation entitled *Ahtna Place Names Lists,* revised and reissued in 2008. The list is arranged by geographic area within the Ahtna language area. Each name is assigned a number followed by the Ahtna name, latitude and longitude, the English name, and a translation. For example, the Susitna River is number 1413 on the list. The Ahtna name is *Sasutna'* which translates to 'sand river' or 'major river' (Kari 2008:141).

Other sources of data on Ahtna place names include Kari and Kari (1987), Kari and Tuttle (2005), and Reckord (1983). There are also two unpublished annotated place name lists, one produced by de Laguna in 1970 and the other by Constance West in 1973.

3.4.2 Dena'ina

The documentation of Dena'ina place names is less complete than for the Ahtna. The most thoroughly documented set of Dena'ina place names appears in *Shem Pete's Alaska* and pertains to the Upper Cook Inlet area, which includes the upper Susitna River to Devil Canyon (Kari and Fall 2003). This volume includes both Dena'ina and Ahtna place names for the proposed project area as well as Dena'ina and Ahtna oral traditions related to the upper Susitna drainage. Place names are arranged geographically: each name is provided a number, followed by the Dena'ina name, a translation of the name, approximate location, and historical information about the place name from Dena'ina informants and published and unpublished accounts. Place names for the Upper Sustina River appear in Chapter 10 where there are 55 names listed (Kari and Fall 2003: 215–230).

Other sources of data on Dena'ina place names include Evanoff (2010) and Balluta (2008)—both of these publications deal with Inland Dena'ina dialect speakers who live around Lake Clark and the tributaries of the upper Kuskokwim River. The Kari and Kari (1982) report on the ethnography of Dena'ina country. Their report includes a list of place names for a number of Dena'ina dialect groups including those Dena'ina living in upper Cook Inlet and the Susitna River drainage, as far north as Devil Canyon.

4.0 RESULTS

This section presents the results of research into the existing literature about subsistence in and adjacent to the Project study area. Information is presented in four subsections. Section 4.1 presents information about subsistence uses organized by community. Section 4.2 presents information about subsistence uses presented on a report-by-report basis. Section 4.3 presents information about available subsistence mapping information, summarized from the available literature. The available subsistence harvest information through the CSIS is described in section 4.4.

4.1 Subsistence Information Organized by Community

The proposed project area is located along the border of traditional Ahtna and Dena'ina territory. The Ahtna are an Athabascan-speaking people whose traditional territory included the entire Copper River Basin. The Western Ahtna, *Hwtsaay Hwt'aene* or 'Little Tree People' inhabited an area that included the western edge of the Talkeetna Mountains and upper Susitna drainage. The Dena'ina are an Athabascan-speaking people whose traditional territory included the middle Susitna River. Dena'ina hunters occasionally entered Ahtna territory to hunt (Kari and Fall 2003:215–216).

Beginning in the mid 20th century the Copper River Basin became a popular place to hunt and fish for the growing populations of Anchorage, Fairbanks, and the Matanuska-Susitna Valley. While the population of the Copper River Basin has remained relatively stable since the mid 1970s, the population of urban areas almost doubled from 1980 to 2009.

Communities in the Vicinity of the Proposed Project Area

Non Copper Basin Communities

The average per capita harvest of subsistence foods in rural Alaska is 375 pounds while in urban Alaska it is 22 pounds. The per capita income for Anchorage is $25,287 and the median family income in $63,682.
http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.cfm?Comm_Boro_Name=Anchorage&Data_Type=economyIncome&submit2=Get+Data

Cantwell, located at the junction of the Parks and Denali Highways. Cantwell is a mixed community with Native and non-Native residents. In 2010 the population of Cantwell was 219. It is within the Denali Borough and a majority of the Native residents of Cantwell are enrolled in the ANCSA regional corporation Ahtna Incorporated. The population was approximately 15.5 percent American Indian or Alaska Native. The per capita income in 2009 was $22,359 while the median household income was $48,750. The Division of Subsistence conducted household surveys in Cantwell in 1983 (Stratton and Georgette (1984), and again in 2000 (Simeone 2002). Following is a description of those studies.
(Population and economic data from http://www.commerce.state.ak.us/dca/commdb/CIS.cfm Accessed 5/26/2011)

Stratton and Georgette 1983, Technical Paper 107

Purpose: the study's purpose was to document harvest and use levels of wild resources and to collect socioeconomic and demographic data on communities in the Copper River Basin. Cantwell was included in the study because the Alaska Native people who live in Cantwell are Ahtna and are members of Ahtna Incorporated, which has its corporate headquarters in Glennallen.

Methods: the primary method used in this study was household interviews. The Division of Subsistence developed an interview protocol that included questions about household size, participation in harvest activities, amounts harvested, use of resources, the sharing of wild, and types of transportation used to obtain resources. Demographic information, such as length of residency, place of birth, and ethnicity was collected. Interviewees were also asked about employment and sources of income. Interviews were conducted with an adult, often the head of household. Interviewees were asked about subsistence activities for members of the entire household for the previous 12 month period. Harvest location data was not collected any species except moose. No mapped data was collected.

Results: In 1983 the population of Cantwell was approximately 136 people living in 47 households. Of these, 43 or 92 percent of households were interviewed. The study found that most heads of households were employed 6.6 months of the year. The per-capita wild food harvest was 130 pounds and the mean household harvest 378 pounds. Big game, mainly moose and caribou, accounted for two-thirds of the mean household harvest while fish accounted for one fourth. Because salmon is not locally available, most salmon fishing occurred with rod and reel some distance from the community. Hunting effort was concentrated on moose and caribou, mostly in the nearby Talkeetna Mountains with some occurring in the Alaska Range. Cantwell residents were eligible to hunt for caribou in the fall and winter, and to hunt moose during the regular fall season.

Simeone 2002, Technical Paper 272

Purpose: the purpose of this study was to update earlier research on Cantwell. The objectives of this study were similar to the Stratton and Georgette (1983) study, to collect socioeconomic and demographic data, and to document the subsistence patterns of community residents. Under Title VIII of ANILCA, Cantwell is recognized as a subsistence use community of the Denali National Park and Preserve (DENA). The National Park Service wanted to document the harvest and use of wild resources by Cantwell residents in the Denali National Park and Preserve. For this reason harvest location data was mapped.

Method: the primary method used in this study was household interviews and interviews with key informants. The Division of Subsistence developed a survey instrument that included questions about household size, participation in harvest activities, amounts harvested, use of resources, the sharing of wild, types of transportation used to obtain resources, and lifetime use areas. Demographic information, such as length of residency, place of birth, and ethnicity was

collected. Interviewees were also asked about employment and sources of income. They were also asked questions about the intergenerational transmission of knowledge and what parts of the animal they used after the animal was harvested. Interviews were conducted with an adult, often the head of household. Interviewees were asked about subsistence activities for members of the entire household for the previous 12 month period. To develop the sample, a list of households was compiled and a sample drawn from that list.

Results: In 2000 the population of Cantwell was between 222 and 210 persons living in 94 households. About 19 percent was Native, primarily Ahtna. Researchers interviewed 76 (79.1 percent) of the approximately 96 year-round households. The study found that only 46.6 percent of adults were employed year around. For the study year, the total community harvest was 27,599 pounds of usable weight, or a household average of 293 pounds, and a per capita harvest of 135 pounds.

Moose made up the largest component of the community's resource harvest (12,368 pounds or 44.8 percent of all resources); caribou (3,698 pounds) and sockeye salmon (3,084 pounds) ranked second and third. Harvest location data was collected during this survey. This data shows that most Cantwell hunters hunt moose, bear and caribou along the Denali Highway, including Brushkana Creek. In addition, Dall sheep, moose, caribou and bear are hunted in areas adjacent to the Parks Highway in Broad Pass, and the eastern edge of Denali National Park, where hunting in allowed (map on page 39).

Wasilla, located on the Parks Highway. Non-Native community.
The 2010 population of Wasilla was 7,831 people. The population is 5.2 percent American Indian or Alaska Native. The per capita income in 2009 was $24,221, and the median household income $53,977. Wasilla is located in the Matanuska-Susitna Borough.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm , accessed May 31, 2011)

The Division of Subsistence has not conducted household surveys in Wasilla. Wasilla is located within a non-subsistence area. The state of Alaska provides opportunity for Wasilla residents to participate in subsistence hunts in other parts of the state; for example, Wasilla residents can apply for subsistence permits to hunt Nelchina Caribou or obtain a permit to fish the Copper River Subsistence salmon fishery. Information on Wasilla resident's participation in subsistence hunts can be found at the Alaska Department of Fish and Game, Division of Wildlife Conservation.

Willow, located on the Parks Highway. Non-Native community.
The 2010 population of Willow was 2,102 people. The population was 5.2 percent American Indian or Alaska Native. The per capita income in 2009 was $27,783, and the median household income $69,010. Willow is located in the Matanuska-Susitna Borough.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm , accessed May 31, 2011)

The Division of Subsistence has not conducted household surveys in Willow. Willow is located within a non-subsistence area. The state of Alaska provides opportunity for Willow residents to participate in subsistence hunts in other parts of the state; for example, Willow residents can

apply for subsistence permits to hunt Nelchina Caribou or obtain a permit to fish the Copper River Subsistence salmon fishery. Information on Willow resident's participation in subsistence hunts can be found at the Alaska Department of Fish and Game, Division of Wildlife Conservation.

Talkeetna, located off the Parks Highway. The 2010 population of Talkeetna was 876 people. The population was 3.7 percent American Indian or Alaska Native. The per capita income in 2009 was $21, 737and the median household income $42,596. Talkeetna is located in the Matanuska-Susitna Borough. As the take-off point for fishing and flightseeing trips and a staging area for Denali climbing expeditions, Talkeetna provides air taxis, helicopters, outfitters, and related services. Numerous air taxis provide transport to Kahiltna Glacier Base Camp. All climbers must register for Mount McKinley and Mount Foraker. In 2009, nine area residents held commercial fishing permits.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm , accessed May 31, 2011)

Trapper Creek, located on the Parks Highway. Non-Native community.
The 2010 population of Trapper Creek was 481 people. The population was 6.4 percent American Indian or Alaska Native. The per capita income in 2009 was $19,996 and the median household income $22,614. Trapper is located in the Matanuska-Susitna Borough. Subsistence and sporting activities are an integral part of the lifestyle. Some residents are retired. Those who are employed work in a variety of industries, such as education, transportation, and construction. In 2009, five residents held commercial fishing permits.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31,2011)

Parks Highway, households scattered along the Parks Highway
There is no aggregate data on subsistence for these households along the Parks Highway.

Petersville Road
The 2010 population of Petersville Road was 4 people. In 2000, the population of Petersville Road was 27 people. Per capita income was $43,200; there is no data on household income. Subsistence and sporting activities are an integral part of the lifestyle. Some residents are retired. Those who are employed work in a variety of industries such as education, transportation, and construction. A lodge and several bed and breakfast businesses are located in the area.
(http://www.commerce.state.ak.us/dcra/commdb/CF_BLOCK.htm Accessed May 31, 2011)

Information on subsistence activities of the above three communities (Trapper Creek, Parks Highway households, and Petersville Road) was collected by the Division of Subsistence in 1986.

Fall and Foster 1987, Technical Paper 143.
Research on Talkeetna, Trapper Creek, Parks Highway, and the upper part of the Petersville Road was part of a project examining the role of wild resources in dispersed settlements in southcentral Alaska.

Method: the primary method used in this study was household interviews. The Division of Subsistence developed an interview protocol that included questions about household size, participation in harvest activities, amounts harvested, use of resources, the sharing of wild, and types of transportation used to obtain resources. Demographic information, such as length of residency, place of birth, and ethnicity was collected. Interviewees were also asked about employment and sources of income. Interviews were conducted with an adult, often the head of household. Interviewees were asked about subsistence activities for members of the entire household for the previous 12 month period. To develop the sample, researchers obtained tax assessment records from the borough. From this list, researchers were able to draw a random sample.

Results: Division staff interviewed 134 households or about 31 percent of the 429 year-round households. The study found that 61 percent of sampled adults had been employed for at least one month of the year and that average length of employment for employed adults was 9.7 months. The per capita harvest of wild resources for surveyed communities was 70.1 pounds of edible weight. Ninety-four percent of sampled household used at least one kind of wild fish, game or plant resource in the study year. Salmon was the most commonly used resource (81.3 percent). Since there was no nearby subsistence salmon net fishery the overwhelming majority of salmon was harvested with rod and reel under sport fishing regulations (90.7 percent). Wild game was harvested by 56 percent of sampled households. Salmon comprised the largest portion of the total (41.4 percent). Game, mostly moose, made up 33.4 percent. Caribou did not inhabit the study area in 1985–86, but 7.5 percent of hunters reported hunting caribou, probably from the Nelchina caribou herd east and north of Talkeetna and Trapper Creek. Other species of fish, game and plants made up the remainder.
This study did not collect location data on where households fished, hunted or gathered plants. We can assume that most subsistence activities took place nearby.

Stanek, Fall and Foster 1988, Technical Paper 161

In 1986 the Division of Subsistence conducted another study on the subsistence harvests in three study areas located between Trapper Creek and Cantwell. These areas included Chase, located north of Talkeetna, Gold Creek, located directly north of Chase, and along the Parks Highway from milepost 132.8 to Milepost 202.1 (the boundary of the Matanuska-Susitna Borough. This last area was referred to as the Hurricane–Broad Pass area. The research was part of a larger project to investigate developing patterns of wild resource uses in communities settled as the result of state and federal land disposal programs.[5]

Method: the primary method used in this study was household interviews. The Division of Subsistence developed a survey instrument that included questions about household size, participation in harvest activities, amounts harvested, use of resources, the sharing of wild, and types of transportation used to obtain resources. Demographic information, such as length of residency, place of birth, and ethnicity was collected. Interviewees were also asked about

[5] The Alaska Department of Natural Resources funded case studies of three past State land offerings (Denali Lake, Talkeetna Paper Subdivision, Hiline Lake) (Stephen R. Braund & Associates 1984). Some data on harvests of wildlife resources is presented in that report.

employment and sources of income. Interviews were conducted with an adult, often the head of household. Interviewees were asked about subsistence activities for members of the entire household for the previous 12 month period. Each interviewed household was also asked to indicate resource harvest areas on USGS maps. To develop the sample, researchers developed a list of households and mapped household locations. From this list, researchers were able to draw a random sample.

Results: Sample sizes in each community are listed below:

Chase—interviewed 17 households or 57 percent of the 30 year-round households.
Gold Creek–Chulitna area—interviewed five of the six year round households (83 percent).
Parks Highway—interviewed eight of the 12 year round households (67 percent).

The study found that wage employment was largely seasonal and that respondents opted to live in these remote areas in order to hunt and fish. Almost every household in the survey harvested or used wild resources. Land mammals made up the dominant resource category in all three places.

This study looked at resources harvest areas for the residents of the three study locations:

- Chase—A majority of the harvest took place close to where people lived including portions of the middle Susitna and Talkeetna river drainages, including a major portion of the Chunilna Creek (Clear Creek drainage) (Stanek, Fall, Foster 1983:41-42).
- Gold Creek–Chulitna area—Like the residents of Chase, the residents of Gold Creek conducted subsistence activities generally close to home. The core subsistence area included the railroad corridor from Curry to Hurricane, as well as portions of the Susitna River, Chulitna River and Chunilna Creek (Stanek, Fall, Foster 1983:79).
- Hurricane–Broad Pass area—The core subsistence area for these residents included most of the Chulitna River drainage including the Parks Highway and the Alaska Railroad corridors from Trapper Creek to Cantwell. Also used were portions of the upper Nenana and Susitna River drainages accessed from the Denali Highway (Stanek, Fall, and Foster 1983:79).

Denali Highway (lodges and individual homes)

The Division of Subsistence has not conducted household surveys along the Denali Highway.

Palmer

The 2010 population of Palmer was 5,937 people. The population was 9.2 percent American Indian or Alaska Native. The per capita income in 2009 was $21,105 and the median household income $60,000. Palmer is located in the Matanuska-Susitna Borough. Many Palmer residents commute to Anchorage for employment. Palmer's economy is based on a diversity of retail and other services and city, borough, state, and federal government. Some light manufacturing occurs.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

The Division of Subsistence has not conducted household surveys in Palmer. Palmer is located within a non-subsistence area. The state of Alaska provides opportunity for Palmer residents to participate in subsistence hunts in other parts of the state; for example, Palmer residents can

apply for subsistence permits to hunt Nelchina Caribou or obtain a permit to fish the Copper River Subsistence salmon fishery. Information on Palmer resident's participation in subsistence hunts can be found at the Alaska Department of Fish and Game, Division of Wildlife Conservation.

Copper Basin Communities

The Division has conducted a number of studies on subsistence harvest and use patterns in the Copper River Basin. All of the communities listed below have been included in these studies, which can be separated into baseline surveys that include information on the harvest and use of all categories of subsistence resources; and issue studies that usually focus on a single species, particularly caribou and salmon. Baseline studies of the Copper Basin are regional. This list includes all of the major communities in the Copper Basin. We have not included descriptions of the more dispersed road communities.

Paxson is located at the junction of the Richardson and Denali Highways. The 2010 population of Paxson was 40 people. No American Indian or Alaska Natives are reported to live in Paxson. In 2000 the per capita income was $26,071 and the median household income $46,500. There are five lodges with restaurants and bars in the area, several gift shops, a post office, gas station, grocery store, and bunk house. This area has been a testing site for snowmachine companies for the past several years. Most income is generated during the summer months. Hunting and other subsistence activities contribute to the local economy.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm , accessed May 31, 2011)

Mentasta, (also called Mentasta Lake) is located about 6 miles off the "Tok Cutoff." The 2010 population of Mentasta was 112 people. The population was 76 percent American Indian or Alaska Native. Mentasta has a federally recognized tribal government and, along with the community of Chistochina, belongs to the Mount Sanford Tribal Consortium. Native residents are also members of Ahtna Incorporated. In 2009 the per capita income was $9,457 and the median household income $21,875. There are several older village sites located around the lake. The families that presently reside in Mentasta Lake come from the old village of Mentasta, Batzulnetas, Nabesna, Suslota, and Slana. Subsistence activities are a crucial component of the village economy and culture.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Slana is located along the "Tok Cutoff" and the Nabesna Road. The 2010 population of Slana was 147 people. The population was 13 percent American Indian or Alaska Native. In 2009 the per capita income was $18,106 and the median household income $45,156. A roadside lodge provides groceries, gas, liquor, an auto mechanic, and RV parking. Other local businesses include a general store, art gallery, canoe rental, bed and breakfast, snowmachine sales, and solar panel sales. A U.S. National Park Ranger Station and state highway maintenance camp are located nearby. Subsistence activities supplement income.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Chistochina or *Cheesh Na'* is located on the "Tok Cutoff." The 2010 population of Chistochina was 93 people. The population was 54 percent American Indian or Alaska Native. *Cheesh Na'* is a federally recognized tribe and, along with Mentasta, belongs to the Mount Sanford Tribal Consortium. Native residents are also members of Ahtna Incorporated. In 2009 the per capita income was $25,371 and the median household income $46,071. Chistochina was the location of an Ahtna fish camp. The village access road later became part of the Valdez–Eagle Trail, constructed by miners during the gold rush to the Eagle area in 1897. The trail was used for construction of U.S. Army Signal Corps telegraph lines from Valdez to Eagle between 1901 and 1904. Gold was mined along the upper Chistochina River and its runoff creeks. The area was settled by homesteaders, although it has remained a traditional Ahtna village. Subsistence activities are a crucial component of the village economy and culture. (http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Gulkana is located on the Richardson Highway. The 2010 population of Gulkana was 119 people. The population was 76 percent American Indian or Alaska Native. Gulkana Village is a federally recognized tribe and Native residents are members of Ahtna Incorporated. In 2009 the per capita income was $11,298 and the median household income $68,750. Gulkana was originally established in 1903 as a telegraph station and was named "Kulkana" after the nearby river. Gulkana was originally located across the river from its present site; it was cut in half by construction of the Richardson Highway during World War II. In the early 1950s, the first house was built at the new site. Chief Ewan and his family were the first Native residents, and eventually all of the villagers relocated. Subsistence activities are a crucial component of the village economy and culture. (http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Gakona is located at the confluence of the Gakona and Copper Rivers at mile 2 on the "Tok Cutoff." The 2010 population of Gakona was 218 people. The population was 20 percent American Indian or Alaska Native. Gakona Village is a federally recognized tribe and Native residents are members of Ahtna Incorporated. In 2009 the per capita income was $28,206 and the median household income $81,500. Gakona is the site of an Ahtna village that was located near the confluence of the Gakona and Copper Rivers. In 1904 Doyle's Roadhouse was constructed at the junction of the Valdez–Eagle and Valdez–Fairbanks Trails and became an essential stopping point for travelers. There is now a post office, and lodge. Subsistence activities are a crucial component of the village economy and culture. (http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Glennallen is located at the junction of the Glenn and Richardson Highways. The 2010 population of Glennallen was 483 people. The population was 8 percent American Indian or Alaska Native. In 2009 the per capita income was $22,799 and the median household income $48,421. Glennallen is the supply hub of the Copper River region. Local businesses serve area residents and Glenn Highway traffic with supplies, services, schools, and medical care. State highway maintenance and federal offices are in Glennallen. RV parks, lodging, fuel, and other services cater to independent travelers. Offices for the Bureau of Land Management, Alaska State Troopers, and the Department of Fish and Game are located here. (http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Copperville is located Richardson Highway, five miles south of Glennallen. The estimated 2009 population of Copperville was 131 people. The community is primarily non-Native. In 2009 the per capita income was $20,716 and the median household income $49,792. (http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Tazlina is located on the Richardson Highway. The 2010 population of Tazlina was 297 people. The population was 34 percent American Indian or Alaska Native. The Native village of Tazlina is a federally recognized tribe and Native residents of the community are members of Ahtna Incorporated. In 2009 the per capita income was $29,050 and the median household income $63,750. At the beginning of the 20th century, a permanent Ahtna village was established on the north and south banks off the Tazlina River near its confluence with the Copper River. During the pipeline era, Tazlina developed around the old Copper Valley School, built to board students from all over the state. It closed in 1971, when local high schools were constructed in the remote areas of the state and boarding schools were discontinued. Subsistence activities are a crucial component of the village economy and culture. Note that Copperville and Tazlina are adjacent communities and often lumped together in research.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Silversprings is located on the old Richardson Highway. The 2010 population of Silversprings was 114 people. The population was 8 percent American Indian or Alaska Native. In 2009 the per capita income was $44,043 and the median household income $85,781. Silver Springs is essentially a bed room community for NPS personnel and, because it is so close to Copper Center often lumped with that community.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Copper Center is located on the old Richardson Highway. The 2010 population of Copper Center was 328 people. The population was 49 percent American Indian or Alaska Native. The Native village of Copper Center or Kluti-Kaah, is a federally recognized tribe and Native residents of the community are members of Ahtna Incorporated. In 2009 the per capita income was $21,010 and the median household income $59,286. Copper Center was the location of an Ahtna fish camp and later a permanent village. During the 1898 gold rush Copper Center became the principal supply center for miners in the Nelchina-Susitna region. In later years the community developed into distinct Native and non-Native settlements. Subsistence activities are a crucial component of the village economy and culture.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

Chitina is located at the end of the Edgerton Highway. The 2010 population of Chitina was 126 people. The population was 20 percent American Indian or Alaska Native. The Native village of Chitina is a federally recognized tribe and Native residents of the community are members of Ahtna Incorporated. In 2009 the per capita income was $16,803 and the median household income $12,500. There were several Ahtna villages in the vicinity of Chitina. The town of Chitina developed after the discovery of copper and the construction of the Copper River and Northwestern Railroad. After the copper mine at Kennicott closed in 1938 Chitina became a

virtual ghost town. Subsistence activities are a crucial component of the village economy and culture.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

McCarthy lies 61 miles east of Chitina on the Kennicott River at the mouth of McCarthy Creek. The 2010 population of McCarthy was 28 people. The population was 96 percent white. In 2009 the per capita income was $12,900. Kennicott was the site of the Kennicott Copper Mine. Today the old mine buildings, artifacts, and colorful history attract visitors during the summer months. Subsistence activities are a crucial component of the village economy and culture.
(http://www.commerce.state.ak.us/dca/commdb/CIS.cfm, accessed May 31, 2011)

4.2 Subsistence Information Organized on a Report-by-Report Basis

Subsistence Division and Studies for the Copper River Basin

The Division has conducted two baseline studies in the Copper Basin, both in the 1980s. A third baseline study is currently being conducted by the National Park Service in cooperation with the Division of Subsistence. The NPS study only covers the communities of Slana, Mentasta, Copper Center, and Chistochina (*Cheesh Na'*).

Subsistence Division Baseline Studies

Stratton, Lee and Susan Georgette

1984 *Use of Fish and Game by Communities in The Copper River Basin, Alaska: A Report On A 1983 Household Survey*. Technical Paper No. 107. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

The purpose of this study was to document harvest and use levels of subsistence resources and to collect socioeconomic and demographic data for the Copper River Basin. Division researchers conducted surveys in 22 communities and/or sample areas. The study area included all Copper Basin communities in addition to communities outside the Basin including Chickaloon, Sheep Mountain, Lake Louise, and Cantwell. Sample sizes ranged from 22 percent to 100 percent of year round households. The study team identified 1,057 households and interviewed 431 households or 40.8 percent.

Method: the primary method used in this study was household interviews. The Division of Subsistence developed a standardized survey instrument that included questions about household size, participation in harvest activities, amounts harvested, use of resources, the sharing of wild, and types of transportation used to obtain resources. Demographic information, such as length of residency, place of birth, and ethnicity was collected. Interviewees were also asked about employment and sources of income. Interviews were conducted with an adult, often the head of household. Interviewees were asked about subsistence activities for members of the entire household for the previous 12-month period. Harvest location data were not collected for any species except moose. No mapped data were included in this report, but see below.

Results: The study found that mean household harvests of resources ranged from a high of 1,233 pounds to 227 pounds, with a majority of communities falling between 290 and 470 pounds per household. Use of resources was slightly higher with most communities reporting a mean household use of between 390 and 670 pounds. Generally, researchers found that the kinds of species harvested and the amount of total harvest was related to geographic location. For example, communities located closer to the Copper River reported higher uses of salmon than those further away, which reported higher uses of big game. Researchers also found that the economy of the region remained marginal and subsistence activities played a significant role in the economy and culture of the study communities.

The community nearest the proposed project is Lake Louise. The sample included households at Lake Louise, Little Lake Louise, Tyone Lake, and Susitna Lake. According to researchers there were few year round residents in the area; the Division identified 15 households and estimated that 39 people considered Lake Louise their permanent residence. Fish, mainly freshwater species, constituted 51 percent of the mean household harvest; big game composed 29 percent, while plants and berries made up another 15 percent. Four households reported harvesting caribou and two reported harvesting moose. Almost all caribou and moose hunting occurred locally on foot, by boat, or by vehicle along the Lake Louise Road.

Stratton, Lee and Susan Georgette

1985 *Copper Basin Resource Use Map Index and Methodology*. Technical Paper No. 124. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

This paper summarized the method used to collect mapped data for subsistence hunting and fishing by residents of the Copper River Basin. The primary method used was interviews with over 200 local residents. The maps are available at the Division of Subsistence office in Anchorage. The maps cover a 20-year period (1964–1984) and the date was recorded on U.S. Geological Survey quadrangle maps (scale 1:250,000). There are some examples of the final product in Stratton and Georgette's report.

McMillan, Patricia O'Brien and Sal V. Cuccarese

1988 *Alaska over-the-horizon backscatter radar system: characteristics of contemporary subsistence use patterns in the Copper River Basin and Upper Tanana Area.* Arctic Environmental and Information and Data Center, University of Alaska Anchorage.

This study was to support an Environmental Assessment (EA) for the United States Air Force. The purpose of the report was to provide a clear, concise understanding of the role of subsistence in the lives of the residence of the Upper Tanana Valley and Copper River Basin. The study was cooperative effort between the Arctic Environmental and Information Data Center, ADF&G Division of Subsistence and the National Park Service. Like the earlier study by Stratton and Georgette (1984), this study covered all Copper Basin Communities. However, the number of sampling units was larger in this study than the earlier 1984 study, which meant that not all of the results were comparable between years.

Method: the primary method used in this study was household interviews. The Division of Subsistence developed a survey instrument that included questions about household size, participation in harvest activities, amounts harvested, use of resources, the sharing of wild, seasonal round and types of transportation used to obtain resources. Demographic information, such as length of residency, place of birth, and ethnicity was collected. Interviewees were also asked about employment and sources of income. Interviews were conducted with an adult, often the head of household. Interviewees were asked about subsistence activities for members of the entire household for the previous 12-month period. Some communities were sampled using a stratified random sample and others were sampled less formally.

Results: Data from this survey was presented by individual community or sampling area. Aggregated data represents both Upper Tanana and Copper River communities. Of the total estimated 1,762 households in the study region, nearly 38 percent were interviewed. The principal resources used were fish, moose, and caribou. Subsistence harvests of Copper Basin residents was dominated by salmon (36 percent), followed by moose (22 percent), and caribou (15 percent). The study also found that most contemporary hunting and fishing follows the regulatory year and occurs in more restricted time periods compared to historical patterns that were based more on environmental conditions particularly weather and the presence or absence of fish and game. Data on land use showed that moose and caribou hunting by Copper Basin residents was largely concentrated in Game Management Unit 13. The study team concluded that this was probably because moose densities were higher in GMU 13 and it includes a major portion of the Nelchina Caribou Herd's fall and winter range. In addition, GMU 13 is served by a network of all-weather roads (see map on page 40). This study also collected data the residence of moose hunters in the study region and area hunted (see table 10, pp. 37–39).

Issue Reports/Papers

Upper Copper River salmon fishery: Issue

There two separate fisheries on the upper Copper River: a subsistence fish wheel fishery in the Glennallen Subdistrict, which includes a portion f the river from the Chitina Bridge to Slana, and a personal use dip net fishery that occurs in the Chitina Subdistrict, located below the Chitina Bridge near the town of Chitina. Before 1980 both these fisheries were classified as subsistence fisheries. In the late 1970s and early 1980s these fisheries began to grow rapidly due largely to an influx of non-Basin residents, i.e. residents from Anchorage, Fairbanks and the Matanuska Valley communities. This expansion was unanticipated by the Department of Fish and Game and not accounted for in the management plan. As a result, the Department began to look for ways to regulate the fishery and to differentiate between Basin and non-Basin fishers. The Department's solution was to create to create a personal use dip net fishery in the Chitina Subdistrict that had different regulations from the upriver subsistence fishery. Whereas the subsistence fish wheel fishery was open all season and had liberal bag limits, the dip net fishery was open only when the Department determined there were enough fish in the river to accommodate the dip netters, and bag limits were much more restrictive. In recent years, the dip netters have attempted to have the dip net fishery reclassified as a subsistence fishery, and they have gone to court. However, all of their attempts have failed. All of the reports in this section focus on this issue.

Fall, James A. and Lee Stratton

1984 *The Harvest and Use of Copper River Salmon: A Background Report*. Technical Paper No. 96. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

This paper summarized the available information about the harvest and use of Copper River salmon. Information in this report was to be used by the Board of Fisheries in developing regulations for the upper Copper River salmon fishery. The report provides information on harvest and use of Copper River salmon by Basin and non-Basin residents.

Stanek, Ronald T.

1981 *Supplemental Notes: Copper River Subsistence Fisheries 1979 and 1980*. Technical Paper No. 31. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

This brief report summarized information on subsistence fishery permit allocations for the Copper River subsistence fisheries in 1980.

Stickney, Alice A. and Paul Cunningham

1980 *Report On The Survey Of Permit Holders in The Copper River Subsistence Fishery, 1979*. Technical Paper No. 36. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

This was one of the first reports by the Division of Subsistence to identify criteria on which to differentiate between Basin and non-Basin fishers.

Simeone, William E., James A. Fall and in collaboration with the Copper River Native Association, *Cheesh Na'* Tribal Council, Chitina Tribal Council

2003 Patterns and Trends in the Subsistence Salmon Fishery of the Upper Copper River, Alaska. Prepared for the U.S. Fish and Wildlife Service, Agreement No. 7018101296, Project No. FIS 00-40 by Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska.

This report provides historical background on the Copper salmon fishery and the results of a survey conducted in 2000 that attempted to illustrate the differences between participants in the personal use dip net fishery and participants in the subsistence fishwheel fishery.

Nelchina Caribou Issue

The Nelchina caribou herd is the only large caribou herd in the state that is accessible by road from the major urban centers of Alaska. For this reason, many people want the opportunity to hunt this herd. Because the herd is so popular, it is often in danger of being over hunted. Since a rapid population decline of the herd in the 1970s the hunting of the Nelchina herd has been restricted by permit. Because of the rural preference in state law, the Department could allocate

permits for both a general and subsistence hunt. Following the McDowell decision in 1989, which eliminated a rural preference, the state established a Tier II permit system to allocate subsistence opportunities among the thousands of Alaskans who wished to participate. Because all residents of the state were eligible to participate in a subsistence hunt, the entire harvestable surplus of the Nelchina herd was allocated for subsistence. There was no sport or non-resident hunting allowed. In 2009 the Board of Game modified the number of caribou it thought was needed for subsistence. The Board of Game also identified two different subsistence patterns relating to the Nelchina herd: an individualized pattern practiced largely by urban residents, and a communal pattern practiced by Copper Basin residents. To accommodate these two patterns the board adopted regulations for a drawing hunt and created regulations for a community subsistence harvest permit. In 2010, the Alaska Superior Court ruled that the Board's actions were not supported by the evidence and the Board modified its regulations to meet the court's ruling.

The following papers in this section provide information on the uses and users of the Nelchina Caribou herd.

Stanek, Ronald T.

1981 *Nelchina Caribou User Group Assessment*. Technical Paper No. 28. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

In 1980, a resident of Gulkana was cited for taking a Nelchina caribou out of season. He went to court and the court dismissed the case saying that the state had accommodated sport hunters while failing to meet the subsistence needs of the defendant. This report provides data to the Board of Game so it can implement the subsistence priority. The report provides information on public attitudes, user group characteristics, and demographic data.

Stratton, Lee

1983 *Copper Basin Caribou Use: A Research Update*. Technical Paper No. 75. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

This report contains information on the characteristics of uses and users of the Nelchina and Mentasta caribou herds. A total of 2,100 questionnaires were sent out to permit holders of the general and subsistence hunts. Results of the survey showed that most Nelchina general permit holders resided in Anchorage, the Palmer/Wasilla area, and Fairbanks. Nelchina subsistence hunters were by regulation Nelchina Basin residents.

Fall, James A. and William E. Simeone

2010 Overview of Nelchina Caribou Herd Regulation and Harvest History. Technical Paper No. not yet assigned. (Topic currently under research 2011. Report not yet completed).

This report will provide background on the use patterns, harvests, and regulatory history of the Nelchina caribou herd. The report begins with a discussion of human and caribou population

trends from the 1940s to the present, a discussion of caribou harvests for about the same period, followed by a discussion of regulations and ending with the summary of harvest and hunter data. There is an earlier Board report by Fall and Simeone that will have to be retrieved from ADF&G.

NON-ISSUE REPORTS

Simeone, William E., James Kari and in collaboration with the Copper River Native Association, *Cheesh Na'* Tribal Council, Chitina Tribal Council
2002 *Traditional Knowledge and Fishing Practices of the Ahtna of Copper River, Alaska*. Technical Paper No. 270. Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska.

This report provides an overview of Ahtna knowledge of salmon including information on harvest practices, fish taxonomy, salmon life history, preparation of salmon, the traditional system of management, and oral traditions about salmon.

Simeone, William E. and James Kari
2005 *The Harvest and Use of Non-salmon Fish Species in the Copper River Basin*. Office of Subsistence Management, Fisheries Resource Monitoring Program, Technical Paper No. 292. Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska.

This report documents the harvest and use of non-salmon fish species in the Copper River Basin. The report contains Ahtna Traditional Knowledge of non-salmon species, including information on the life history of different species, seasonal movement, distribution, spawning activity and diet. The report also contains the results of a household survey concerning the harvest and use of non-salmon fish by Copper Basin residents.

Haley, Beth and Matthew J. Nemeth
2002 *Atlas on Non-Salmon Fish Harvested for Subsistence by Selected Communities in the Upper Copper River Drainage, 2001*. Final Report for USF&WS FIS Project 03-010 by LGL Alaska Research Associates, Inc., Anchorage, Alaska.

The information on the maps in this report came from the household survey that was reported in ADF&G Technical Paper 292 (Simeone and Kari 2005). Data are from four communities within the Copper Basin: Copper Center/Silver Springs, Gakona, Gulkana and Tazlina/Copperville. The report contains information on harvests in 48 rivers, lakes and creeks, all but two of which were within the Copper River watershed. Eight species of fish were known to be harvested, with the greatest amount of effort spent on Arctic grayling (*Thymallus arcticus*) and rainbow trout (*Oncorhychus mykiss*).

Simeone, William E. and Erica McCall Valentine
2007 *Ahtna Knowledge of Long-Term Changes in Salmon Runs in the Upper Copper River Drainage, Alaska*. Technical Paper No. 324. Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska.

This report looks at the history of the Copper River salmon fishery and tries to account for changes in the fishery based on archival data and oral tradition. There is a chapter on climate change and a chapter on the history of Ahtna involvement in regulating the fishery.

Reckord, Holly

1983 *That's The Way We Live—Subsistence In The Wrangell-St. Elias National Park and Preserve*. Occasional Paper No. 34. Anthropology and Historic Preservation, Cooperative Park Studies Unit, University of Alaska Fairbanks, Fairbanks, AK.

This report provides information about historical and contemporary subsistence patterns in the Copper River. Information was collected through a literature review and key informant interviews. One purpose of this report was to provide information on subsistence uses in Wrangell St. Elias National Park. The report provides some very good detailed information about the social and cultural organization of subsistence.

4.3 Subsistence Mapping Available Information

Mapped subsistence information is limited to only 11 of the some two dozen communities or geographic areas that use the project area, or harvest wildlife resources which utilize the project area. Mapped Traditional Ecological Knowledge (TEK) is available for four geographic regions in the area (upper, middle, and entire Copper River drainage, Upper Susitna drainage). Mapped and annotated placenames information is available for the upper Cook Inlet region (Kari and Fall 2003), the Ahtna Region (Kari and Tuttle 2005), and the Athabascan speaking Interior region (Kari 2005). Placenames provide valuable linguistic clues to the use and history of geographic locations, as well as providing transmission of cultural knowledge.

The available subsistence mapping information for the middle and upper Susitna drainages is dated. Baseline studies of some communities were conducted in the 1980s. Few have been updated. An exception is Cantwell, where baseline research conducted in the 1980s has been updated in 1999, and for bird harvests only, updated in 2009. For many small, recently settled communities or locales along the Alaska Railroad and the Denali Highway for example, there is no mapped subsistence information or baseline data (Sherman, Honolulu, Colorado, Broad Pass–Summit, households and lodges along the Denali Highway). In the Copper River region, much attention has been devoted towards subsistence fisheries research, due to the complications arising from legal challenges to state management, and the presence of large federal conservation system units (CSUs) such as Wrangell-St. Elias National Park and Preserve.

The paucity of available data, the absence of data for many communities and dispersed residence areas, combined with the lack of mapped subsistence harvest use areas and dated information makes it difficult to assess the current state of subsistence in the project study area.

Table 2. Subsistence Maps in Watana Hydro Project Area.

Community		Dates	Map Source
Cantwell			
	Bear	1999–2000	TP 272 Fig. No. 6, pg. 41
	Caribou	1999–2000	TP 272 Fig. No. 6, pg. 41
	Freshwater Fish	1999–2000	TP 272 Fig. No. 7, pg. 43
	Furbearers	1999–2000	TP 272 Fig. No. 8, pg. 45
	Moose	1999–2000	TP 272 Fig. No. 6, pg. 41
	Salmon	1999–2000	TP 272 Fig. No. 7, pg. 43
	Sheep	1999–2000	TP 272 Fig. No. 8, pg. 45
	Vegetation	1999–2000	TP 272 Fig. No. 7, pg. 43
Chase			
	Black bear	1968–1986	TP 161 Fig. No. 11, pg. 68
	Caribou	1968–1986	TP 161 Fig. No. 10, pg. 64
	Edible plants, firewood	1968–1986	TP 161 Fig. No. 12, pg. 72
	Furbearers	1968–1986	TP 161 Fig. No. 11, pg. 68
	Moose	1968–1986	TP 161 Fig. No. 10, pg. 64
	Salmon and freshwater fish	1968–1986	TP 161 Fig. No. 9, pg. 53
Copper Center and Silver Springs			
	Freshwater Fish	2001	TP 03-010 Fig. No. 18, pg. 46
Copper River Drainage			
	Salmon	TEK	TP 00-40 Fig. No. 6-1, pg. 101
Gakona			
	Freshwater Fish	2001	TP 03-010 Fig. No. 19, pg. 48
Gold Creek–Chulitna			
	All resources	1940s–1986	TP 161 Fig. No. 13, pg. 80
	Berries, plants, wood	1940s–1986	TP 161 Fig. No. 19, pg. 96
	Birds	1940s–1986	TP 161 Fig. No. 19, pg. 96
	Black bear	1968–1986	TP 161 Fig. No. 23, pg. 106
	Caribou	1940s–1986	TP 161 Fig. No. 21, pg. 102
	Freshwater fish	1940s–1986	TP 161 Fig. No. 19, pg. 96
	Furbearers	1968–1986	TP 161 Fig. No. 23, pg. 106
	Moose	1940s–1986	TP 161 Fig. No. 21, pg. 102
	Salmon	1940s–1986	TP 161 Fig. No. 19, pg. 96
Gulkana			
	Freshwater Fish	2001	TP 03-010 Fig. No. 20, pg. 50
Hurricane–Broad Pass			
	All resources	1968–1986	TP 161 Fig. No. 14, pg. 81

Community		Dates	Map Source
	Berries, plants, and wood	1968–1986	TP 161 Fig. No. 24, pg. 107
	Birds	1968–1986	TP 161 Fig. No. 25, pg. 109
	Black bear	1968–1986	TP 161 Fig. No. 24, pg. 107
	Caribou	1968–1986	TP 161 Fig. No. 22, pg. 104
	Freshwater fish	1940s–1986	TP 161 Fig. No. 20, pg. 97
	Furbearers	1968–1986	TP 161 Fig. No. 25, pg. 109
	Moose	1968–1986	TP 161 Fig. No. 22, pg. 104
	Salmon	1940s–1986	TP 161 Fig. No. 20, pg. 97
Middle Copper River			
	Freshwater Fish	TEK	TP 292 Fig. No. 4, pg. 21
Nabesna			
	Caribou	1983–1984	TP 124 Fig. No. 4, pg. 12
	Freshwater Fish	1983–1984	TP 124 Fig. No. 4, pg. 12
	Moose	1983–1984	TP 124 Fig. No. 4, pg. 12
	Sheep	1983–1984	TP 124 Fig. No. 4, pg. 12
	Vegetation	1983–1984	TP 124 Fig. No. 4, pg. 12
Susitna Drainage			
	Freshwater Fish	TEK	TP 292 Fig. No. 6, pg. 33
Tazlina and Copperville			
	Freshwater fish	2001	TP 03-010 Fig. No. 21, pg. 52
Upper Copper River			
	Freshwater Fish	TEK	TP 292 Fig. No. 8, pg. 117
	Freshwater Fish	TEK	TP 292 Fig. No. 5, pg. 29
	Historical fishing sites and villages	1940s–2007	TP 324 Fig. No. 12, pg 106
	Placenames	TEK	TP 324 Fig. No. 11, pg. 46
Valdez			
	Freshwater Fish	1983–1984	TP 124 Fig. No. 3, pg. 11
	Furbearers	1983–1984	TP 124 Fig. No. 3, pg. 11
	Salmon	1983–1984	TP 124 Fig. No. 3, pg. 11
	Vegetation	1983–1984	TP 124 Fig. No. 3, pg. 11
Western Susitna Basin			
	Furbearers	1982 and 1984	TP 134 Fig. No. 15, pg. 71
	Furbearers	1984	TP 134 Fig. No. 16, pg. 80

Source: Northern Land Use Research, Inc. 6/11/2011

4.4 Subsistence Harvests Available Information

The Community Subsistence Information System (CSIS) is the online repository of Alaska community subsistence harvest information gathered by the Alaska Department of Fish and Game, Division of Subsistence research over the past 30+ years. The website and output formats are still undergoing public review; but the website is up and operational for some functions (http://www.adfg.alaska.gov/sb/CSIS, accessed June 7, 2011). Queries to the website to create Excel© tables for download were attempted numerous times over the course of several weeks during the preparation of this report. Successfully completing a query or completing a "Create Excel File" command failed on numerous occasions for various combinations of communities, resources, or regions. For these reasons, we were unable to prepare an overview table using the ADF&G website data summarizing the available subsistence information by community, resource, date, and sample size.

According to the ADF&G website, information is available from the CSIS database that includes harvest information organized by community, by resource categories, resources by region, by State subsistence regions, and by Federal subsistence regions.

Harvest information is retrievable by Game Management Units in two ways – by specific Game Management Units or by specific GMUs plus communities within a 25-mile radius for specific species or resource categories, by years of available data.

Community information is available as summary information, economics, demographics, references, and methods. For Cantwell for example, summary information is available from the 1982 Copper River research, the 1999 Cantwell community research, or the 2000 Southcentral bird harvest research study. The baseline study year data and the most representative year's harvest data are indicated.

A special topic report gives conversion factor summaries for converting harvested units (e.g. one caribou) into pounds/kilograms of usable weights organized by regions of the state, or statewide.

We queried the ADF&G database trying to obtain representative examples of data available and various output formats using Cantwell as the example community.

Table 2 presents information on all resources harvested by Cantwell residents in 1982. Some resource categories with zero harvest values for 1982 were deleted such as halibut, and brown bear. Those resources may be harvested in other years. An examination of this table shows that there is detailed information about species and numbers harvested for Cantwell for the year 1982. For Cantwell, there is also information about harvests in 1999, and for harvests of birds for 2000.

Other socio-economic information about Cantwell can be accessed through the ADF&G website, and through a link to the Alaska Department of Community Affairs and Economic Development's Community Profiles database.

We prepared screen shots of some of the available information for Cantwell to illustrate the sort of data which lies within the ADF&G website database. Figures 3 through 7 present these screen shots. Figure 3 illustrates summary harvest information for Cantwell, for the 1982 baseline year. Elements include information on the number of sampled households, estimated number of households in the community, sampled population size, total estimated community population, federal region, USGS map quadrant, and geo-political region. Links to electronic copies of the relevant ADF&G subsistence Technical Papers are included along with a location index map. The baseline harvest profile for aggregated resource categories is presented in the form of a colored pie chart, along with total pounds harvested for each resource category.

Figure 4 is an illustrative demographic summary for Cantwell for 1982. Information presented in bar graph and numerical formats includes U.S. Census information about population, percent Native and non-Native, occupied housing units, and recent Alaska Department of Labor population estimates. Household size, numbers of households, and age-sex information are presented.

Figure 5 presents summary community economics, for Cantwell for 1982. Data presented includes a bar graph for household incomes, and the percentages of households in the community at each income level. There is no detailed economic information available for 1982 at Cantwell. Where such data are available, household income can be presented by age of head of household, ethnicity, education, and years residence in the community.

Figure 6 presents summary information about the research methods used to collect information at Cantwell in the 1982 study year. Information methods include data on the project name, number of sampled households, total number of households in the community, percentage of households sampled, the total sampled population size, the total estimated community population, the reference for the data source, and comments about the research methods used for the study.

Figure 7 illustrates an example list of references for the Cantwell community prepared by Alaska Division of Subsistence researchers. Data presented for each Technical Paper includes a hot link to an electronic copy of the paper, title, authors, and a summary of the Technical Paper.

Table 3. CPDB Community Specific Data, Cantwell, 1982, All Resources.

CPDB Community Specific Harvest Data, Cantwell, 1982, All Resources

Resource	Percent Using	Percent Harvesting	Reported Harvest	Units	Estimated Harvest	Reported Pounds Harvested	Estimated Pounds Harvested	Lower Harvest Amount Estimate	Upper Harvest Amount Estimate	Conversion Factor	Average Lbs Harvested per Household	Lower Harvest Lbs Estimate	Upper Harvest Lbs Estimate	Per Capita Lbs Harvested
All Resources	100	97.7	13944	Pounds	15241	13944	15241	13447	17035	1	324.28	13447	17035	111.55
Fish	83.7	83.7	3957.5	Pounds	4326	3957.5	4325	3728	4924	1	92.03	3727	4923	31.66
Salmon	23.3	23.3	113	Individual	124	892.3	975	93	155		20.75	747	1203	7.14
Coho Salmon	16.3	16.3	49	Individual	54	298.9	327	39	69	6.1	6.95	236	418	2.39
Chinook Salmon	9.3	9.3	24	Individual	26	434.4	475	18	34	18.1	10.1	334	616	3.48
Pink Salmon	2.3	2.3	6	Individual	7	16.2	18	3	11	2.7	0.38	8	28	0.13
Sockeye Salmon	7	7	34	Individual	37	142.8	156	23	51	4.2	3.32	97	215	1.14
Non-Salmon Fish	83.7	83.7	3065.2	Pounds	3350	3065.2	3350	2852	3848	1	71.28	2852	3848	24.52
Greenling	11.6	11.6	48	Individual	52	115.2	126	35	69	2.4	2.68	85	167	0.92
Lingcod	11.6	11.6	48	Individual	52	115.2	126	35	69	2.4	2.68	85	167	0.92
Char			456	Individual	498	848.2	927				19.72			6.78
Dolly Varden	7	7	58	Individual	63	52.2	57	37	89	0.9	1.21	34	80	0.42
Lake Trout	37.2	37.2	398	Individual	435	796	870	357	513	2	18.51	715	1025	6.37
Grayling	76.7	76.7	2744	Individual	2999	1920.8	2099	2360	3638	0.7	44.67	1652	2546	15.36
Pike	2.3	2.3	40	Individual	44	112	122	19	69	2.8	2.6	52	192	0.89
Trout	14	11.6	21	Individual	23	29.4	32	16	30	1.4	0.68	22	42	0.23
Rainbow Trout	14	11.6	21	Individual	23	29.4	32	16	30	1.4	0.68	22	42	0.23
Whitefish	7	7	44	Individual	48	39.6	43	30	66	0.9	0.92	27	59	0.31
Land Mammals	100	60.5	486	Individual	531	8963	9797	393	669		208.44	8451	11143	71.71
Large Land Mammals	69.8	37.2	33	Individual	36	8288	9059	31	41		192.74	7802	10316	66.3

Black Bear	2.3	2.3	1	Individual	1	58	63	0	2	58	1.35	27	99	0.46
Caribou	32.6	27.9	21	Individual	23	2730	2984	19	27	130	63.49	2486	3482	21.84
Moose	60.5	23.3	11	Individual	12	5500	6012	10	14	500	127.91	5003	7021	44
Small Land Mammals	48.8	48.8	453	Individual	495	675	738	358	632		15.7	528	948	5.4
Beaver	4.7	4.7	6	Individual	7	52.5	57	4	10	8.75	1.22	29	85	0.42
Fox	11.6	11.6	28	Individual	31	0	0	22	40	0	0	0	0	0
Hare	44.2	44.2	389	Individual	425	583.5	638	295	555	1.5	13.57	443	833	4.67
Lynx	7	7	6	Individual	7	24	26	5	9	4	0.56	18	34	0.19
Marten	2.3	2.3	1	Individual	1	0	0	0	2	0	0	0	0	0
Mink	2.3	2.3	1	Individual	1	0	0	0	2	0	0	0	0	0
Muskrat	2.3	2.3	12	Individual	13	6	7	6	20	0.5	0.14	3	11	0.05
Porcupine	2.3	2.3	2	Individual	2	9	10	1	3	4.5	0.21	4	16	0.07
Wolf	2.3	2.3	2	Individual	2	0	0	1	3	0	0	0	0	0
Wolverine	4.7	4.7	6	Individual	7	0	0	4	10	0	0	0	0	0
Birds and Eggs	72.1	72.1	875	Individual	956	464.5	508	833	1079		10.8	440	576	3.72
Migratory Birds	4.7	4.7	27	Individual	30	40.5	44	15	45		0.94	21	67	0.32
Ducks	4.7	4.7	27	Individual	30	40.5	44	15	45	1.5	0.94	21	67	0.32
Other Birds	72.1	72.1	848	Individual	927	424	463	808	1046	0.5	9.86	403	523	3.39
Upland Game Birds	72.1	72.1	848	Individual	927	424	463	808	1046	0.5	9.86	403	523	3.39
Grouse	20.9	20.9	36	Individual	39	18	20	30	48	0.5	0.42	16	24	0.15
Ptarmigan	72.1	72.1	812	Individual	888	406	444	772	1004	0.5	9.44	386	502	3.25
Vegetation	67.4	67.4	559	Pounds	611	559	611	539	683	1	13	539	683	4.47
Berries	67.4	67.4	497	Pounds	543	497	543	475	611	1	11.56	475	611	3.97
Plants/Greens/Mushrooms	16.3	16.3	62	Pounds	68	62	68	46	90	1	1.44	46	90	0.5
Source: ADF&G website, accessed June, 2011. ADF&G Project ID:25														
Note: Columns deleted to fit table on page or rows deleted for null values by NLUR.														

Table 3 presents information about caribou harvests for GMU 13A which included Chickaloon, *Cheesh'na* (Chistochina), Copper Center, the households along the East Glenn Highway, Gakona, Glennallen, Lake Louise, Matanuska Glacier, and Sheep Mountain during the 1982 research year. This table illustrates the results of querying harvest CSIS information by species, by GMU, by year.

Table 4. CSIS Harvest Data by GMU - Caribou, GMU13A, Copper River, 1982 data.

CSIS Harvest Data by GMU - Caribou GMU13A, Copper River 1982

Community Name	Percent Using	Percent Attempting to Harvest	Percent Harvesting	Percent Giving Away	Percent Receiving	Reported Harvest	Units	Estimated Harvest	Reported Pounds Harvested	Estimated Pounds Harvest	Lower Harvest Amount Estimate	Upper Harvest Amount Estimate	Average Lbs Harvested per Household	Per Capita Lbs Harvested
Chickaloon	5.6		0			0		0	0	0	0	0	0	0
Cheeshna (Chistochina)	54.5		22.7			8	Individual	11	1040	1465	6	16	47.27	17.62
Copper Center	44.4		22.2			9	Individual	43	1170	5590	11	75	43.33	12.86
East Glenn Highway	53.3		33.3			7	Individual	30	910	3944	6	54	60.67	21.67
Gakona	60.9		30.4			10	Individual	15	1300	1922	9	21	56.52	17.81
Glennallen	51		13.7			11	Individual	58	1430	7543	17	99	28.04	8.27
Gulkana	33.3		11.1			6	Individual	7	780	932	4	10	21.67	7.65
Lake Louise	76.9		30.8			5	Individual	6	650	750	4	8	50	19.12
Matanuska Glacier	33.3		10			4	Individual	9	520	1109	2	16	17.33	5.84
Sheep Mountain	22.2		11.1			1	Individual	2	130	274	-1	5	14.44	4.64

Source: ADF&G website, accessed June, 2011. ADF&G Project ID:25

Note: Columns deleted to fit table on page or for null row values by NLUR.

5.0 SUMMARY

5.1 Summary

This section presents a summary and analysis of the available subsistence data for communities which use, or are believed to use the Watana Hydroelectric project area, or which use wildlife resources which live in, or use the project area on a seasonal basis. We assess the quality and quantity of available subsistence use data and identify data gaps. Author abstracts or report summaries for the subsistence references are presented in Appendix A of this report.

5.2 Data quality

The Alaska Department of Fish and Game, Division of Subsistence has collected subsistence harvest data since the early 1980s. Over that time the Division has refined its methods. In the 1980s the Division conducted two baseline studies and a number of issue oriented studies in communities surrounding the project study area. The quality of the harvest data is good and often more accurate than harvest data obtained from permits. Many rural residents do not obtain hunting licenses or return permits. To ensure data quality Division of Subsistence personnel have never had any enforcement capability. (Other ADF&G field personnel such as fisheries and terrestrial biologists have limited "law enforcement powers" and may issue citations when they observe or investigate wildlife harvests.) A methodological problem with collecting harvest data in a social science context is that people will often provide information only on legal harvests. These legal harvests often do not reflect the actual total harvest.

A major problem with the subsistence data is that it dated, most having been collected in the early 1980s. Data on Cantwell is an exception, but even the most recent data is 10 years old. All Subsistence Division baseline survey reports are organized along the same format and include historical background, a description of the seasonal round, and harvest by species that includes per capita harvests and mean household harvests. Information on sharing of resources and data on the local wage economy is always included. There is also information about harvest composition. In later years (starting in the mid-1980s to 1990) Division researchers worked with subsistence harvesters to map harvest locations data. These data could be mapped as life time use areas or species specific harvest areas over various years. Harvest data were collected for the previous 12 month period so that it was always recall data. Generally, the mapped data are accurate because hunters know what they harvested within a given year. A major strength of the Division's research plan is that most of the researchers know the people in the communities and can assess the accuracy of the data they collect.

5.3 Data collection methodologies

Standard data collections methods were used in all Division research projects. In small communities the goal was to interview 100 percent of households. In larger communities a sample was developed by first mapping the community and locating each house, then numbering the houses, eliminating those that were vacant, and then selecting a random sample. The household was the unit of analysis. The survey instrument was standardized. Interviews were

conducted with the head of household in person. Either the researcher or a trained assistant from the community conducted the interview. Most interviews were conducted in English but interpreters were also used. Survey instruments are reviewed in the field for any discrepancy. The data are then error-checked, entered, and checked again for logic. Reports were written by the researchers and reviewed by the Division research director.

In addition to collecting survey data, reports often summarize the historical literature obtained through a literature review. The historical harvest data were usually augmented with information collected through key informant interviews. These interviews were conducted with knowledgeable people in the community. The collection of traditional ecological knowledge or TEK was also an inherent part of the research process, but there was no focused effort to collect this kind of information. Traditional or local knowledge was often scattered throughout division reports. In 2000 the U.S. Fish and Wildlife Service, Office of Subsistence Management began a program to collect data on subsistence fisheries. This program supported research focused specifically on traditional ecological knowledge related to subsistence fisheries for both salmon, and non-salmon species. There is no comparable ongoing research effort to collect TEK for game species.

5.4 Issue related data quality

The major issue is competition between rural and urban residents. Animal populations and fish stocks are finite resources. As the urban areas grow, residents from Anchorage, the Matanuska-Susitna Valley, and Fairbanks travel into rural areas to hunt and fish. The upper Susitna and Copper River basins are popular areas because they are largely accessible by road. Urban hunters can drive to trailheads and use off road vehicles to access the back country in a weekend. During hunting season urban hunters spread out into the far reaches of the upper Susitna country. Research shows that many rural residents do not have the money to purchase off road vehicles so they use their cars and pickup trucks to hunt along the highway. One problem with so many hunters in the back country is that they may alter the caribou migration so that rural residents are unable to intercept the caribou as they cross the road. Other rural-urban issues were outlined above.

5.57 Traditional Ecological Knowledge - Data Gaps

For the Ahtna there are three dedicated TEK studies on Ahtna knowledge of salmon and non-salmon fish species. Limited information on Ahtna knowledge of big game species can be found in Simeone (2006). There is no published study of Ahtna plant lore. A general overview of the Ahtna perspective of the relationship between humans and animals is in de Laguna (1969–70). There is no publication that addresses Ahtna TEK in the proposed project area.

The only dedicated publication on Dena'ina TEK pertains to Dena'ina plant lore (Kari 1995). As previously noted, data on other aspects of Dena'ina TEK can be found in a number of

publications, but there is no single publication that addresses Dena'ina TEK in the proposed project area.

5.6 Place Names - Data Gaps

There is considerable information on Ahtna and Dena'ina place names within the project area and many of these place names are located by latitude and longitude. A next step would be to develop additional information on these places through archaeological investigations, collecting oral history and gathering information from unpublished sources.

5.7 Data Gaps - Summary

1. The current quantitative information on subsistence in the project area is dated.

2. There is no information about subsistence harvesters who may currently be using the project area for subsistence.

3. Subsistence use area maps are not available for many communities, or for all species harvested in each community.

4. Where subsistence use area maps are available, most are dated (from 10 to 20+ years old information).

5. There is no subsistence harvest or subsistence use area map information for several communities or dispersed households and lodges along the road system and the Alaska Railroad.

6. Access to the ADF&G website to download summary tabular data on subsistence is frequently interrupted by error messages, or failures to create useable Excel tables from the information displayed on the website.

7. The Watana Hydroelectric Project study area for subsistence is a large geographic area. During the course of this report preparation, we have identified, located, reviewed, and analyzed the available data. The presently available data are not adequate to prepare an ANILCA Section 810 analysis of the impacts of the Project on subsistence where federal lands may be withdrawn, reserved, leased, or otherwise permitted for use, occupancy, or disposition.

8. There is no TEK documentation specific to the project area.

9. Further research on place names in the proposed project area should include an integrated approach using archaeology, oral history, and library research.

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2000 Subsistence in Alaska: A Year 2000 Update. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J. and Robert G. Bosworth
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ABSTRACTS OF CITATIONS

Bleakley, Geoffrey T.

2002 *Contested Ground: An Administrative History of Wrangell-St. Elias National Park and Preserve, Alaska, 1979–2001*. USDOI, National Park Service, Alaska System Support Office, Anchorage, Alaska.

[6]"Wrangell-St.Elias National Park and Preserve (WRST) is the largest unit in America's national park system, it contains 13.2 million acres, making it about six times the size of Yellowstone National Park or around twice the size of Yellowstone, Yosemite, Grand Canyon, Everglades, and Glacier National Parks combined. The country's premier mountain wilderness, it includes parts of four major ranges and nine of the nation's sixteen highest peaks. It also contains North America's largest active shield volcano, its biggest tidewater glacier, its longest interior valley glacier, and its largest piedmont glacier.

After statehood, Alaska selected the most accessible portions of the region to facilitate community expansion, and following the Alaska Native Claims Settlement Act of 1971 (ANCSA), Native Corporations chose some of the remaining land to protect subsistence resources or provide a basis for future economic growth. Each continues to pursue its own special and often conflicting objectives.

The Alaska National Interest Lands Conservation Act (ANILCA) protected certain lands by instructing the Interior Department to "preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species … ; to preserve in their natural state extensive unaltered . . . ecosystems; . . . to protect and preserve historic and archaeological sites, river, and lands and to preserve wilderness resource values and related recreational opportunities . . . within large arctic and subarctic wildlands and on freeflowing rivers; and to maintain opportunities for scientific research and undisturbed ecosystems."

ANILCA, however, also allowed some sport hunting and mining to continue and required the NPS to "provide the opportunity for rural residents engaged in a subsistence way of life to continue to do so." WRST therefore faced the dual and often conflicting task of retaining traditional park values while preserving the lifestyles of its residents-protecting resources while permitting their consumptive use. Unfortunately, as resources remain finite and user numbers continue to grow, the opportunities will inevitably decrease." (au)

Fall, James A. and Lee Stratton

1984 *The Harvest and Use of Copper River Salmon: A Background Report*. Technical Paper No. 96. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

[6] Where quotation marks appear around the abstract followed by (au), it indicates that the abstract appears as an abstract, or executive summary in the document written by the author(s). Where no quotation marks are present, the abstract was written by NLUR researchers.

"This report summarizes the available information about the harvest and use of Copper River salmon. The data are drawn from recent Alaska Department of Fish and Game, Division of Subsistence research and from management reports prepared by the Division of Commercial Fisheries. This information may be used by the Board of Fisheries, advisory committee members, and the public to assess proposed changes to the Copper River Subsistence Salmon Management Plan.

Presently, salmon may be taken for subsistence purposes in the Copper River with dipnets near Chitina, and with fishwheels from Chitna upriver to Slana, a distance of about 120 river miles. Any Alaskan resident may obtain a subsistence permit. Participation in these fisheries has increased rapidly, from 4,078 permits issued in 1981, to 7,540 permits in 1983. About 92 percent of the permits in 1983 were for the dipnet fishery. The estimated subsistence harvest has increased from about 69,000 salmon in 1981 to over 118,000 salmon in 1983; most of this catch was sockeye. In 1983, 67 percent of the catch was taken with dipnets. This rapid growth was unanticipated by the management plan. It can be attributed largely to increased participation by non-Copper Basin residents, most of whom fish with dipnets.

The monetary economy of Copper Basin communities has remained marginal compared with that of Alaska's urban centers. Wage employment opportunities are limited, and many are seasonal or part-time. Average household incomes in the Copper Basin are low. Many Basin households follow an economic strategy that combines seasonal wage employment with local fishing and hunting.

Division research has documented an extensive use of wild fish and game resources by residents of Copper Basin communities. Mean household harvests for each community, in pounds dressed weight, demonstrate that a large number of Basin households hunted moose; the average harvest of fish and game resources for these moose-hunting households was 558 pounds. Households using fishwheels had an average fish and game harvest of 644 pounds.

Most Copper Basin residents who harvest Copper River salmon use fishwheels. The number of Basin subsistence permit holders has remained fairly stable over the last three years; 409 in 1981 (83 percent fishwheel permits), and 397 in 1983 (83 percent fishwheel permits). Salmon harvests by local residents have also remained steady: returned permits in 1981 reported a harvest of 18,662 fish while the 1983 reported harvest was about 20,359 salmon.

Overall, Basin residents have a lengthy history of use of Copper River salmon; 50 percent of a sample of Basin fishwheel operators in 1982 had used wheels for more than 20 years. Many operated wheels from longstanding camps located in "clusters" along the river. Large portions of the catch were smoked or dried. Basin fishermen harvested other fish and game resources, mostly within the Basin. Only about 11 percent used other salmon fisheries in 1982. Salmon was a widely shared resource in Copper Basin communities in 1983.

Most non-Basin participants in the Copper River subsistence fishery use dipnets. A survey of dipnetters in 1982 found that 72 percent had participated in the fishery for less than five years. These fishermen harvested other fish and game resources outside the Copper Basin, and over one third use other salmon fisheries in 1982.

Other than the Copper Basin itself, several communities of the Upper Tanana River region are the only areas of the state in which Copper River fishwheel permittees outnumber dipnet permittees. Residents of the Upper Tanana area have historical ties to the upper Copper River and its resources which have been documented since 1885.

In summary, research has shown that notable differences exist between Basin residents and most non-Basin residents in terms of wild resources. The pattern of resource use by Basin residents is molded in part by the histories and socioeconomic systems of Basin communities. Fish and game harvest remain central to the economy and way of life of many Copper Basin households and communities. Because of their abundance, predictability, and accessibility, Copper River salmon play a critical role in these harvest patterns." (au)

Fall, James A. and Daniel J. Foster

1987 *Fish and Game Harvest and Use in the Middle Susitna Basin: The Results of a Survey of Residents of the Road-Connected Areas of Game Management Units 14B and 16A, 1986*. Technical Paper No. 143. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"This report presents the results of research conducted by the Division of Subsistence, Alaska Department of Fish and Game, in 1986 on patterns of wild resource use by residents of the portion of the Matanuska-Susitna Borough in Game Management Units 14B and 16A (called the Middle Susitna Basin in the report). This research is part of a multi-component project which is examining the role of wild resource harvests in dispersed settlements in southcentral Alaska. In July and August 1986, division researchers interviewed 134 households in the road-connected portion of the study area, in four sampling areas: Parks Highway (30 interviews), Talkeetna (68), Trapper Creek (19), and Upper Petersville Road (17). This is a 31 percent sample of the approximately 429 year-round households living along roads in the Middle Susitna Basin. Because very few interviews were conducted with the approximately 33 non-road connected households, this population is not discussed in the report, nor do the report's conclusions necessarily pertain to these households.

The population of the study area in August 1986 was approximately 1,134, 93 percent of which could be reached by roads. The two major population concentrations were the Talkeetna townsite and Trapper Creek. The rest of the population was dispersed along the Parks Highway, the Talkeetna Spur Road, and the Petersville Road. Almost all of the interviewed household heads had been born outside the study area, and their average length of residence in the Middle Susitna Basin was 12 years.

The cash economy of the study area has developed around the Parks Highway transportation corridor. This road was completed between Anchorage and Fairbanks in 1971. In 1986, businesses were oriented towards serving highway travelers, as well as recreationists who arrive in the area for sport fishing, hunting, skiing, hiking, camping, and mountaineering. State, federal, and local governments also supplied a large segment of local jobs. Sixty one percent of all the sampled adults were employed for at least one month in 1985. The

average length of employment for employed adults was 9.7 months. Year-round employment in the study area was the norm for the majority of these adults.

In the 12 months study period in 1985–86, 94 percent of the sampled households used at least one kind of wild fish, game, or plant resource. The average number of resource category (81.3 percent of the sample), followed by plants (80.6 percent), non-salmon freshwater fish (62.7 percent), and game (56.0 percent). In addition, 92.5 percent of the households attempted to harvest wild foods, and 88.1 percent were successful. The average number of resources harvested per household was 4.91. Of the four sub-samples, the Upper Petersville Road group was the most involved in the harvest and use of wild foods, and the Parks Highway group was the least involved.

The per capita harvest of wild foods for the entire sample was 70.1 pounds edible weight. Salmon comprised the largest portion, 41.4 percent. Almost all of the salmon were taken with rod and reel under sport fishing regulations; there were no local subsistence or personal use net fisheries. Game, mostly moose, made the next largest contribution, 33.4 percent of the total, followed by freshwater fish (8.1 percent), plants (6.3 percent), marine fish (5.7 percent), edible furbearers (2.4 percent), birds (1.8 percent), and marine invertebrates (.9 percent). One half of the households harvested less than 50 pounds of wild resources, while 4.5 percent took over 1000 pounds of wild foods. The Upper Petersville Road sample had the highest per capita harvest, 167 pounds, followed by Trapper Creek (66 pounds), Parks Highway (58 pounds), and Talkeetna (55 pounds).

The report concludes that in 1986 the cash economy of the Middle Susitna Basin along the highway corridor was oriented around providing goods and services to visitors from other parts of southcentral Alaska. Many residents of the area participated in non-commercial hunting and fishing as well. For most households, harvest quantities were lower than those recorded for less accessible parts of the Cook Inlet Basin, such as Tyonek (272 pounds per capita) or the Upper Yentna River (Skwentna) area (178 pounds per capita). Harvest levels in the Middle Susitna Basin sample were comparable to those reported for communities on the road system of the Kenai Peninsula such as Kenai, Ninilchik, and Homer." (au).

Haley, Beth and Matthew J. Nemeth

2002 *Atlas on Non-Salmon Fish Harvested for Subsistence by Selected Communities in the Upper Copper River Drainage, 2001*. Final Report for USF&WS FIS Project 03-010 by LGL Alaska Research Associates, Inc., Anchorage, Alaska.

"A map series was created to display harvests of non-salmon fish for subsistence by four communities in the upper Copper River drainage in 2001. Data were from household surveys conducted in 2002 by the Copper River Native Association and the Alaska Department of Fish and Game. Harvests were reported from 48 rivers, lakes, and creeks, all but two of which were within the Copper River watershed. Eight species of fish were known to be harvested. The greatest amount of effort (as measured by number of days fished) was spent on Arctic grayling and rainbow trout. Arctic grayling were also harvested from the greatest number of waterbodies. Fish were harvested using six different methods, the most common of which was rod and reel. Cars and trucks were

used to access the greatest number of sites, but participants also used boats, snowmachines, ATVs, planes, and walked to sites. Most sites also contain salmon (seasonally), but it is not known how often salmon and non-salmon harvests were coordinated. This map series could be augmented by adding harvest data from other species or years, environmental information, and demographic data." (au)

Henderson, Michelle M., Keith R. Criddle and S. Todd Lee

2009 The Economic Value of Alaska's Copper River Personal Use and Subsistence Fisheries. *Alaska Fishery Research Bulletin* 6(2):63–69.

"Commercial, sport, personal use and subsistence fishers share the salmon harvest on the Copper River, Alaska. The allocation of salmon among these user groups is a contentious and recurring issue. Economic analyses, along with biological, legal, social, and cultural considerations have the potential to help policy makers appreciate the consequences of alternative allocations. The zonal travel cost method is used in this study to estimate the net economic value (consumer surplus) of the Copper River Basin personal use and subsistence fisheries. The nature of the fishery and the data set are especially well suited for this purpose." (au)

Overturf, Jan H.

1984 *Regional Subsistence Bibliography, Volume IV, Southcentral Alaska, Number 1*. Technical Paper No. 97. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"Each bibliographic entry consists of author, date, title, publisher, keyword, and, in most cases, an abstract. Only references that were located and examined were abstracted. Abstracts have been kept brief to enhance cost effectiveness. The bibliography is not annotated in the sense of offering a detailed description and evaluation of contents. Rather, it is designed to provide the user with potentially pertinent material through the use of keywords. Some keywords listed in a citation are not referenced in the keyword guide. This is because the entire collection has been drawn from a statewide database and therefore contains keywords pertinent to regions other than Southcentral Alaska.
Citations are arranged alphabetically by author, and multiple words by a single author are listed in chronological order. Joint authors are listed last name first and separated by a semicolon." (au)

Reckord, Holly

1983 *That's The Way We Live—Subsistence In The Wrangell-St. Elias National Park and Preserve*. Occasional Paper No. 34. Anthropology and Historic Preservation, Cooperative Park Studies Unit, University of Alaska Fairbanks.

"The main focus of this study is the people who live around the proposed Wrangell National Park and use the resources in and around the proposed parklands. The study both outlines the history of subsistence from the aboriginal past to the present day and describes Native and white modes of modern subsistence. Through the use of a historical perspective, the study shows that the use of subsistence resources during the past 150 years has changed in an adaptive way. Subsistence has responded to economic, technological, demographic and social changes that either have been introduced from outside the region or have occurred within the region itself.

In 1800, the Native residents of the Wrangell region looked to the land to provide all, their needs: clothes, weapons, ornamentation, housing, and food. Today Natives and Whites alike travel to local stores where they purchase necessary supplies. The dependence of most people within the region on the American economy is almost total, yet there is a small but significant minority which depends greatly on resources from the land. These people serve wild foods on their tables almost every day, heat with and build their homes from local wood, and trap furbearers to add a substantial portion to their cash income. In short, they pursue a way of life that has been typical in the past, combining subsistence and cash-oriented economic activities. This strategy, initiated with the first Native trading party to travel down the river ice to the Russian community of Nuchek, was also followed by the early American settlers and continues today.

The researcher generally used an open-ended interview technique, although in the summer of 1977 an interview outline was also used to guide the work. The use of two techniques revealed differences in interviewee responses. Whites usually appeared most comfortable in the interview situation when the survey sheet was followed or at least shown and used during the interview. Natives generally showed discomfort when the survey sheet appeared and seemed to be more comfortable in an interview situation in which the only props were notebook and pencil.

There is little documentation of subsistence in the Wrangell region outside of the Alaska Department of Fish and Game publications. These publications are helpful to some extent, but they do not focus on subsistence. Here, more than in many other regions in Alaska, Fish and Game tends to view the hunting in the Wrangells as sport hunting, and for this reason the statistics are of limited use in this study. Because of their role as game managers, Alaska Fish and Game researchers deal almost exclusively with studies of game populations and resource management. This approach contrasts with that of the researcher, which concentrates on the use of game and other subsistence resources by local residents.

The researcher sees several kinds of limitations which affect the quality of data collection on the subject of subsistence in the area. The Wrangells offer comparatively easy access due to a good road system, and for this reason the region has been settled extensively during the last 70 years. In fact, from 1913 to 1919 McCarthy was the second largest city in Alaska and Chitina was a bustling little town beside a railroad which brought many Fairbanks-bound travelers to the region. Although these particular towns are almost ghost towns today, especially when compared to their past importance, the population of the region is varied, and people pursue many diverse strategies in order to continue living here. The heterogeneous nature of the population makes it difficult to generalize. Even within the Native community, variation in subsistence approaches occurs. In the course of this

study the researcher tries to explain the differences found in subsistence approaches by clarifying the variables which affect a subsistence life style.

Another limitation of the study arises from the resentments and suspicions many residents direct toward any government-funded undertaking. Many of the local residents are understandably anxious about the future of the lands which surround them and, at the same time, they feel at odds with "government," any government. Residents also believe that past studies have been superficial and not in their best interests. Some informants answered questions circumspectly I as if they always kept in mind the thought, "How will I sound best to those people who make decisions in Juneau and Washington?" Yet, overall, most informants appeared honest and helpful, and it was generally easy to tell which informants were stretching the facts a bit.

The study is also limited by the nature of the data and of the subject matter itself. In the long run, subsistence is a process which changes with time, depending on the nature of game population, the economic opportunities in the region, and other factors. Time depth is needed to analyze trends in subsistence and to understand the specific changes which occur from year to year. It is hoped that the historical approach will mitigate the problem to some extent.

Finally, the present fish and game laws rigidly define what is legally permissible. Thus, in some cases people may procure what is legal but not what is necessary. Furthermore, poaching is not reported, and the researcher has reason to believe that a few species are systematically poached every year and that other species are sporadically poached. Thus, the present management policy of the Alaska Department of Fish and Game influences strongly the system of subsistence in and around the Wrangells." (au)

Sheppard, William L. and S. Craig Gerlach

2000 *Demographic, Economic, and Subsistence Profiles of Thirteen Communities within and Near the Copper River Basin. Volume II*. Technical Report No. 90b. 2 vols. Report prepared for Clearwater Environmental, Inc., Anchorage, Alaska by Northern Land Use Research, Inc., Fairbanks, Alaska.

"The community profiles presented in this volume were prepared for Clearwater Environmental., Inc., a subsidiary of Ahtna Regional Corporation, and for BP Exploration (Alaska) Inc. and other owners of the Trans-Alaska Pipeline System (TAPS) by Northern Land Use Research, Inc. (NLUR). Research and writing of the volume was completed by William L. Sheppard, Ph.D., of Sheppard Research, Portland, Oregon, under subcontract to NLUR. These profiles summarize existing information and provide background documentation for the Sociocultural Systems and Subsistence Harvest Patterns sections of an Environmental Report being prepared for the renewal of the TAPS Right-Of-Way (ROW), required in 2004. This document is one of two volumes prepared by NLUR, Inc. to provide summary information about 31 rural and non-rural communities and areas that occur in relative proximity to the pipeline corridor, and that may be affected directly or indirectly by either the action or no-action alternatives. The map directly following this introduction shows the location and name for each of the study communities. Volume I summarizes data for communities north of the Copper River Basin, as far north as Arctic

Village and Anaktuvuk Pass. Volume II includes communities in or adjacent to the Copper River Basin.

An assessment of cumulative effects is presented in the Draft Environmental Report. In summary, social and economic impacts to these communities may occur: (1) if the pipeline continues to function in much the same way that it does now; (2) as a result of developments associated with continuing pipeline and Dalton Highway operations; or (3) if the ROW permit application is denied or if the amount of oil flowing through the pipeline is diminished to the point where the pipeline is demobilized and removed. Perhaps the biggest existing and potential effects on subsistence activities and subsistence harvest patterns result from increased access to rural areas via the Dalton Highway. Although the State of Alaska and the Alaska Department of Transportation and Public Facilities are now responsible for the operation and maintenance of the Dalton Highway, the pipeline and highway are nonetheless related in terms of potential effects on rural subsistence users.

The data presented in this and the other NLUR Community Profile volume (Gerlach et al. 2000) represent roughly a six-week effort to compile and summarize as much existing information as possible about each of the potentially affected communities. No new field or community-based research was conducted for any community by NLUR personnel. Given the relatively short amount of time available to complete this project, we optimized use of existing Alaska Department of Fish and Game reports, the Alaska Department of Fish and Game Community Profile Database, the Alaska Department of Community and Economic Development Community Profile Database, and individual ethnographic and historical sources for each community.

In addition to the data presented in the text with accompanying tables and graphics, Appendices 1–13 of this volume contains printouts of the ADF&G Community Profile Database Community Harvest Summaries for each community where such data exist. The literature-based research from which the community profiles are constructed is comprehensive but not exhaustive, and the historical, ethnographic, and subsistence data available for each community are very uneven in terms of quality and scope. Subsistence activities and harvest patterns for some of these rural communities have been studied in detail by the Division of Subsistence, Alaska Department of Fish and Game, while others, particularly those within or in proximity to the pipeline corridor north of the Copper River Basin, have received relatively little systematic attention by anyone." (au).

Simeone, William E.

2002 *Wild Resource Harvests and Uses by Residents of Cantwell, Alaska, 2000*. Technical Paper No. 272. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"This report summarizes the results of research by the Division of Subsistence, Alaska Department of Fish and Game, on the patterns of fish and wildlife harvest and use in the community of Cantwell, located on the George Parks Highway corridor east of Denali Park and Preserve. Research for this project was conducted in April 2000 and covers the period from April 1999 through March 2000.

Census figures collected by the U.S. government put the 2000 population of Cantwell at 222, while the Division of Subsistence estimated a year-round population of 210 with a mean household size of 2.2 persons. Researchers interviewed 76 (79.1 percent) of the approximately 96 year-round Cantwell household. Almost 69 percent of the total adult population was employed, but only 46.6 percent of employed adults were employed year around. Employed adults worked and average of 9.3 months and held an average of 1.4 jobs. The average household income, derived from all sources, was $39,184, while the average earned income was $27,883.

For the study year Cantwell's total community harvest of wild resources was 27,599 pounds usable weight, or an average household harvest of 293 pounds, and a per capita harvest of 135 pounds (note, the average per capita harvest of subsistence foods in rural Alaska is 375 pounds. In urban Alaska it is 22 pounds). Moose made up the largest component of the community's resource harvest as measured by edible weight (12,368 pounds; 44.8 percent of all resources). Households harvested on average 131 pounds of moose, or 60 pounds per capita. Caribou (3,698 pounds) and sockeye salmon (3,084 pounds) ranked second and third. Households harvested 39 pounds of caribou and almost 33 pounds of sockeye salmon. Other resources with a mean household harvest of 10 pounds or more were berries (15 pounds), king salmon (11 pounds), and hare (10 pounds).

In summary, the current research found that the harvest and use of wild resources played a significant role in the socioeconomic system of Cantwell and that these results were not that different from those reported by Stratton and Georgette (1984) and the Alaska Department of Fish and Game Community Profile Database (CPDB) of the 111 pounds per capita and 324 pounds per household." (au)

Simeone, William E. and James Kari

2005 *The Harvest and Use of Non-salmon Fish Species in the Copper River Basin*. Office of Subsistence Management, Fisheries Resource Monitoring Program, Technical Paper No. 292. Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska.

"This report documents the harvest and use of non-salmon fish species in the Copper Basin. Historically Ahtna fishermen harvested whitefish, trout, grayling, and burbot in the spring and fall using weirs and fish traps. Through this interaction the Ahtna gained considerable knowledge of non-salmon species, which, along with harvesting and processing techniques, as well oral traditions about non-salmon species, is documented in this report. In the 1950s the character the non-salmon fishery changed. Ahtna families stopped going to traditional fishing sites to harvest of non-salmon species and were replaced by non-Native fishermen. Today most people that fish for non-salmon species use rod and reel or ice fish in lakes and streams located on or near the highway system. Whitefish continue to be harvested by a few Basin residents, primarily for dog food but the most frequently reported harvested species were grayling, burbot, rainbow trout, lake trout, Dolly Varden, and then whitefish. The popularity of rainbow trout and grayling can be attributed to the fact that these species are stocked by the Alaska Department of Fish and Game in lakes easily accessible by road." (au).

Simeone, William E. and Erica McCall Valentine

2007 *Ahtna Knowledge of Long-Term Changes in Salmon Runs in the Upper Copper River Drainage, Alaska*. Technical Paper No. 324. Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska.

"This research combines Ahtna environmental knowledge with data from the biological and social sciences to document changes in the upper Copper River salmon fishery. Information in this report covers the period from 1989 to 2004. Ahtna elders have observed that over time, fisheries management and competition from other users have adversely affected the productivity of subsistence harvests. The Ahtna attribute effects on salmon spawning in the headwaters of the Copper River to environmental pollution and interception by commercial and recreational fishers. Since 1889, when the commercial fishing industry began, historical reports document various effects on Copper River salmon stocks and subsistence harvests. The effect of commercial fishing on the long-term abundance of salmon stocks spawning in the headwaters is uncertain. Global climate change may be playing a role in salmon abundance and subsistence harvests, but its effect is difficult to distinguish from natural variation and local environmental conditions. This project is the first of its kind to document the history of the upper Copper River salmon fishery using written historic and scientific documents and Ahtna oral accounts. It provides insights for further research on the long-term effects of human use and environmental changes on these fisheries." (au).

Simeone, William E., James A. Fall and in collaboration with the Copper River Native Association, *Cheesh Na'* Tribal Council, Chitina Tribal Council
2003 *Patterns and Trends in the Subsistence Salmon Fishery of the Upper Copper River, Alaska.* Prepared for the U.S. Fish and Wildlife Service, Agreement No. 7018101296, Project No. FIS 00-40 by Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska.

"This is part two of a report on the investigation of the Copper River subsistence salmon fishery. Part one provided information on the traditional knowledge and salmon fishing practices of the Ahtna of the Copper River Basin (Simeone and Kari 2002). Part two consists of an update of information about the Upper Copper River subsistence and personal use fisheries based on recent harvest and permit data. This report also includes the results of a survey conducted in 2000 designed to update information related to customary and traditional use of salmon in the Glennallen and Chitina subdistricts of the upper Copper River (Fig. 1-1). Previous descriptions of this fishery by the Alaska Department of Fish and Game (ADF&G), Division of Subsistence include Stratton (1982), Fall and Stratton (1984), and Simeone and Fall (1996).

The Copper River flows out of the Wrangell Mountains 250 miles to the Gulf of Alaska (see Fig. 1-1). Its extensive network of tributaries and lakes are the spawning grounds for three species of salmon. Of these, the most numerous are sockeye salmon *(Oncorhynchus nerka)* found in all parts of the Copper River ecosystem, except for its extreme western edge. Chinook *(Oncornhynchus tshawytcha)*, and coho *(Oncorhynchus kisutch)* salmon are also present. The former can be found throughout much of the Copper River drainage while the latter are not usually present above the mouth of the Tazlina River.

Each species of salmon has been used for subsistence purposes in the Upper Copper River Basin for thousands of years. For the indigenous Ahtna Athabascans, salmon have been critical to their economic and cultural survival since at least 1000 AD (Workman 1976). Over the last 125 years, new groups of fishermen have been attracted to the abundant Copper River salmon resource. In1889 a commercial salmon fishery began at the mouth of the Copper River and has remained a cornerstone of the economy of Cordova to this day. More recently, Alaskans living outside the Copper Basin have participated in subsistence, personal use, and sport fisheries. The growth of these fisheries have been facilitated by a road system connecting the Copper River Basin with the population centers of Alaska that have grown far more rapidly than the Copper Basin's communities (Table 1-1, Figure 1-2, Figure 1-3, Figure 1-4). As a result, management of Copper River salmon stocks has been challenged with increasing demand by a diverse set of user groups." (au)

Stanek, Ronald T.

1981 *Supplemental Notes: Copper River Subsistence Fisheries 1979 and 1980*. Technical Paper No. 31. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"Brief summary of subsistence fishery permit allocations for the Copper River Subsistence dip net and fishwheel fisheries 1980. There were 399 fishwheel permits issued. About 85% of these went to Copper River Basin residents. There 2,804 dip net permits issued and 97% of these went to non-Copper River Basin residents. Three percent of these went to Copper River Basin residents. In a 1979 survey of Copper River Subsistence Fishery permit holders the questions of what additional activities and what portion of the annual meat supply was a composed of game meat were asked. A copy of Figure 3 and page 16 of that report are included. Information from the 1980 Copper River Subsistence Fishery permit survey already presented to the Game Board is presented in Figures 1, 2, 4, 5, and 6. Additional information as to how the fishery could be limited is presented in Figure 7." (au)

1987 *Historical and Contemporary Trapping in the Western Susitna Basin*. Technical Paper No. 134. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"Patterns of wild resource harvest and utilization, and the economics of trapping, are described for the western Susitna Basin from Alexander Creek in the south to Youngstown Bend in the North. Area residents are predominantly white settlers who have moved into the area since the turn of the century. Interviews were conducted with people who moved to the area as early as 1925. Approximately 64 households currently reside permanently in the area. Data were collected from 44 area households between January and May 1985. An additional sample of six trapper households was interviewed in the Trapper Creek area.

The cash economy of the area was closely tied to the harvest of wild resources, indirectly through the operation of commercial lodges and guiding operations for fishermen and hunters, and directly by commercial trapping. Area residents also participated in a variety of other cash jobs locally and non-locally. Resources taken for personal consumptive uses were a vital part of this mixed economy.

The study found high levels of participation in hunting and fishing activities by area residents. Over 50 percent of the households attempted to harvest salmon, trout, moose, and berries. between one-third and one-half the households participated in the harvest of furbearers, spruce grouse, burbot, hooligan, and grayling. Moose and salmon contributed over three-quarters of the total edible resource harvest. A decrease of 30 percent occurred in the 1984 harvest compared to the 1982 harvest. Demographic characteristics which appeared to increase household harvests were many years of residency, large-sized households, heads of households between 35 and 49 years of age, and the presence of a hunting or fishing guide or trapper in the household.

Trapper households harvested an average of 312 pounds more edible resources than did non-trappers. Trappers were categorized into three groups: commercial-subsistence, commercial-subsistence-recreational, and recreational. The first two groups harvested more pounds edible resources and produced more cash earnings than did the recreational group. The commercial-subsistence group produced nearly three times as much earnings as the commercial-subsistence-recreational group.

Trapping in the western Susitna Basin study area was valued using six cost accounting methods. Net potential earnings from trapping averaged $833 for 15 trappers. The seven commercial-subsistence trappers averaged $2,258 in potential earnings, almost one-fifth of the 1982 average total annual income per return for Skwentna. Trapping was a seasonal income source that occurred in winter months when cash sources were scarce. Several non-monetary values associated with trapping were the maintenance of good mental and physical health, and teaching you people to accept responsibilities.

The role of trapping in the local economy was that of being a long-term, relatively stable income source among several sources. Residents maintained the capacity to earn cash from a range of income sources, any one of which might diminish from year to year. A variety of wild resources were also utilized since the abundance of any one may fluctuate annually.

An estimated 39 resident and non-resident trappers used the study area in 1984. Trapper numbers and levels of activity may fluctuate from year to year depending on fur prices, weather and other environmental conditions, and an individual trapper's commitments to alternate cash sources. Marten, beaver, mink, and fox were the major furbearer species harvested and those which produced the most amounts of cash income. Marten were trapped in the largest numbers of any fur and produced the greatest amount of gross income. Beaver yielded the second largest amount of gross income to trappers. Many beaver carcasses were used for dogfood and a few were used for human consumption.

Acquisition of traplines was done historically through cash purchases and settling untrapped areas. Today, most trappers are given areas by former trappers or settle on untrapped areas. Recreational trappers, who were not present historically, commonly utilized portions of commercial trappers' areas. The most productive commercial trappers utilized areas averaging 198 square miles in size. Most commercial trappers who utilized areas which had been trapped historically, extended the boundaries of these areas with the use of snowmachines and often consolidated portions of adjoining areas. Expansion of these areas was necessary in order to maintain production and to reach areas unaffected by settlement and recreational trappers." (au)

Stanek, Ronald T., James A. Fall and Daniel J. Foster

1988 *The Harvest and Use of Fish and Game, and Plant Resources by the Residents of Chase, Gold Creek–Chulitna, and Hurricane–Broad Pass, Southcentral Alaska*. Technical Paper No. 161. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

“This report summarizes the results of research by the Division of Subsistence, Alaska Department of Fish and Game, on the patterns of fish and game harvest and use in three

study areas in the Matanuska-Susitna Borough in Game Management Unit l3E in 1986. The first area, Chase, is located within the Alaska Railroad corridor north of Talkeetna and is non-highway connected. Division researchers interviewed 17 (56.7 percent) of the approximately 30 year-round households in the Chase area during the research. The second study area, called Gold Creek Chulitna in the report, is also located along the Alaska Railroad, directly north of Chase. Five (83.3 percent) of the six year-round households were interviewed. Finally, the third area is along the Parks Highway from Milepost 132.8 (the GMU 14/13 boundary) to Milepost 202.1 (the borough boundary). Eight (66.7 percent) of the 12 year-round households in this area, called Hurricane–Broad Pass in the report, were interviewed. In addition to administering the survey instrument, division researchers also mapped resource harvest areas with each household. This research is part of a larger project which is investigating the developing patterns of wild resource uses in communities that have been settled as a result of state and federal land disposal programs.

The 17 interviewed Chase households had a total population of 78. The average length of residency of these households in the Chase area was 11.4 years, with a maximum of 18 years. Wage employment among these households was mostly seasonal, with adults working an average of 6.4 months in 1986. Most Chase residents had obtained their land through state settlement entry programs, and had opted to live in this relatively remote area in order to live a particular lifestyle based in part on local hunting and fishing.

On average, the five sampled Gold Creek–Chulitna households had lived in that area for 20.2 years, with a maximum of about 40 years. Sixty percent of the adults worked year-round, with an average of 10.0 months of employment per adult in 1986. Household heads in the Hurricane–Broad Pass sample had an average length of residency of 16.5 years in the area. The average number of months employed for adults in this sample was 8.9, with 61.5 percent of the adults holding year-round jobs.

All of the 17 sampled Chase households harvested and used wild resources in 1986. On average, these households used 11.7 categories and harvested 10.0 categories. The mean household harvest was 553.8 pounds edible weight and the per capita harvest was 209.2 pounds. Land mammals made up 54.9 percent of the total harvest, followed by salmon with 23.7 percent. Most harvests occurred in Game Management Unit l3E relatively near the community.

Horticultural production (small scale farming) was a notable part of the Chase community's economic system in 1986. On average, households grew 12.2 kinds of vegetable foods for a mean household production of 579.6 pounds, 227.7 pounds per capita.

Resource harvest and use patterns in the other two study areas were similar to those in Chase in 1986. All of the Gold Creek Chulitna households used and harvested wild resources in 1986. The mean number of resource categories used was 11.2 and the mean number harvested was 9.4. The mean household harvest of wild foods for these five households was 347.9 pounds, 174.0 pounds per capita. As at Chase, land mammals was the dominant resource category, providing 44.2 percent of the total harvest weight.

Participation in the harvest and use of wild foods was also universal in the Hurricane–Broad Pass sample. These eight households used a mean of 10.1 categories of wild foods and harvested a mean of 7.8 categories in 1986. The mean household harvest was 600.5

pounds and the per capita harvest was 177.9 pounds. Land mammals made up 66.9 percent of this harvest by weight.

In conclusion, the research found that the harvest and use of wild fish, game, and plant resources played a large role in the socioeconomic systems of all three study areas in 1986. Resource harvests were high in comparison with urban, more densely populated areas of southcentral Alaska. Patterns of wild resource use in Chase, Gold Creek–Chulitna, and Hurricane–Broad Pass most closely resemble those documented by earlier division research in Skwentna and Cantwell. The characteristic socioeconomic pattern in the three study areas, which combines seasonal employment, fishing and hunting, and (in the case of Chase) horticultural production, is a product of the availability of wild resources, a low population density, a marginal cash economy, and a value orientation conducive to living in a relatively remote area." (au)

Stickney, Alice A. and Paul Cunningham

1980 *Report on the Survey of Permit Holders in the Copper River Subsistence Fishery, 1979*. Technical Paper No. 36. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"A survey was conducted by the Subsistence Section of the Alaska Department of Fish and 'Game of all 1979 permit holders of the Copper River Subsistence fishery. The goal was to identify criteria on which temporary restrictions could be imposed given a critical resource situation. Many variables were considered in an attempt to differentiate between users and relate their activities to the subsistence criteria outlined in Sec. 4 AS 16.05.251. Most of these variables were discarded as inappropriate. Residency appeared to be the most suitable criterion on which to base temporary permit allocations. Local residents in general proved to be the most dependent user group, not only on the Copper River fishery, but on the wild resources of the Copper Basin itself." (au)

Stratton, Lee

1982 *The Dipnet and Fishwheel Fisheries of the Copper River, 1982*. Technical Paper No. 37. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"This report describes the fishwheel and dipnet fisheries of the Copper River based on data collected from observation and interviews of a sample of permitholders during the 1982 season.

The 1982 data corroborates 1979 Division of Subsistence research which found substantial differences between local and non-local participants. In general, Basin fishwheel users have a longer history of participation than non-Basin participants. Patterns of harvesting other resources also differed. While both segments of the sample tended to participate in hunting and fishing activities, Basin residents hunt, fish, trap, and gather berries almost exclusively within the Copper River Basin, while non-local fishwheel users engaged in these activities outside the Basin.

Eighty-one fishwheel fishery participants were interviewed, primarily at their fishwheel sites at eleven different locations. The interview sample constituted 13.2 percent of the 615 fishwheel permitholders in 1982. Of those interviewed, 69.1 percent were residents of the Copper River Basin, and 30.9 percent lived outside the Basin.

Of the dipnet fishery participants at Chitina, 93 were interviewed, representing a 1. 5 percent sample of the 5,481 permitted dipnetters in 1982. Of these 93 interviewees, 78 (83.9 percent) resided outside the Copper River Basin and 15 (16.1 percent) were residents of the Basin.

In 1982, 51.1 percent of the fishwheel permitholders were local residents and 48.9 percent were not Basin residents. The local fishwheel sample was characterized by a long-established participation in the fishery; non-local permitholders generally had shorter histories of involvement in the fishery. Among the fishwheel participants hunting was the most commonly mentioned additional resource harvest activity. Non-local fishwheel operators were much more likely to participate in other salmon fisheries in addition to the Copper River fishery than the local residents. Copper River Basin residents were most likely to participate in fishing, hunting, trapping, and berry picking activities within the Basin, while non-local residents frequently reported using areas outside the Basin.

Four areas with several fishwhee1 sites are described in detail. The Chitina Bridge and Slana clusters are included because of the predominately non-local residency of most of the fishermen. The Chitina Bridge cluster was also the cluster within the largest number of wheels and permits in the fishwheel fishery. The Copper Center cluster illustrated a mixture of mostly use patterns. The Gu1kana cluster also is a local use fishery characterized by even less non-Basin participation than Copper Center, and an over-all longer history of involvement in the fishery.

The dipnet fishery is characterized by a vast majority of non-local participants (98. 5 percent). Forty-one percent of the interviewed dipnetters were first-year permitho1ders. Fourteen percent had a history of involvement greater than 10 years. Fishing for species other than salmon was the resource harvesting activity mentioned most frequently by dipnetters that were interviewed. Dipnetters normally fish and hunt outside the Copper River Basin. Basin dipnetters engage in resource harvesting activities within the Basin more often." (au)

1983 *Copper Basin Caribou Use: A Research Update*. Technical Paper No. 75. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"This report contains information on characteristics of the uses and users of the Nelchina and Mentasta caribou herds. Data were collected with questionnaires mailed to 1982–83 permit holders for the Nelchina caribou general (503) and subsistence (503W) hunts and the Mentasta (502) caribou hunt. A total of 2,100 questionnaires were sent out, of which 1,055 (50.2 percent) were returned.

Questionnaire data were analyzed in order to compare the three groups of caribou hunters. Results showed that hunters in all three groups were predominantly males, and lived in households with an average size between three and four persons. Most Nelchina general (503) hunt permit holders resided In the Anchorage area (57.0 percent), the Palmer–Wasilla area (18.4 percent) and Fairbanks (11.4 percent). Mentasta (502) hunt permit

holders primarily resided in the Nelchina Basin (38.0 percent), the Anchorage area (24.1 percent) and "Other Alaska" (16.9 percent). Nelchina subsistence (503W) hunters were, by regulation, Nelchina Basin (Game Management Unit 13) residents, with significant numbers giving addresses in Glennallen (28.7 percent), Copper Center (16.9 percent) and Cantwell (12.4 percent).

Of the three permit groups. 503W hunters had the greatest length of residency in their communities and in the State, and were generally older than the other two groups of hunters. The same group of permit holders had a longer history of having used the Nelchlna caribou (mean number of 15 years) than did the 503 permitholders (mean number of 7 years). Of the three permit groups, the 503 permitholders hunted other caribou herds most frequently, and the herds were predominantly fly-in hunts. 503W permit holders that hunted other herds most commonly used the Mentasta herd, which is relatively accessible to Basin residents. The 503W hunters reported the highest dependence on wild food resources, the lowest average income, and the most prevalent employment in part-time and seasonal jobs; in contrast, 503 and 502 permit holders had lower dependence on wild renewable resources, higher incomes, and were predominately employed full-time, year round.

The study corroborates previous research findings on caribou use patterns (Stratton 1982a) and Copper River Basin fishwheel users (Stratton 1982b) which noted extensive histories of use of local resources and wide utilization of a variety of wild natural resources by Copper Basin residents.

In summary, the results of the study indicate that substantial differences in economic circumstances and resource use patterns exist between the 503W subsistence permit hunters and the 503 general permit group. Also, the 1982 questionnaire results suggest that a large number of Basin residents who in 1981 were not participating in the permit system have obtained permits under the Nelchina subsistence hunt regulations." (au)

Stratton, Lee and Susan Georgette

1984 *Use of Fish and Game by Communities in the Copper River Basin, Alaska: A Report on a 1983 Household Survey*. Technical Paper No. 107. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"In 1983, the Division of Subsistence, Alaska Department of Fish and Game in cooperation with the Copper River Native Association and the National Park Service, conducted research focusing on resource harvest and use patterns of residents in the Copper River Basin and Wrangell Mountains. The primary purpose of the project was to document harvest and use levels of fish, game, and wild plant resources and to collect socioeconomic and demographic data for the area.

The methodology included a literature review, a household survey, and in-depth interviews with households and business operators. During four months of field work, 431 households and 144 businesses were contacted. The household and business surveys were administered in 22 communities and sample areas. Depending on the size of the community, from 20 to 100 percent of local, year-round households were interviewed.

Household information on resource use pertains to the 12 month period from June 1982 to May 1983.

An historic and economic overview briefly chronicles the settlement and development of the. Copper Basin from the aboriginal Ahtna occupants, through the gold rush at the turn of this century and the trans-Alaska pipeline boom of the 1970s, to the present day. Today, the estimated total population of the study area is 3,310 people. Glennallen is the largest community in the region, with an estimated population of 861 persons.

Demographic variables such as length of residency, place of birth, and ethnicity varied among the communities surveyed. For instance, in Mentasta, the mean length of residency for household heads was 41.3 years. Sixty-eight percent of the household heads were born in the Copper River Basin, and 90 percent of Mentasta household had at least one Alaska Native member. By contrast, households surveyed in other areas, such as Matanuska Glacier, the North and South Wrangell Mountains, and Paxson–Sourdough, reported no Alaska Natives in the sample. Residency in these areas was much shorter than in Mentasta, .and the majority of heads of household were born outside Alaska. Mean length of employment per year of household heads varied for each community, from Lower Tonsina with a low of 2.9 months to a high of 10.9 months in Glennallen.

In the report, the 22 sampled communities and areas have been grouped into six geographical subregions Glenn Highway, Regional Center, Lower Copper River, Wrangell Mountains, Upper Copper River, and the Denali Highway subregion. Within each subregion, individual communities and samples are discussed. Mean household harvest of resources ranged from a high of 1,233 pounds dressed weight for the Nabesna Road sample to 227 pounds in Glennallen. The majority of the communities fell between 290 and 470 pounds per household. Use of resources was slightly greater, with most communities reporting a mean household use level between 390 and 670 pounds. Communities which lie close to the Copper River such as Chitina, Gakona, and Lower Tonsina reported that salmon constituted over 50 percent of the household harvest, while communities more distant from the Copper River, such as Cantwell, Matanuska Glacier, Mentasta, and the North Wrangell Mountains indicated that big game played a larger role in household diet.

Several factors were identified as shaping a community's resource use pattern. The geographic location of a community determined the species locally available, and the extent to which they were accessible to both local and non-local residents. The kinds of species harvested and the amount of total harvest were both decidedly related to geographic location.

Hunting and fishing regulations were also found to affect harvest levels in that they set constraints on availability of species, seasons, and methods of harvest. For example, restrictive antler requirements for moose influenced the availability of this resource to hunters. Likewise, bag limits for salmon limited the availability of this resource to fishermen.

Other factors relating to resource harvest were the type and length of wage employment. Communities with a proportionately high number of big game guides such as Nabesna Road and the North Wrangell Mountains had a higher mean household harvest than other samples.

The composition of households corresponded to levels of resource use. Communities with high numbers of single women and retired heads of household had lower mean household

harvests. Community and household resource use patterns were shaped by a number of environmental, economic, social, and cultural factors. The economy of the region has remained marginal, and hunting, fishing, and gathering continue to play a significant role in the way of life in Basin communities." (au)

Stratton, Lee

1989 *Resource Uses in Cordova, a Coastal Community of Southcentral Alaska*. Technical Paper No. 153. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"This report describes contemporary patterns of resource harvest and use in Cordova, a small town (population 2,307) located on eastern Prince William Sound in southcentral Alaska. The report is based on data collected during a survey of 206 randomly selected Cordova households (24.2 percent) in January through April 1986, and 26 key respondent interviews conducted between July 1985 and April 1986. The harvest and use data reflect activities during 1985.

Cordova's roots in Native Alaskan villages, and expansion because of the commercial fishing, mining and railroad industries, are reflected in the town's demography. Almost one third of Cordova's population was born in the Prince William Sound area, while 58 percent were born in the United States other than Alaska. Eighteen percent of the surveyed population was Alaska Native. The mean length of residency was 13.5 years, with 60.4 percent of the population residing in Cordova ten or more years.

Employment in Cordova was characterized by seasonality and dominated by commercial fishing and support industries. Household heads worked an average of 9.6 months per year, and held an average of 1.4 jobs per person. Thirty-five percent of the employed adults worked in trades and services, which include many of the businesses that exist to support commercial fishing. Twenty-nine percent were involved in commercial fishing, and 18 percent were employed in government jobs.

Commercial fishing in Prince William Sound and the Copper River, as in other areas is a highly variable industry which fluctuates annually as a result of run strengths and market values. While Cordova residents held between one third and one half of the limited entry permits for these areas, trends show that residency of limited entry permit holders is changing, moving increasingly away from local rural areas.

Cost of living estimates indicate that food in Cordova costs 25 to 40 percent more than in Anchorage, and electricity rates are more than double Anchorage' s kilowatt per hour rate. Incomes vary annually corresponding to the commercial fishing industry. The mean Cordova income averaged for three years was $19,050, lower than Anchorage and Valdez, but higher than many villages.

The 1986 survey found 81 types of resources harvested' by Cordova households. On average, households harvested 7.2 different resources, and used 10.8. The seasonality of harvests was guided not only by availability of resources, but also by hunting and fishing regulations. Halibut and berries were used by about three fourths of the surveyed households, followed by silver salmon (70.9 percent), sockeye salmon (68.4 percent), and

deer (64.1 . percent). Almost three-fourths (72.3 percent) of the surveyed households harvested salmon, and 47.1 percent harvested game.

The fact that more households use resources than harvest them reflects sharing among Cordova households. More households received resources than gave them away. Over three fourths of the households reported giving away resources, while 92.7 percent reported receiving resources. The sharing occurred widely within the community of Cordova, as 91.3 percent of the households received resources from other Cordova households. Sixty five percent of the households gave resources to other Cordova households. In addition, 63.6 percent of the surveyed households indicated that they purchased wild resources locally, either from commercial fishermen or processors.

In 1985, Cordova households harvested a mean of 402.7 1bs of wild resources per household, or 151.7 lbs per capita. By weight, 39.0 percent of the harvest was salmon, 27.3 percent was game, and fish other than salmon comprised 22.6 percent of the harvest. The majority of the salmon brought home for consumption (62.7 percent) came out of commercial harvests. Thirty-five percent was taken from rod and reel harvests, and the remaining 2 percent came from the subsistence fishery, largely attributable to the restrictive regulatory regime for subsistence fishing in place in 1985. Salmon taken for home use by Cordova households comprised less than one percent of all salmon harvested in Prince William Sound and Copper River in 1985.

Factors associated with higher household harvests included involvement in Commercial fishing, participation in the subsistence salmon fishery, and use of certain types of transportation for harvesting. Households using boats, airboats, and airp1anes showed higher household harvests than those not employing those modes.

At 151.7 lbs per capita harvest, Cordova ranked above the larger, road-connected communities of Anchorage, Fairbanks, and Kenai. It was similar to other coastal communities such as Sitka, Kodiak City and Wrangell, but had considerably lower harvests than many smaller villages in southcentral Alaska." (au)

1992 *Cordova: A 1988 Update on Resource Harvests and Uses*. Technical Paper No. 204. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"This report summarizes the findings of research conducted by the Division of Subsistence of the Alaska Department of Fish and Game in Cordova, a community of Prince William Sound, southcentral Alaska. Cordova had a population of 2,282 in 1990. The primary purpose of the research was to document noncommercial harvests and uses of wild fish, game, and plant resources by Cordova residents in 1988. Most data were collected through interviews with a stratified, randomly-selected sample of 101 households using a standard survey instrument. In addition to resource harvest and use data, information on demography, cash employment, monetary income, and household expenses was also collected. The research was conducted In February 1989, and updates a similar study undertaken by the division in Cordova pertaining to 1985.

The research found that, overall, Cordova households used over 100 different wild food resources in 1988. On average, households used 14.3 different kinds of wild resources and harvested 9.7 kinds during 1988. Almost every interviewed household (97.8 percent) used wild resources in the study year, 88.7 percent harvested resources, 88.4 percent gave

resources to other households, and 91.0 percent reported receiving resources from other households. Based on the survey results, it is estimated that 79.7 percent of Cordova's population, including people of almost all ages, participated in noncommercial resource harvesting activities in 1988.

Cordova residents' per capita harvest of resources increased from 163.8 pounds in the 1985 study to 233.8 pounds in 1988. Marine resources dominated the wild food harvest in 1988 as they had in 1985, with non-salmon fish harvests accounting for 91.4 pounds per person for 39.1 percent of the harvest, followed by salmon at 69.3 pounds (25.4 percent), big game at 50.2 pounds (21.5 percent), marine invertebrates with 21.8 pounds (9.3 percent), wild plants with 5.6 pounds (2.4 percent), birds and eggs at 4.7 pounds (2.0 percent), and marine mammals with 0.8 pounds (0.3 percent).

As measured in numbers of fish harvested, rod and reel catches accounted for 52.6 percent of Cordova's salmon harvest for home use in 1988. Salmon removed from commercial catches ware also a significant source of home use salmon, contributing 44.9 percent of the total. Subsistence nets provided 2.5 percent of Cordova's harvest of salmon for home use in 1988. Based on survey findings, it is estimated that Cordova residents harvested about 20,000 salmon for home use by these three methods. While this represents a significant source of food for the community, this catch is just 0.134 percent of the total salmon harvest of 15,000,000 fish in Prince William Sound in 1988. Commercial catches accounted for about 99.6 percent of this take.

Cordova's noncommercial harvests of fish, game, and wild plants in both 1985 and 1988, as measured in pounds useable weight per person, were lower than the two villages in Prince William Sound for which there are harvest data, Chenega Bay and Tatitlek, and lower than other isolated Alaska Native villages in southwest and southcentral Alaska. However, Cordova's harvests were similar or higher than other communities of southern Alaska which share many of its demographic and economic characteristics, such as Sitka and Kodiak City. Furthermore, Cordova's wild resource harvests in both 1985 and 1988 were much higher than more urbanized places such as Kenai or Homer, suggesting a more significant role for noncommercial harvesting activities in Cordova than in these other Alaska communities.

The results of the household survey regarding monetary employment in Cordova in 1988 corroborated the findings pertaining to 1985. Again, the dominance of commercial fishing in Cordova's cash economy was documented. Over half (55.4 percent) of the surveyed households contained at least one commercial fisherman. Commercial fishing accounted for 31.6 percent of all jobs in the community in 1988, and 38.1 percent of all employed adults were employed as commercial fishermen. Commercial fishing provided well over half (58.6 percent) of Cordova's earned income in the study year. Other important employer types in Cordova included government (19.7 percent of all Jobs), services (13.5 percent), and retail trade (11.9 percent).

The report concludes that the study findings, combined with those from 1985, demonstrate the continuing importance of hunting, noncommercial fishing, and gathering for the people of Cordova. Levels of harvest are relatively high, involve a large majority of the community's population, and are diverse. Resource sharing patterns are strong in the community. Comparisons of the findings for the two study years (1985 and 1988) suggest that this pattern of harvest and use of wild foods in Cordova is relatively stable.

None of the comparisons suggested a diminishing role for noncommercial fishing, hunting, and gathering in the community's way of life through the 1980s." (au).

Stratton, Lee and Susan Georgette

1985 *Copper Basin Resource Use Map Index And Methodology*. Technical Paper No. 124. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

"This paper is a summary of the methodology used to collect the mapped data presented in the Copper Basin Resource Use Maps, and includes an index to the maps. These maps depict the areas used between 1964 and 1984 for hunting, fishing, trapping, and gathering by 20 communities in or near the Copper River Basin, Alaska. Mapping was accomplished primarily through individual interviews with over 200 local hunters and fishermen during the 1983 and 1984 field seasons. Species and resource categories presented in the maps include moose, caribou, sheep, waterfowl, furbearers, salmon, other freshwater fish, and berries and plants. The majority of the mapping was conducted on the Gulkana, McCarthy, Mt. Hayes, Nabesna, and Valdez U.S. Geological Survey topographic quadrangles (scale 1:250,000). The Anchorage, Bering Glacier, Healy, Talkeetna Mountains, and Tanacross quadrangles were also used, but to a lesser extent.

This summary of methodology is intended to accompany the maps, clarify their scope and representativeness, and explain their limitations. The paper also sets out some applications for the resource use maps for interested individuals and land management agencies.

The map index references each set of community maps by quadrangles and the species shown on each map. The set of 113 maps is available at the Division of Subsistence Anchorage office, and will be in all field offices of the Alaska Department of Fish and Game upon completion of the Southcentral Regional Habitat Guide in 1986." (au)

Terrestrial Environmental Specialists, Inc.

1982 *Phase I Environmental Studies Final Report Subtask 7.07 - Land Use Analysis*. Report prepared by Terrestrial Environmental Specialists, Inc. for the Alaska Power Authority, Anchorage, Alaska (APA Document No. 302).

"This Subtask 7.07 report describes the results of the land use portion of the environmental analysis of the Susitna hydroelectric project proposed by the Alaska Power Authority (APA). The direct and indirect effects of the project on land use were assessed, considering changes in use that would occur with and without the project. The analysis addressed project components, including the dams, reservoirs, and related facilities; access transportation system; transmission facility; construction camps and villages; proposed recreational facilities; and other aspects of the project. The potential effects of the project were assessed in relation to four major land use factors: land developments, dispersed use and activity patterns, land ownership and stewardship, and natural aesthetics.

A summary of these results has been presented previously in Volume 2 of the Susitna Hydroelectric Project Feasibility Report (APA1982). The results of the land use analysis will be included in a license application to the Federal Energy Regulatory Commission (FERC) if such application is made following state agency and public review of the Feasibility Report. This report provides additional information and details of the land use factors analyzed and presented in the Land Use and Aesthetic Resources sections of the Feasibility Report.

The land use analysis involved an evaluation of the changes in land use likely to be caused by the proposed Susitna hydroelectric project and provided the basis for summarizing the overall impact of the project. The analysis was designed to provide baseline data and an impact assessment that will satisfy FERC license application requirements. The objectives of the Subtask 7.07 land use analysis were to: (1) describe past, present and future land use trends; (2) identify potential changes in land use that would result with the development of the project; (3) evaluate the changes in terms of impacts on land use; and (4) identify possible mitigative measures to minimize impacts on aesthetic resources." (au)

FIGURES

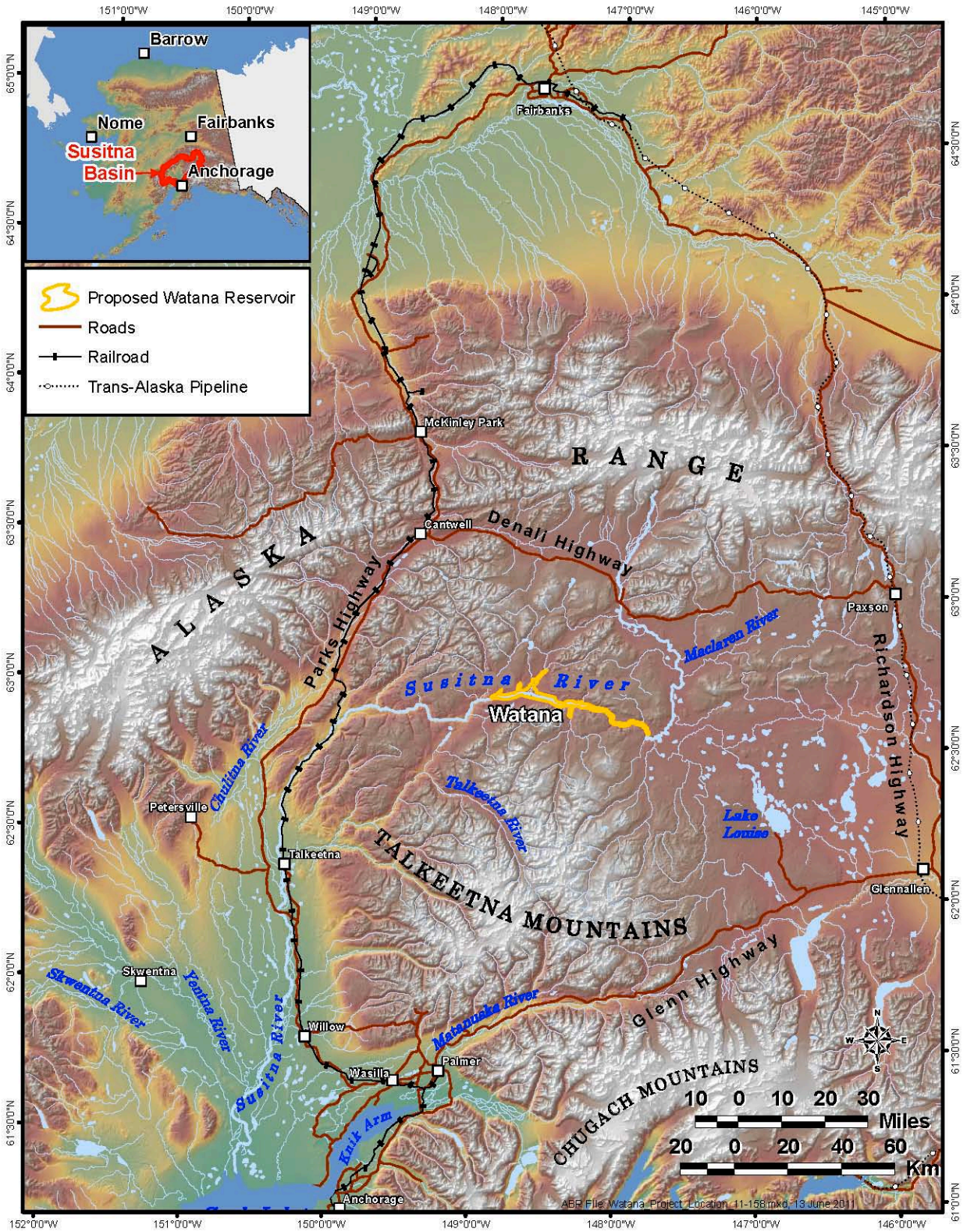

Figure 1. Watana Hydroelectric Project general vicinity map (map courtesy ABR, Inc.).

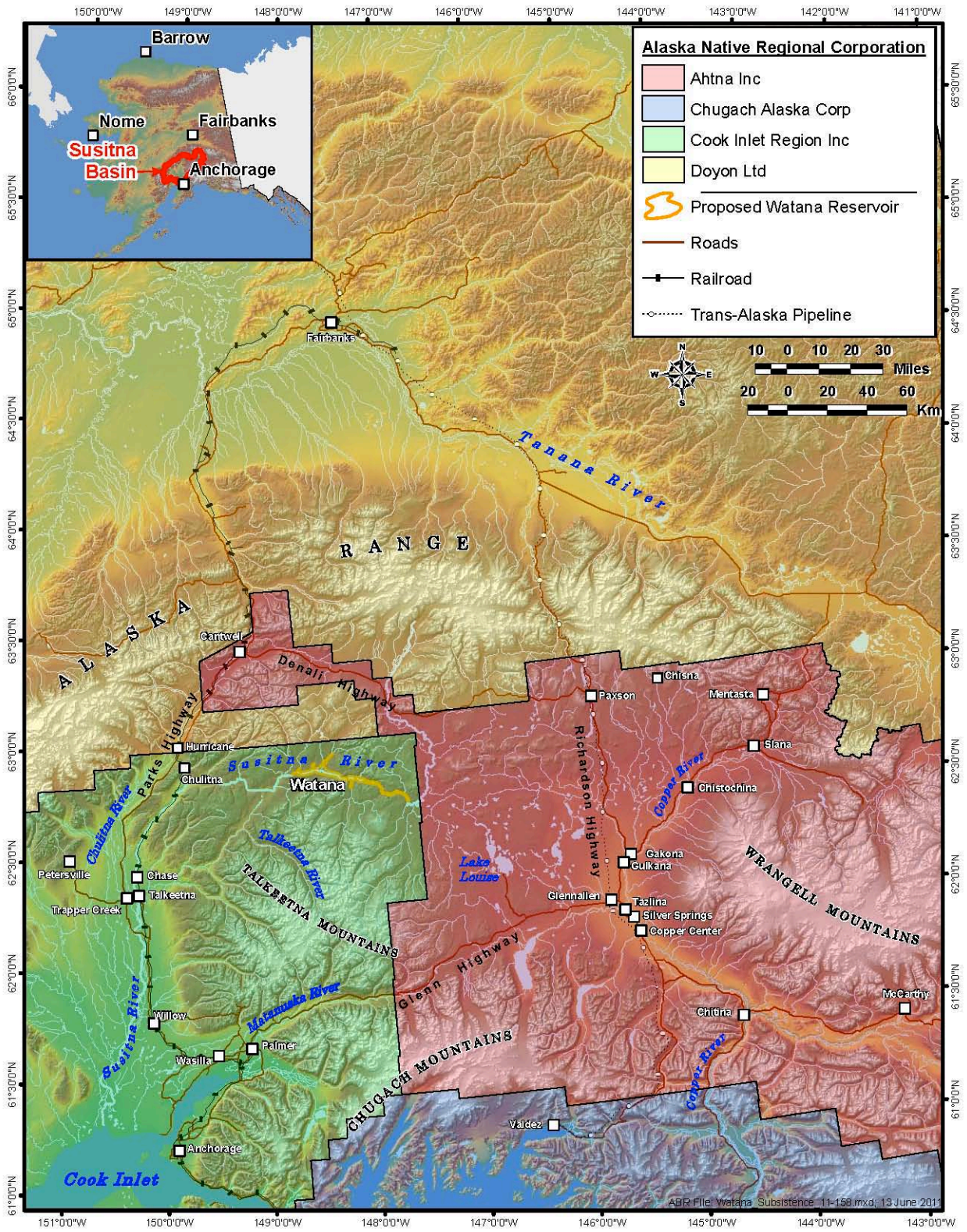

Figure 2. Communities described in subsistence data gap analysis (map courtesy ABR, Inc.).

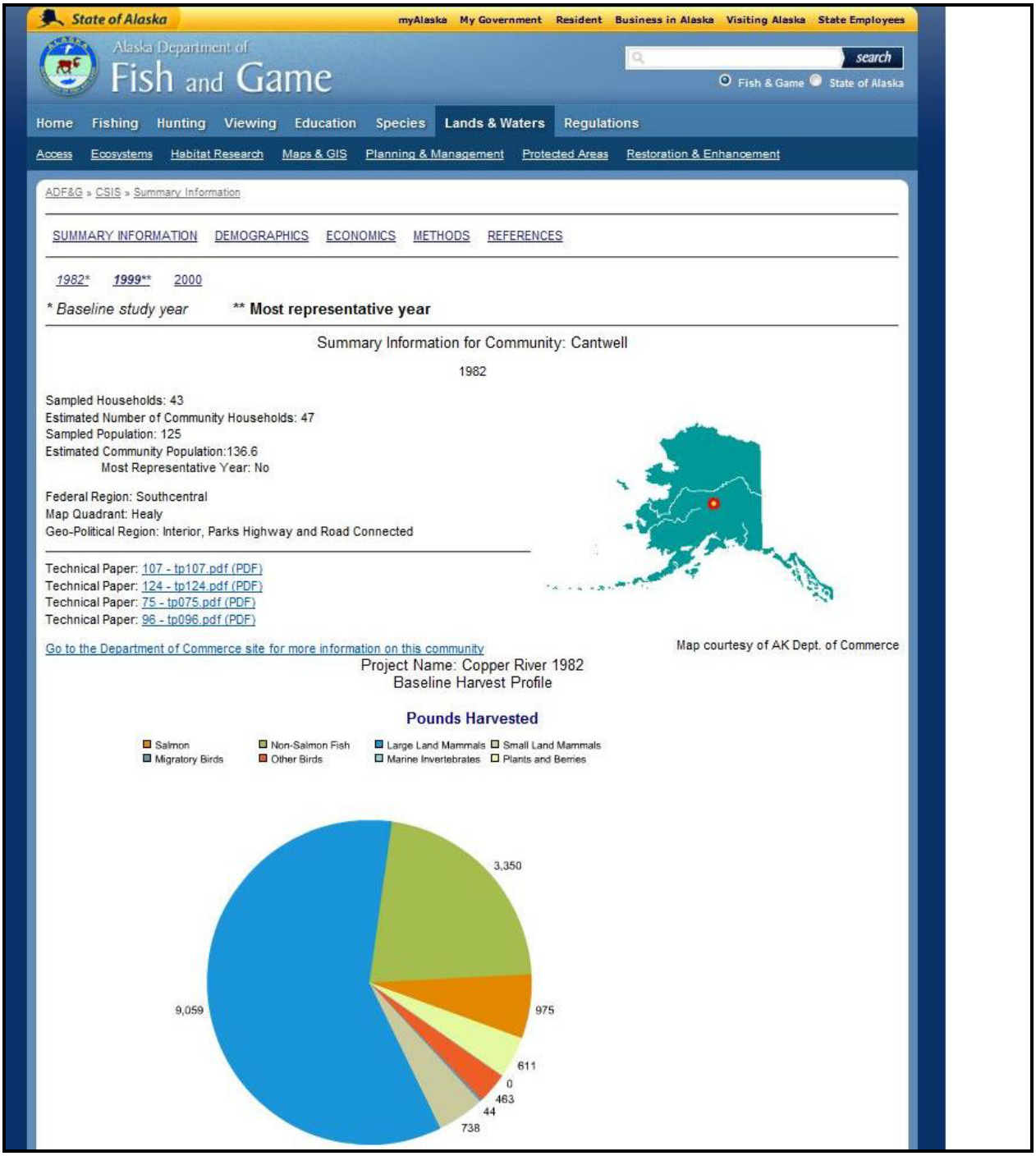

Figure 3. Summary harvest information for Cantwell, 1982 baseline year. (ADF&G screen shot)

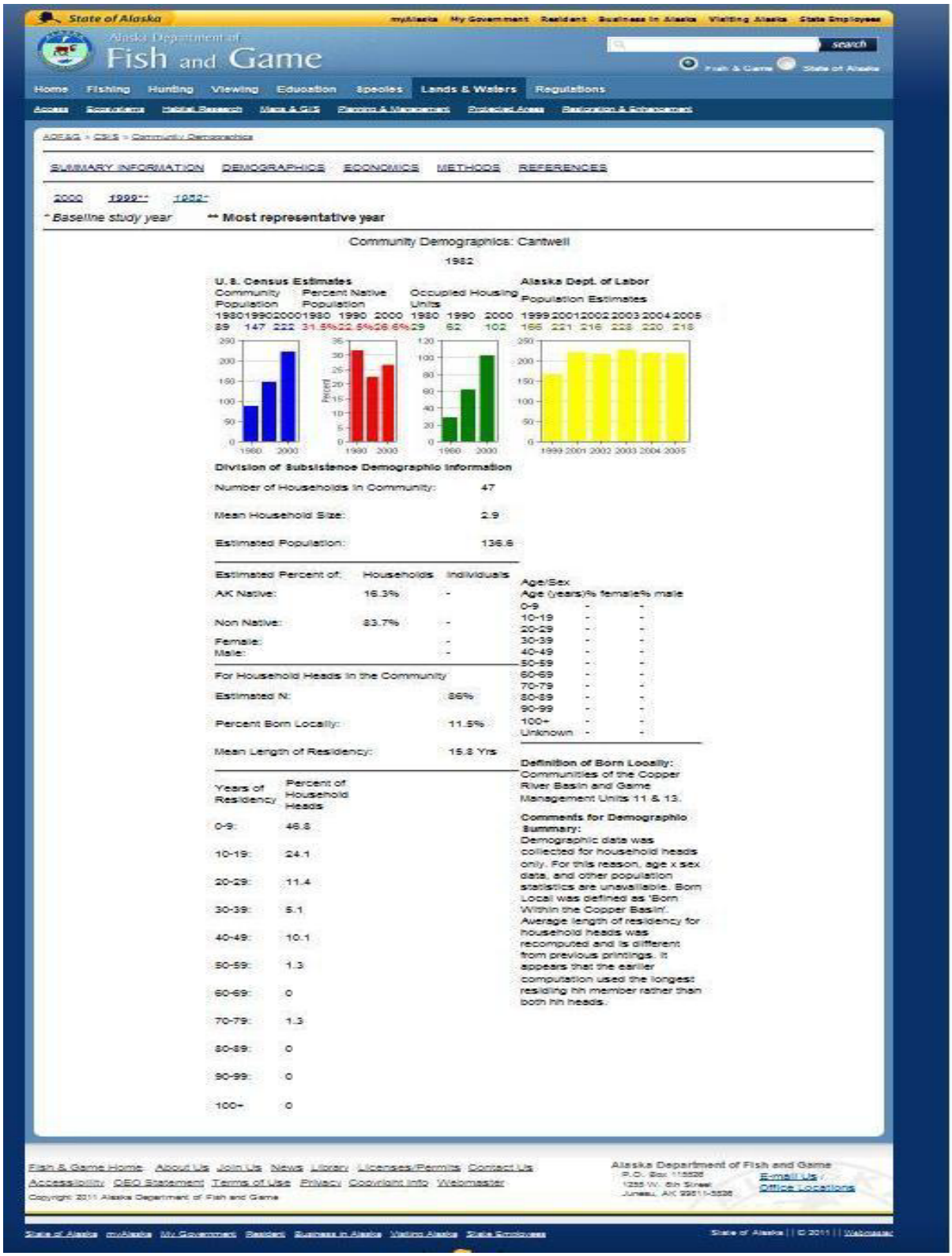

Figure 4. Summary demographic information for Cantwell, 1982 baseline year. (ADF&G screen shot)

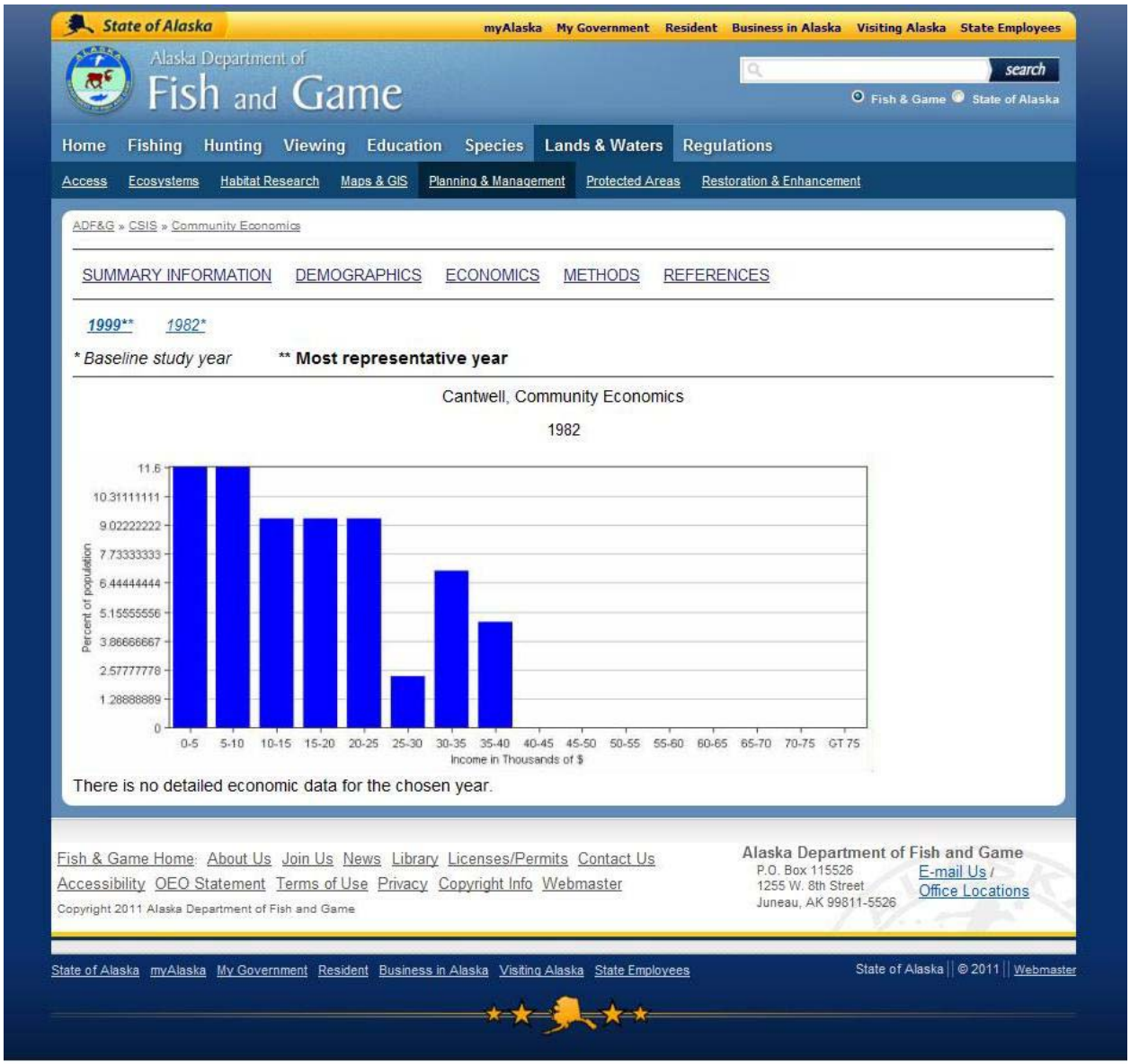

Figure 5. Community economics, Cantwell, 1982 (ADF&G screen shot).

Figure 6. Summary information, Cantwell research methods, 1982 (ADF&G screen shot).

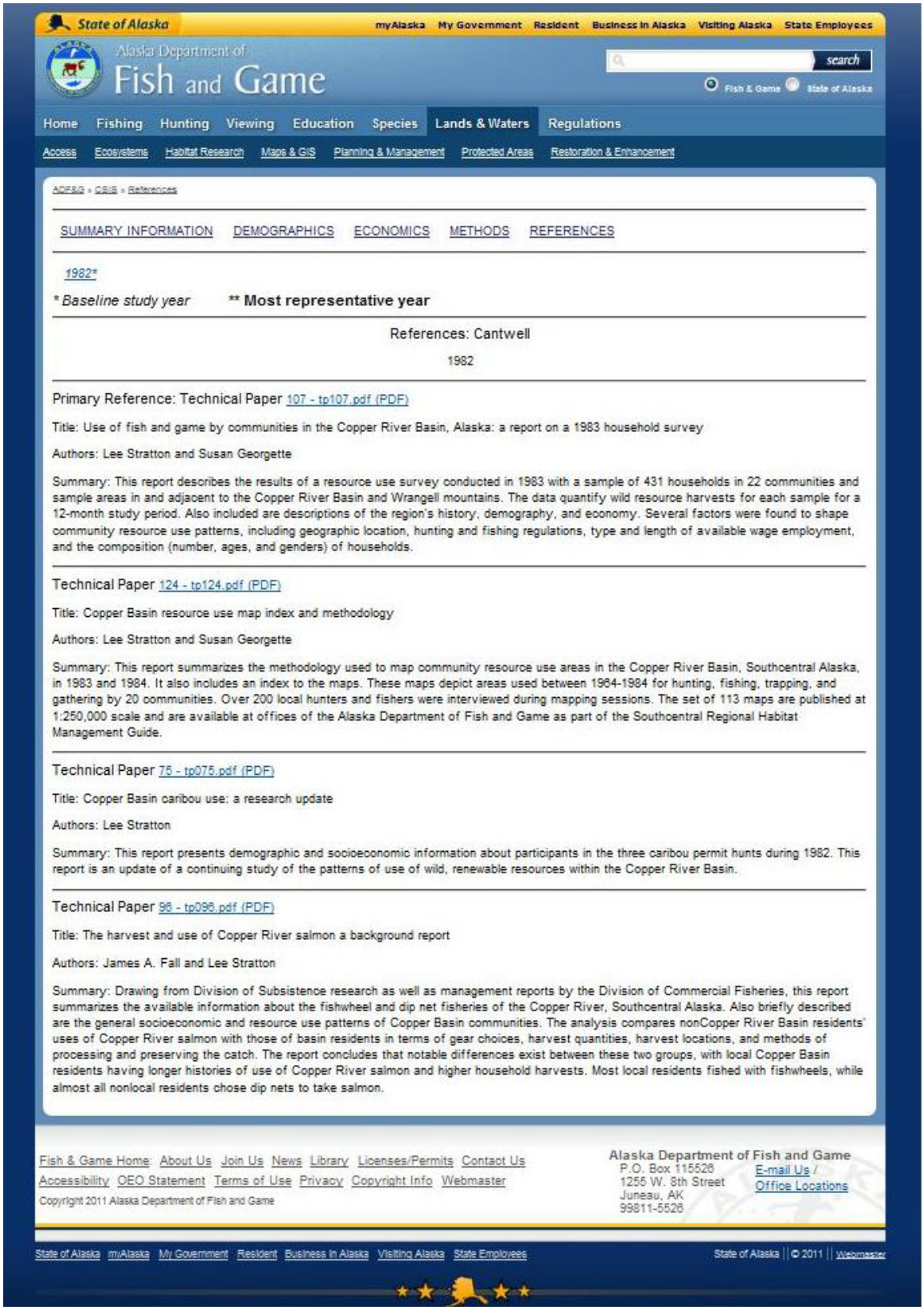

Figure 7. Technical Papers references for Cantwell (ADF&G screen shot).