Fishery Management Report No. 07-47

Fishery Management Report for the Recreational Fisheries of the Upper Copper/Upper Susitna River Management Area, 2005

by

Mark A. Somerville

and

Tom Taube

August 2007

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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by

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The Division of Sport Fish Fishery Management Reports series was established in 1989 for the publication of an overview of Division of Sport Fish management activities and goals in a specific geographic area. Since 2004, the Division of Commercial Fisheries has also used the Fishery Management Report series. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm. This publication has undergone regional peer review.

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PREFACE

This report provides information for the Upper Copper/Upper Susitna Management Area (UCUSMA) and is one in a series of reports annually updating fisheries management information within Region III. The report is directed toward the state Board of Fisheries, Fish and Game Advisory Committees, the general public, and other interested parties. It presents fisheries assessment information and the management strategies that are developed from that information. In addition, this report includes a description of the fisheries regulatory process, the geographic, administrative, and regulatory boundaries, funding sources, and other information concerning Sport Fish Division management programs within the area.

The goals of the Sport Fish Division of the Alaska Department of Fish and Game are to protect and improve the state's recreational fisheries resources by managing for sustainable yield of wild stocks of sport fish, providing diverse recreational fishing opportunities, and optimizing social and economic benefits from recreational fisheries. In order to implement these goals the division has in place a fisheries management process.

A regional review is conducted annually during which the status of important area fisheries is considered and research needs are identified. Fisheries stock assessment research projects are developed, scheduled, and implemented to meet information needs identified by fisheries managers. Projects are planned within a formal operational planning process. Biological information gathered from these research projects is combined with effort information and input from user groups to assess the need for and development of fisheries management plans, and to propose regulatory strategies.

Sport Fish Division management and research activities are funded by State of Alaska Fish and Game (ADF&G) and federal aid in Fisheries Restoration funds. ADF&G funds are derived from the sale of state fishing licenses. Federal aid funds are derived from federal tax on fishing tackle and equipment established by the Dingell-Johnson (D-J) Act. The D-J funds are provided to the states at a match of up to three-to-one with the ADF&G funds. Additional funding specified for providing, protecting, and managing access to fish and game is provided through a tax on boat gas and equipment established by the Wallop-Breaux (W-B) Act.. Other peripheral funding sources may include contracts with various government agencies and the private sector.

This area management report provides information regarding the Upper Copper/Upper Susitna Management Area (UCUSMA) and its fisheries for 2005, with preliminary information from the 2006 season. This report is organized into three primary sections, the management area overview, a section on the significant area fisheries, and a section on invasive species.

ABSTRACT

Sport fisheries management recommendations and background information for 2005 in the Upper Copper-Upper Susitna Management Area (UCUSMA) are presented. This information is provided as a reference for the Alaska Board of Fisheries, general public, and other interested parties. The UCUSMA consists of all waters and drainages of the Copper River, upstream of Haley Creek and all waters and drainages of the Susitna River, upstream of the Oshetna River. The area's king, sockeye, and coho salmon are targeted in sport, personal use, and subsistence fisheries. Other resident and anadromous fishes such as burbot, lake trout, rainbow/steelhead trout, Arctic grayling, and Dolly Varden are primarily targeted in year-round sport fisheries and minimal subsistence fisheries. Whitefish are mainly targeted in subsistence fisheries. Sport angler effort was 41,782 angler-days in 2005 and has been declining over the past 5 years. Over 44% of this effort was expended in the Gulkana River drainage. Total sport catch and effort has been decreasing over the past 5 years. Total sport catch was 106,077 fish in 2005. Arctic grayling made up 48% of the sport catch in both years. Sport harvest totaled 23,779 fish in 2005 with sockeye salmon accounting for 34% of the harvest. A total of 66,615 salmon were harvested in the Copper River subsistence fishery in 2005. Sockeye salmon made up over 93% of the subsistence harvest. The Copper River Personal use fishery harvest has been increasing over the past 5 years and totaled 124,403 salmon in 2005 with sockeye salmon accounting for over 95% of the harvest. Overall, the UCUSMA fish stocks are healthy and sustainable, but significant challenges exist to maintain sustainable stocks in the face of decreasing returns or increased effort on specific lakes or flowing waters.

Key Words: Copper River, Susitna River, Gulkana River, Chitina Subdistrict, Glennallen Subdistrict, personal use, subsistence, king salmon, sockeye salmon, burbot, lake trout, Arctic grayling, invasive species, sport fish, Fisheries Management

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into eighteen regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47–70. Sport Fish Division of the Alaska Department of Fish and Game (ADF&G) divides the state into three administrative Regions with boundaries roughly corresponding to groups of the BOF regulatory areas (Figure 1). Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River drainage, Cook Inlet–Resurrection Bay Saltwater, Anchorage Bowl, Knik Arm, Susitna River drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes Upper Copper River and Upper Susitna River area and the Arctic-Yukon-Kuskokwim Region (including the North Slope, Northwestern, Yukon River, Tanana River, Kuskokwim-Goodnews regulatory areas) .

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 1,357,080 km^2 (526,000 mi^2) of land, some of the state's largest river systems (the Yukon, the Kuskokwim, the Colville, Noatak, Upper Copper and Upper Susitna River drainages), thousands of lakes and thousands of miles of coastline and streams. Regional coastline boundaries extend from Cape Newenham in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River Valley. Fairbanks (population about 31,000) is the largest community.

For administrative purposes Sport Fish Division has divided Region III into six fisheries management areas (Figure 1). They are:

The Northwestern Management Area (Norton Sound, Seward Peninsula and Kotzebue Sound drainages);

The Arctic-Yukon Management Area (the North Slope drainages, the Yukon River drainage except for the Tanana River drainage);

The Upper Copper/Upper Susitna Management Area (the Copper River drainage upstream of Canyon Creek and Haley Creek, and the Susitna River drainage above the Oshetna River);

The Upper Tanana River Management Area (the Tanana River drainage upstream from Banner Creek and the Little Delta River);

The Lower Tanana River Management Area (the Tanana River drainage downstream from Banner Creek and the Little Delta River);

The Kuskokwim Management Area (the entire Kuskokwim River drainage); and,

Area management biologists for the six areas are located in Nome/Fairbanks, Fairbanks, Glennallen, Delta Junction, Fairbanks, and Bethel/Fairbanks, respectively.

ALASKA BOARD OF FISHERIES

The Alaska Board of Fish (BOF) is a seven-member board that sets fishery regulations and harvest levels, allocates fishery resources, and approves or mandates fishery conservation plans for the State of Alaska. Board members are appointed by the governor for three years terms and must be confirmed by the legislature.

Statewide fisheries issues may be considered at any BOF meeting. Under the current operating schedule, the BOF considers fishery issues for regulatory areas or groups of regulatory areas on a 3-year cycle. Proposals to create new or modify existing regulations and management plans are submitted by ADF&G and the public (any individual can submit a proposal to the BOF) for evaluation by the BOF. During its deliberations the BOF receives input and testimony through oral and written reports from ADF&G staff, members of the general public, representatives of local fish and game advisory committees, and special interest groups such as fishermen's associations and clubs.

ADVISORY COMMITTEES

Local Fish and Game Advisory Committees have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes. Advisory committee members are nominated from the local public and voted on by all present during an advisory committee meeting. Most active committees in urban areas meet in the fall and winter on a monthly basis. Rural committees generally have only one fall and one spring meeting due to funding constraints. Advisory meetings allow opportunity for direct public interaction with department staff that answer questions and provide clarification concerning proposed regulatory changes. The Boards Support Section within the Division of Administration provides administrative and logistical support for the BOF and Fish and Game Advisory Committees. During 2005, the department had direct support responsibilities for 81 advisory committees in the state.

ADF&G EMERGENCY ORDER AUTHORITY

ADF&G has emergency order (EO) authority (5 AAC 75.003, 2006) to modify time, area, and bag/possession limit regulations. Emergency orders are implemented to deal with conservation

issues that are not adequately controlled by existing regulations. Once implemented, an EO deals with the situation until it is resolved or the BOF can formally take up the issue. Emergency orders are also used as a tool for "in-season" management of fisheries. In-season management is usually in accordance with a fisheries management plan approved by the BOF.

FEDERAL REGIONAL ADVISORY COUNCILS

Under the Alaska National Interest Lands Conservation Act (ANILCA) the federal government requires the state of Alaska to establish use of fish and game by rural residents as the priority of possible uses, and establishes federal rules to which the state priority must conform. This is unconstitutional under state law, which requires equal access to those resources for all Alaska residents. Since the state did not amend the constitution to conform to the federal law, managers of federal lands in Alaska were obligated by ANILCA to implement that priority on federal lands and waters. On October 1, 1999 the federal government assumed management responsibilities for subsistence fisheries on all non-navigable waters on public lands and navigable and non-navigable waters within and/or adjacent to the boundaries of the federal lands. The development of regulations for subsistence fisheries under federal management occurs within the established Federal Subsistence Board (FSB) process. The public provides their input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council meetings or by becoming council members. Ten Regional Advisory Councils have been established throughout Alaska to assist the FSB in determining local subsistence issues and providing recommendations on proposed fishing and hunting regulations on the fish and game populations under consideration. Each Regional Council meets twice a year, and subsistence users and other members of the public can comment on subsistence issues at these meetings.

REGION III SPORT FISH DIVISION RESEARCH AND MANAGEMENT STAFFING

The Region III Sport Fish Division staff biologists are organized into a research group and a management group. The management group consists of a management supervisor, an area biologist for each of the six management areas, one or more assistant area management biologists, and two stocked water biologists. The area biologists evaluate fisheries and propose and implement management strategies through plans and regulation in order to meet divisional goals. A critical part of these positions is interaction with the BOF, advisory committees, and the general public. The stocked waters biologists plan and implement the regional stocking program for recreational fisheries. The regional management biologist assigned to the Region III headquarters office in Fairbanks also administers the regional fishing and boating access program.

The research group consists of a research supervisor, a salmon research supervisor, a resident species supervisor, research biologists, and various field technicians. The research biologists plan and implement fisheries research projects in order to provide information needed by the management group to meet divisional goals. The duties of the management and research biologists augment one another.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey (Mills 1979–1980, 1981a-b, 1982–1994; Howe et al. 1995–1996, 2001a-d, Walker et al. 2003, Jennings et al. (2004, 2006a-b, 2007, *In prep*). The survey is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is

not designed to provide estimates of effort directed towards a single species. Species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. Two types of questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or non-resident). Information gathered from the survey includes participation (number of anglers, trips, and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaskan waters as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. The survey results for each year are not available until the following year; hence the results for 2005 were not available until fall 2006. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or in-season management.

The utility of statewide survey estimates depends on the number of responses received for a given site (Mills and Howe 1992). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation. Therefore the following guidelines were implemented for evaluating survey data:

1. estimates based on fewer than 12 responses should not be used other than to document that sport fishing occurred,
2. estimates based on 12 to 29 responses can be useful in indicating relative orders of magnitude and for assessing long-term trends, and
3. estimates based on 30 or more responses are generally usable.

SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The Upper Copper River Upper Susitna River Management Area consists of all waters and drainages of the Copper River upstream from a line crossing the Copper River between the south bank of the mouth of Haley Creek and the south bank of the mouth of Canyon Creek in Wood Canyon, and all waters and drainages of the Upper Susitna River upstream from the confluence of the Oshetna River (Figure 2) (5 AAC 52.005). Located within the UCUSMA are the communities of Glennallen, Gulkana, Gakona, Chitina, McCarthy, Kenny Lake, Copper Center, Chistochina, Paxson, Mentasta, and Slana. Three of the state's major highways (Edgerton, Glenn and Richardson), together with numerous secondary roads and trails, provide access to most of the area's sport fisheries. Float-equipped aircraft are commonly used during the summer to access the area's many remote lake and stream fisheries. Snow machines are the popular mode of travel to remote fisheries during winter. Principal land managers in the UCUSMA are the National Park Service (Wrangell-St. Elias National Park), Bureau of Land Management (Gulkana Wild River), Ahtna Incorporated, and the Alaska Department of Natural Resources.

Regulations governing fisheries in the UCUSMA are found in 5 AAC 52.001 through 5 AAC 52.065 (sport fishing), in 5 AAC 77.001 through 5 AAC 77.025, 5 AAC 77.570, and 5 AAC 77.591 (personal use fishing), in 5 AAC 01.001 through 5 AAC 01.040, 5 AAC 01.580, and 5 AAC 01.600 through 5 AAC 01.647 (subsistence fishing), and in 5 AAC 24.360 (Copper River District Salmon Management Plan) and 5 AAC 24.361 (Copper River King Salmon Management Plan). Effort and harvest statistics for UCUSMA fisheries are reported in the statewide harvest survey (SWHS) by Mills (1979–1980, 1981a-b, 1982–1994), Howe et al. (1995–1996, 2001a-d),

Walker et al. (2003), Jennings et al. (2004, 2006a-b, 2007, *In prep*) under the heading "Glennallen Area" (Area I). In 2004, the statewide harvest survey data areas were modified and UCUSMA fisheries are now divided under the headings of the "Upper Copper River Drainage" (Area I) and the "Susitna River Drainage" (Area M).

Management and research of UCUSMA sport, personal use, and subsistence fisheries are directed from the Fairbanks and Glennallen area offices of the Alaska Department of Fish and Game. The area management biologist and assistant area management biologist are stationed in Glennallen. Research biologists based in Fairbanks and Glennallen conduct several research projects within the area. The professional staff is assisted by numerous seasonal technicians and biologists (based in Fairbanks and Glennallen) whose employment ranges from 2 to 10 months. Expertise on experimental design is provided to area staff by the Division of Sport Fish, Research and Technical Services staff stationed in Fairbanks and Anchorage.

FISHERIES RESOURCES

The UCUSMA offers a unique blend of freshwater fishing opportunities to sport anglers, personal use, and subsistence participants. Three species of Pacific salmon (king *Oncorhynchus tshawytscha*, coho *O. kisutch*, and sockeye *O. nerka*) are available to anglers fishing the Upper Copper River drainage. A velocity barrier in Devil's Canyon prevents upstream migration for most salmon species into the Upper Susitna River. Only a few small stocks of king salmon are found in the Upper Susitna River drainage above Devil's Canyon upstream to Fog Creek. Anglers can also target coho salmon stocked in several landlocked lakes of the UCUSMA.

Popular fisheries occur on the area's resident stocks of Arctic grayling (*Thymallus arcticus*), burbot (*Lota lota*), Dolly Varden (*Salvelinus malma*), rainbow and steelhead trout (*O. mykiss*), and lake trout (*Salvelinus namaycush*). Smaller fisheries occur on the area's resident stocks of whitefish (*Coregonus* and *Prosopium sp*).

In UCUSMA 24 lakes were stocked with rainbow trout, coho salmon, and Arctic char (*S. alpinus)* during 2005 and 2006. The stocked fish are reared at state-owned hatcheries on Fort Richardson and Elmendorf Air Force Base in Anchorage. The stocked-lake fisheries provide additional and diversified angling opportunity and reduce harvest pressure on wild fish stocks.

A sockeye salmon hatchery operated by Prince William Sound Aquaculture Corporation (PWSAC) is located in the upper Gulkana River near the community of Paxson. Egg-takes are conducted near the hatchery and overwinter incubation is accomplished at the hatchery. Fry are subsequently released at Crosswind, Paxson and Summit lakes. The returning adults are harvested within commercial, subsistence, personal use, and sport fisheries.

OTHER USER GROUPS

Returns of salmon to the Copper River support commercial fisheries in the Copper River District. From 2000 through 2004, an average of 1,137,694 sockeye salmon and 39,086 king salmon were commercially harvested in the Copper River District (Hollowell et al. 2005, Table 1).

The Board of Fisheries (BOF) has established one personal use and two subsistence salmon fisheries in the Upper Copper River. From 2000 through 2004, an average of 166,810 salmon were reported harvested annually in these fisheries (Table 2). Sockeye salmon comprise about 95% of the total catch. The Division of Sport Fish has the lead management responsibility for all

these fisheries (as opposed to Commercial Fisheries Division which manages most of the State subsistence fisheries).

ALASKA BOARD OF FISHERIES ACTIVITIES

Regulations for fisheries in the UCUSMA are developed within the established BOF process. The public provides their input concerning regulation changes and allocation through submission of written proposals and testifying directly to the BOF, by participating in local fish and game advisory committee meetings, or by becoming members of local fish and game advisory committees.

Advisory Committees

Advisory committees assist the BOF in assessing the effects of fisheries issues and proposed regulations on communities local to the resource under consideration. ADF&G staff generally attends the local committee meetings. In this way, advisory committee meetings provide opportunity for the public and staff to interact on resource issues of local concern. Within the UCUSMA there are three advisory committees the Tok Cutoff/Nabesna Road, Copper Basin, and Paxson committees. In addition, the Copper River/Prince William Sound (Cordova), Fairbanks, Delta Junction, Mat-Su (Palmer/Wasilla), Upper Tanana-Forty Mile (Tok) and Anchorage advisory committees often comment on proposals concerning Copper River fisheries.

Recent Board of Fisheries Actions

The BOF meets annually, but deliberates on each individual regulatory area on a 3-year cycle. Several major changes regarding the management of king salmon, resident species, and the personal use fisheries in the UCUSMA were passed by the BOF during the 1999 BOF meeting in Valdez (Taube 2002).

At its January, 2003 meeting in Cordova, the BOF addressed 50 proposals regarding UCUSMA sport, personal use, and subsistence fisheries (Taube 2006a). Major changes to the fisheries regulations at this meeting involved the Chitina Subdistrict reclassification to personal use, Glennallen Subdistrict fish wheel identification and fish marking requirements, adjustments to the Copper River king salmon escapement goal, Gulkana River rainbow trout and steelhead closed areas, Upper Copper and Upper Susitna drainage burbot bag and possession limits and closed waters, UCUSMA Arctic grayling bag and possession limits, methods and means in Paxson and Summit lakes, bow fishing for whitefish and suckers, and ice house registration.

The BOF considered two proposals regarding changes to the UCUSMA regulations at the January 2004 meeting. These proposals were taken out of cycle through acceptance by the BOF of agenda change requests. As a result, the BOF adopted the Regional Arctic Grayling Management Plan and the Regional Stocked Waters Management Plan (Taube 2006b).

The most recent meeting of the BOF for the UCUSMA was convened in December 2005 in Valdez. The board addressed 34 proposals specific to Copper River subsistence and personal use fisheries and UCUSMA sport fisheries. Of these 11 were adopted, 16 opposed, and no action taken on seven.

Three proposals were adopted that affected the Copper River subsistence fishery in the Glennallen Subdistrict. The BOF adopted a proposal requiring that live boxes on fish wheels be checked every 10 hours. The original proposal requested a 24 hour check period, but based on input from the Alaska Bureau of Wildlife Enforcement (ABWE) an amendment reducing the

time to every 10 hours to allow better enforcement of the regulation was adopted. A second proposal required that only one opening can occur inside of the barrier islands, during each of the first two statistical weeks in the Copper River District. The intent of the board regarding this proposal was to provide for Upper Copper River subsistence harvests and escapement of the early king and sockeye salmon stocks. Thirdly, the board generated a proposal that set Amounts Necessary for Subsistence (ANS) in the Glennallen Subdistrict. To measure subsistence harvests, particularly in the upper portion of the subdistrict, the Glennallen Subdistrict was divided into three components and set the amounts of salmon that are reasonably necessary for subsistence uses at: 1) 25,500 to 39,000 salmon for that portion of the Glennallen Subdistrict from the Chitina-McCarthy Road Bridge to the Tonsina River; 2) 23,500 to 31,000 salmon for that portion of the Glennallen Subdistrict upstream of the Tonsina River to the Gakona River; and, 3) 12,000 – 12,500 salmon for that portion of the Glennallen Subdistrict upstream of the mouth of the Gakona River to the Slana River and including the Batzulnetas fishery. Previously, the ANS for the Glennallen Subdistrict was set at 60,000 to 75,000 for the entire subdistrict.

The BOF rejected or took no action on three proposals requesting changes in the Chitina Subdistrict personal use fishery.

The BOF adopted a proposal to close the waters of the Susitna River drainage above Devils Canyon to all salmon fishing. A small number of these drainages support small stocks of salmon that may not be able to sustain a fishery. No other proposals regarding salmon sport fisheries in the UCUSMA were adopted during the 2005 BOF meeting.

Two proposals were adopted specific to rainbow trout/steelhead by the BOF. The first reduced the bag and possession limit for rainbow trout/steelhead in Lake Louise, Susitna, Tyone lakes and the Tyone River drainage to two fish, of which only one may be 20 inches or greater in length. This aligned the regulations on those lakes with the background regulations recommended by the *Cook/Inlet Copper River Wild Rainbow Trout Management Policy*. The second proposal established catch and release regulations in the entire Hanagita River drainage. Previously, a harvest of two fish, one over 20 inches was allowed upstream of Lower Hanagita Lake. This action was taken to protect the relatively small population of steelhead that spawns above Lower Hanagita Lake.

Three proposals were adopted specific to Arctic grayling. The first incorporated Moose Lake, Our Creek, and the Gulkana River drainage upstream of Paxson Lake under the conservative management category in the Wild Arctic Grayling Management Plan. The remaining two proposals set the bag and possession limits for Arctic grayling in Moose Lake and Our Creek at two fish, no size limit, and an open season of June 1 – March 31; and the bag and possession limit for Arctic grayling in the Gulkana River drainage upstream of Paxson Lake at two fish, of which only one may be 14 inches or greater in length. Previously, the Arctic grayling fisheries in Moose Lake and Our Creek were under the background bag and possession limits of five fish, no size limit for the entire year. Department data indicated the Arctic grayling population in this system had declined and the conservative management strategy would allow the population to recover to historic levels. The Gulkana River drainage upstream of Paxson Lake was previously under catch-and-release regulations to provide a trophy Arctic grayling fishery. Input from local advisory committees for a desire to harvest fish in this area resulted in a modified proposal that allowed a minimal level of harvest that will also maintain a large proportion of Arctic grayling above 14 inches in the population.

The BOF adopted a proposal to allow bait in the entire Tonsina River drainage downstream of Tonsina Lake. This was a housekeeping measure to clarify regulations previously adopted during the 2003 meeting.

Two proposals were adopted by the board for lake trout. The first was the Upper Copper/Upper Susitna Management Area Lake Trout Management Plan. This plan sets bag and possession limits and management strategies to guide the department for lake trout management and the board and public for addressing future proposals. The second proposal allowed the use of bait in Paxson and Summit lakes from November 1 to April 15, and reduced the bag and possession limit of lake trout from two fish over 24 inches to one fish any size. This aligned the regulations with the Lake Trout Management Plan guidelines. Previously, bait had been prohibited in Paxson and Summit lakes to reduce hooking mortality in released lake trout. Under the new regulations, hooking mortality should be reduced and harvests maintained at sustainable levels.

Emergency Order Authority

To address conservation concerns and to implement BOF adopted management plans, the department has emergency order authority under AS 16.06.060 and 5 AAC 75.003 to modify time, area, and bag/possession limit regulations. Emergency orders issued under this authority during 2005–2006 are summarized in Appendix B.

FEDERAL SUBSISTENCE

On October 1, 1999 the federal government assumed management responsibilities for subsistence fisheries on all non-navigable waters on public lands and navigable and non-navigable waters within and/or adjacent to the boundaries of the wild-designated portion of the Gulkana River, and Wrangell-St. Elias National Park. The Upper Copper River personal use and subsistence salmon fisheries are the fisheries within the UCUSMA affected by the change in management responsibilities. The development of regulations for subsistence fisheries under federal management is within the established Federal Subsistence Board (FSB) process. The public provides their input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council meetings or by becoming council members. Regional advisory councils have been established throughout Alaska to assist the FSB in determining local subsistence issues and providing recommendations on proposed fishing and hunting regulations on the fish and game populations under consideration. The UCUSMA fisheries fall under the purview of the Southcentral Regional Advisory Council. The council meets twice each year. The most recent meeting was held in October, 2006 in Homer. At this meeting, three federal fisheries proposals for the Prince William Sound Area (including federal waters in the Upper Copper River drainage) were addressed and council recommendations were forwarded to the Federal Subsistence Board.

STATEWIDE HARVEST SURVEY

Effort and harvest statistics for UCUSMA fisheries are reported in the SWHS by Mills (1979–1980, 1981a-b, 1982–1994), Howe et al. (1995–1996, 2001a-d), Walker et al. (2003), Jennings et al. (2004, 2006a-b, 2007, *In prep*). Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. The SWHS is an annual postal survey of license holders conducted to estimate sport fishing participation (effort), harvest and catch statewide by fisheries, areas, regions, and species. All sport fishing catch and harvest statistics reported in this report are based on data from the SWHS.

ECONOMIC SURVEYS

The economic value of specific management changes regarding the king salmon fishery on the Gulkana River were examined via survey in 1993 (Layman et al. 1996). The four management options surveyed were: 1) status quo, no regulatory change; 2) doubling the harvest; 3) double the daily bag limit; and, 4) seasonal bag limit of five king salmon. The results of the survey suggest that the seasonal bag limit provided the greatest net economic benefit, followed by option 2, option 3 and option 1. In 1994, a seasonal bag limit of five king salmon was adopted by the BOF for the Upper Copper River drainages.

The estimated net economic value of the Upper Copper River personal use and subsistence fisheries were calculated based upon the permit and harvest database from 1990 using the travel cost method (TCM; Jones 1998). The average value of the fishery to the participant per permit in 1990 was estimated at approximately $47, with 95% confidence limits of $31 and $114. Values varied dependent on the distance traveled to participate in the fisheries.

SPORT FISHING EFFORT

The following summary of sport angler effort in the UCUSMA is based on SWHS mail survey data (Mills 1979–1980, 1981a-b, 1982–1994, Howe et al. 1995–1996, 2001a-d, Walker et al. 2003, Jennings et al. 2004, 2006a-b, 2007 *In prep*). Angler effort in the UCUSMA averaged 2.1% of the overall statewide effort from 2000–2004 compared to an average 2.6% for 1995–2004 (Table 3). Except for a surge of effort between 1991 and 1996 and again in 1999, sport angler effort in the UCUSMA has stayed between 44,000 and 58,500 angler days since 1977. Angler effort achieved an all-time low in the UCUSMA in 2005 at 41,782 angler-hours. This continues the decreasing trend in effort over the last five years. UCUSMA angler effort averaged around 23.4% of the overall effort expended within Region III from 2000–2004.

The Upper Copper River drainage has supported over 75% of the sport effort in the UCUSMA from 1995–2004 (Table 4). Within this drainage, the Gulkana River drainage accounts for about 49% of overall sport fish effort in the UCUSMA followed by the Klutina River at 19% and the combined systems of the Tazlina, Tonsina and mainstem Copper River at 7%. The Gulkana and Klutina river drainages support the major king and sockeye salmon fisheries in the area. Major sport fisheries in the Upper Susitna River drainage are in the Tyone River drainage and include Lake Louise, Susitna and Tyone lakes. These fisheries mainly target lake trout, burbot, grayling and rainbow trout during the open water season and ice fishing season.

Sport fishing effort on stocked lakes accounted for about 6% of overall effort expended within the UCUSMA from 1995–2004 (Table 4). Stocked waters within the UCUSMA are generally accessible from the road system with a few exceptions that require off-road vehicles. This accessibility helps maintain consistent effort on stocked lakes even with recent reductions in the number of fish available for stocking. However, if stocking levels remain low and catch levels become consistently lower, effort may also fall.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Some UCUSMA fisheries have been the focus of allocative conflicts. These conflicts have led the BOF to establish several management plans and policies to guide the fisheries in the area. The goal of these plans is to allocate fish resources among users and to provide managers with guidelines to maintain a sustained yield of the fish stocks in the area. The following management plans and policies have been adopted by the BOF for UCUSMA fish stocks:

Copper River District Salmon Management Plan (5 AAC 24.360, 2006). This management plan contains spawning escapement goals for sockeye and other salmon, inriver goals for the subsistence, personal use, and sport fisheries in the drainage, and hatchery brood stock and hatchery surplus goals. The goals are met through regulation of the commercial fishery near the mouth of the river, and are measured at the sonar counter at Miles Lake.

Copper River King Salmon Fishery Management Plan (5 AAC 24.361, 2006). This management plan provides for a sustainable escapement goal for king salmon in the Copper River drainage of 24,000 or greater. To ensure this goal, during statistical weeks 20 and 21 the department may open no more than one fishing period per statistical week within the inside closure area of the Copper River District. The department will manage the sport fishery of the Upper Copper River drainage through an annual limit for king salmon 20 inches or greater in length of four fish. The department also has the authority to further restrict the sport fishery to achieve the escapement goals using the following management measures in the following priority order: a) reduction of the annual limit; b) modification of other methods and means not specified in the plan; c) catch-and-release only designation; and, d) closure of specific waters to sport fishing for king salmon.

Copper River Subsistence Salmon Fisheries Management Plan (5 AAC 01.647, 2004). This management plan ensures that adequate escapement of salmon pass the Miles Lake sonar in the Lower Copper River and that subsistence needs are met. It also establishes the open area, gear, season, bag and possession limits, and permit requirements for a subsistence fishery near the traditional fishing village of Batzulnetas along a portion of Tanada Creek and its confluence with the Copper River.

Copper River Personal Use Dip Net Salmon Fishery Management Plan (5 AAC 77.591, 2003). This management plan establishes fishing seasons, open area, gear, bag limits, and seasonal harvest level for a personal use fishery in the Copper River. The harvest will be distributed throughout the season based on projected daily sonar counts from the Miles Lake sonar counter. Harvest will be adjusted, based on actual sonar counts, through reduction or increase of fishing times by emergency order. The permit limit may be increased during weeks of harvestable surplus determined from actual sonar counts.

Lake Burbot Management Plan (5 AAC 52.045, 1989). This management plan stipulates that the burbot fisheries in lakes of the UCUSMA be managed to ensure maximum sustainable harvests, and provides the department the authority to use emergency orders to reduce the time or areas open to fishing and/or prohibit set lines to accomplish this management objective.

Wild Arctic Grayling Management Plan (5 AAC 52.055, 2006). This management plan directs the department to manage wild Arctic grayling populations in the UCUSMA for long-term sustained yield through a conservative harvest regime. The plan establishes and defines three management approaches under which the department shall manage wild Arctic grayling populations in the UCUSMA: 1) the regional management approach; 2) the conservative management approach; and, 3) the special management approach. Guidelines and considerations for the department and board to change or address the management approach for a water body or fish stock are outlined in the plan.

Wild Lake Trout Management Plan (5 AAC 52.060, 2006). This management plan directs the department to manage wild lake trout populations in the UCUSMA by employing a conservative harvest regime and by maintaining harvest below the maximum sustained yield level. The department may take one or more management actions if there is a conservation or biological concern for the sustainability of the fishery or a stock harvested in that fishery. These actions include reduction of bag and possession limit, reduction of fishing time, allowing only catch-and-release, and modification of methods and means of harvest. The plan also specifies allowable measures to reduce harvest if the harvest level exceeds sustainable yield for a two year period. Finally, the plan establishes a process for designating Special Management Areas and criterion for limiting harvest in these areas.

Upper Copper River and Upper Susitna River Area Stocked Waters Management Plan (5 AAC 52.065, 2004). This management plan directs the department to manage stocked waters in the UCUSMA to provide the public diverse fishing opportunities. The plan establishes and defines three management approaches under which the department shall manage stocked waters in the UCUSMA: 1) the regional management approach; 2) the conservative management approach; and, 3) the special management approach. Stocked waters may be reclassified through a proposal from the public, department or board during the board's meeting cycle.

Cook Inlet & Copper River Basin Rainbow/Steelhead Trout Management Policy. This management policy was adopted by the BOF to provide future boards, fisheries managers, and the sport fishing public with: (1) management policies and implementation directives for area rainbow and steelhead trout fisheries; (2) a systematic approach to developing sport fishing regulations that includes a process for rational selection of waters for special management; and, (3) recommended research objectives. This management policy was never adopted as regulation.

MAJOR ISSUES

The major issues associated with UCUSMA sport, personal use, and subsistence fisheries are summarized below:

Copper River King Salmon: From 1995 through 1999 commercial harvests of king salmon, the largest component of the annual harvest, increased in conjunction with the area's subsistence and sport fisheries raising concerns regarding sustainability of these harvest levels. From 1999 to 2002, Upper Copper River king salmon escapement was estimated through a department radiotelemetry research study. This information, in addition to harvest and age data, resulted in modifying the *Copper River King Salmon Management Plan* (CRKSMP) spawning escapement range of 28,000–55,000 king salmon to a sustainable escapement goal of 24,000 or more king salmon. From 2003 through 2005, king salmon escapement was estimated through a fish wheel mark-recapture study conducted by the Native Village of Eyak and LGL, Inc. Establishing a king salmon biological escapement goal is still hindered by the lack of spawner-to-recruit data to assess the long-term productivity of the Copper River king salmon return.

As a result of the actions taken through the CRKSMP, king salmon harvest has declined in the commercial, personal use and sport fisheries. The department considers the king salmon resources of the Copper River fully utilized and while king salmon harvests have

declined with the inception of the management plan, the allocation issues between the different user groups will remain controversial.

Copper River Personal Use/Subsistence Salmon Fisheries: The Chitina Subdistrict dip net fishery has been controversial since its inception. Its designation as a personal use fishery with no allocative priority or as a subsistence fishery with an allocative priority has changed back and forth creating animosity among user groups at each change. The repeal of the Chitina Subdistrict as a subsistence fishery in 2003 frustrated some of the more vocal dipnetters. The commercial users were supportive of the repeal, as the Chitina Subdistrict harvest no longer had a subsistence priority over the commercial harvest allocation. The Native population was also supportive of the repeal as they do not consider the urban dipnetters "true" subsistence users. The classification of the Chitina Subdistrict will continue to remain an issue as well as the allocation of the Copper River salmon harvests between upper and lower river stakeholders.

Harvest and participation have doubled in the Chitina Subdistrict personal use and Glennallen Subdistrict subsistence salmon fisheries since 1990. Both fisheries are managed under BOF-adopted management plans. These management plans set an escapement goal of 61,000–82,500 salmon for the Glennallen Subdistrict fishery and 100,000–150,000 salmon for the Chitina Subdistrict fishery. An allocation increase, following the 1999 BOF meeting, addressed the harvest numbers in the Chitina Subdistrict that increased annually since 1996. A BOF review in 2005 of the Amounts Necessary for Subsistence (ANS) for three areas within the Glennallen Subdistrict increased the harvest guidelines for this fishery which were exceeded in 1997, 1999, and 2001. Larger harvests in the Glennallen Subdistrict fishery reflect increased participation in the fishery and may also be contributed, in part, to recently strong returns of sockeye salmon to the Copper River.

Land Access: Ahtna Native Corporation owns a majority of the land along the three major river fisheries in the Upper Copper River drainage. Ahtna Corporation controls the uplands along the Klutina River between Klutina Lake and the Richardson Highway. They own the majority of land along the Gulkana River downstream of Sourdough and the Gulkana River Scenic River corridor. Ahtna Corporation or its shareholders also own the majority of land along the Copper River within the Glennallen Subdistrict. Ahtna Corporation initiated an access fee program for native-owned uplands adjacent to the Klutina River (1998) and the Gulkana River (1999). The fee program ended years of convenient, free access to these river systems. A public easement (managed by the Bureau of Land Management (BLM)) runs parallel to the Klutina River and provides free access to Klutina Lake, but it provides limited direct river access. Non-shareholders were required to pay a day use fee to access the Klutina River from the BLM easement and also pay camping fees to camp at sites off the easement. On the Gulkana, public access to the lower river is limited to two public easements (Sailors Pit near Gakona and Mile 141 Richardson Highway pullout) and the Richardson Highway Bridge right-of-way (ROW). Access fees angered many of the sport fishing public that traditionally used Native lands to access the rivers and resulted in some users avoiding these access points.

Access to the Chitina Subdistrict fishery has long been an issue between dipnetters and Ahtna and Chitina Native Corporations. An access fee was associated with the State issued permit from the early 1990s through 2003. In 2000, DOT conducted a survey of

the O'Brien Creek Road from Chitina to Haley Creek and determined that the road ROW provided access to the Copper River from the road for a majority of its distance in the fishery. The Alaska Legislature removed the access fee from the permit due to the DOT survey results. This action was opposed by Ahtna and Chitina Native Corporations who remained concerned over trespass and vandalism allegedly caused by dipnetters. In July 2004, Chitina Native Corporation blocked access to the Copper River at O'Brien Creek, a primary river access point and boat launching area for charter operators and private boats, forcing these boat operators to launch approximately 3 miles upstream at the Chitina-McCarthy Bridge. This also reduced the parking and camping area used by many of the fishery participants. The state did not dispute the blocked access, as the survey indicated that this land was outside of the ROW, but has tried to negotiate access at this point with the corporations. During 2005–2006, the Native corporations placed a fee station at the site and allowed access to the river to those individuals who paid the access fee.

User Conflicts: Since 1991 there has been a significant increase in the use of powerboats above the Richardson Highway on the Gulkana and Klutina Rivers. Also, a notable increase in the number of guides specializing in targeting king salmon has occurred. Prior to the 1986 season, only one individual specialized in guiding anglers for king salmon on the Gulkana River. Fourteen guides registered with the Bureau of Land Management to operate on Upper Gulkana River (Wild River Corridor) in 2005 (Denton Hamby, BLM, personal communication). Available data indicate that guided anglers are more successful than unguided anglers.

Increased use by float and powerboat operators on the Gulkana River is intensifying conflicts between users. Float-boat operators fish primarily from the bank casting and drifting lures through the holes while powerboats back troll. Additionally, reports have been made by float-boat operators that powerboats have bumped into them. The Bureau of Land Management (BLM) initiated the process of updating the management plan for the Wild portion of the Gulkana River upstream of Sourdough in 1998. The "River Management Plan for the Gulkana River" was published by the BLM in August 2006. There were two proposals submitted for the 1999 BOF meeting regarding motorized use on the Gulkana River and one proposal submitted for the 2002 BOF meeting requesting the prohibition of motorized boats for fishing and transporting on the entire Gulkana River drainage. None of these were addressed, as they fell outside the purview of the BOF.

Burbot and lake trout fisheries: The lakes of the UCUSMA have historically supported some of the largest sport fisheries for burbot and lake trout in Alaska. Stock assessment work indicated that many of the larger burbot and lake trout stocks were depressed due to overfishing in the early 1980s. Based on these and other findings, the BOF adopted management plans for burbot and lake trout stocks in UCUSMA lakes. Under these management plans, the board adopted more conservative regulations for UCUSMA burbot and lake trout fisheries which allows previously overfished stocks to recover enough to permit sustainable fisheries, and which protects healthy stocks from over-harvest. Part of the current regulatory regime is the elimination of unattended setlines from the burbot fishery. Many local anglers oppose elimination of setlines and have submitted proposals to the BOF to have unattended setlines reintroduced to the fishery. ADF&G staff oppose the reintroduction of unattended setline use in lakes, but has

allowed use of unattended setlines under conservative sport fishing regulations for the mainstem Copper River.

A 24-inch minimum size limit on lake trout was implemented for Lake Louise, Susitna, Tyone, Paxson, Summit, and Crosswind lakes in 1994. The lake trout bag and possession limit was also reduced to one in some of the larger fishery lakes. The local advisory committees supported these actions. In 2003, the use of bait in Paxson and Summit lakes was eliminated to reduce potential hooking mortality resulting from 80% of all lake trout caught being released. This action adversely affected anglers targeting burbot in Paxson Lake. Angler effort on Paxson Lake dropped by 50% in 2004 and remained low in 2005. Catch and harvest of lake trout dropped 94% and 75% respectively after the bait restriction was enacted. Burbot catch and harvest showed similar, but less dramatic declines as with lake trout. Based on lake trout stock assessments and to accommodate burbot fishing, the bag limit on lake trout in Paxon Lake was changed to one fish any size and the bait restriction was lifted from November 1–April 15 beginning the 2006 season. Management of these species will continue to be a challenge as often management strategies used to maintain lake trout harvests below sustainable yield requires restrictions on methods and means that impact burbot fisheries in the same water body.

CURRENT MANAGEMENT AND RESEARCH ACTIVITIES

During 2005 and 2006 several research and management projects were initiated or continued.

Research Projects

King Salmon – A radiotelemetry study was conducted from 2000 through 2004 to determine inriver abundance, spawning distribution and migratory timing of king salmon in the Upper Copper River (Savereide, 2005). King salmon were captured with fish wheels located in Baird Canyon (upstream of the Miles Lake sonar) and implanted with radio transmitters. Radiotelemetry tracking stations determined when fish moved upstream of the capture site, entered and left the Chitina Subdistrict dip net fishery, and entered either four spawning tributaries (Gulkana, Tazlina, Klutina, and Tonsina river drainages), the Upper Copper River (upstream of the Gakona River), or the Chitina River drainage. Tracking flights were conducted over the spawning tributaries to gain additional spawning distribution information not collected by the tracking stations. Abundance was estimated using king salmon captured during the sampling for radio transmitter implantation as the marking event and the harvest in the Chitina Subdistrict fishery as the recapture event. The resulting estimate was used to determine if king salmon spawning escapement for the Upper Copper River was within the range specified in the revised *Copper River King Salmon Fishery Management Plan*.

A study to enumerate spawning king salmon in the Gulkana River was initiated in 2002 and has been conducted annually since (Taras and Sarafin 2005, Perry-Plake and Taras *In prepa*, *b*). This project, in conjunction with the Copper River king salmon radiotelemetry project has estimated the proportion of king salmon spawning in the Upper Gulkana River and the escapement for the entire Gulkana River. The radiotelemetry component estimated the proportion of radio-tagged king salmon that spawn above and below the counting tower. This proportion was used to expand the number of king salmon passing the counting tower to estimate the total escapement to the Gulkana River. Following the end of the radiotelemetry study in 2004, only king salmon escapement passing the counting tower is estimated. The enumeration of king salmon into the Upper Gulkana River is expected to continue through 2010 (in cooperation

with the U.S. Bureau of Land Management) in order to establish an escapement goal for Gulkana River king salmon upstream of the counting tower.

Genetic analysis of king salmon stocks in the Copper River drainage has been conducted from 2003–2005. The study is intended to document the timing and origins of king salmon stocks in the Copper River fisheries that target them (Seeb et.al., 2006). The study has identified 4 genetic groups of king salmon in the Upper Copper River, Gulkana River, middle rivers (Tazlina, Klutina and Tonsina rivers) and the Chitina River. The most genetically distinct stocks were located in the Upper Copper River from the Chistochina River upstream. The ultimate objectives of the study are to delineate geographic and temporal stocks within the Copper River, investigate run timing with respect to these stocks, characterize the timing of stocks in the Copper River commercial fishery and determine the proportion of Copper River versus delta stocks within the harvest, and contribute the Copper River data to a coastwide DNA database.

Rainbow/Steelhead Trout –Work initiated in 1999 indicated a stunted population of rainbow trout in Summit Lake (Tebay River drainage), which had documented catches of rainbow trout greater than 32 inches in the 1980s. A 20-year study plan was developed to reestablish the historic age and size composition of rainbow trout in Summit Lake. The first stage was initiated in 2003 to remove approximately 80% of the population from Summit Lake over a five-year period. Approximately 23,500 rainbow trout have been removed from Summit Lake and outstocked to Silver Lake along the McCarthy Road between 2003 and 2006. The objective of this study is to reduce the density of rainbow trout in the lake to promote growth with the theory that the now larger rainbow trout would prey upon the smaller rainbow trout and maintain a population, in conjunction with sport harvests, which would produce larger trout.

A mark-recapture study to estimate abundance of rainbow trout in the mainstem Gulkana River from Sourdough to Paxson Lake was conducted in 2005. Rainbow trout were captured with baited hoop traps or rod and reel and marked with numbered tags during two separate events in August and September (Schwanke and Taras *In prep*).

A radiotelemetry study for steelhead trout was conducted in 2005 and 2006 to determine distribution of steelhead in the Upper Copper River drainage. Steelhead were captured during August and September by fish wheel and dip nets and then were implanted with radio-tags and tracked through the Upper Copper River drainage via tracking stations and small aircraft to determine spawning distribution (Savereide 2005, *In prep*).

Burbot – Burbot abundance has been sampled annually in Tolsona Lake since 1986 and was closed to sport fishing in spring 1998 due to a population decline. Estimates of abundance, CPUE and length composition are collected at Tolsona Lake in late May, shortly after ice-out. Assessment of the burbot population in Crosswind Lake occurred in 2006 to estimate abundance, CPUE and length composition. The assessment will be repeated in 2007. (Schwanke and Craig *In prep*.).

Lake trout - A mark-recapture stock assessment was conducted on the lake trout population in Paxson Lake from 2001 – 2004 (Scanlon 2004, *In prep*). Results of this study were used to modify bag and possession limits for lake trout in Paxson Lake and as justification for the use of bait during the winter burbot fishery. A population assessment of lake trout in Lake Louise was conducted during the fall of 2006 to refine estimates of yield based on the Lake Area Model and determine if further assessment is necessary.

Northern Pike – Northern pike are not native to the waters of the UCUSMA, but anecdotal reports indicate that the species may have been introduced into area waters. Extensive sampling for northern pike was conducted in Tyone and Paxson lakes during spring 2006. No northern pike were captured during sampling, which determined that there is a low probability that northern pike are present in the UCUSMA.

Management Projects

King/Sockeye salmon - Two management projects were continued in 2005: 1) biological catch sampling of the Chitina Subdistrict Personal Use Salmon Fishery and 2) aerial surveys of four king salmon spawning escapement index streams. Sampling of the Chitina Subdistrict personal use fishery occurred from the opening of the fishery in June through the entire king salmon run and the majority of the sockeye salmon run ending at the end of August. Length and age data of sockeye and king salmon harvested in the fishery were collected. Otoliths from a portion of the sampled sockeye salmon were removed to be examined for the presence of a strontium mark that was imprinted on sockeye fry prior to release from the Gulkana River hatchery. The collected data are used to estimate hatchery contribution to the Copper River sockeye salmon run and to determine age and length composition of the sockeye and king salmon Chitina Subdistrict harvest.

Prior to 2005, aerial surveys were flown annually on nine index streams in the Copper River drainage (Taube 2006b). Following review of the radiotelemetry data five index streams were dropped from the program. These streams either represented a small percentage (<25%) of the run to the major tributary or the entire Upper Copper River and no management action would be taken based on the information provided by survey of these streams. The streams that are no longer surveyed include Indian River, Greyling Creek and the Little Tonsina River (Tonsina River drainage), and Mendeltna and Kiana creeks (Tazlina River drainage). The current index streams are East Fork Chistochina River, Gulkana River (upstream and including the West Fork), and St. Anne and Manker Creeks (Klutina system). In 2005, only the Gulkana River and East Fork Chistochina River were surveyed, whereas in 2006 all four index streams were flown.

ACCESS PROGRAMS

The Wallop-Breaux amendment to the Federal Aid in Sport Fish Restoration Act mandates that at least 12.5% of the federal funds collected from taxes on sport fishing equipment be used by the states for the development and maintenance of boating access facilities. A broad range of access facilities can be approved for funding if they are constructed to achieve a state fishery management objective. These facilities can include boat ramps and lifts, docking and marina facilities, breakwaters, fish cleaning stations, rest rooms, and parking areas. In spite of the large land base in the UCUSMA, access to sport fishing is restricted near most popular fisheries. The causes for limited access are several: much of the land in the area is private, few roads and trails exist, and suitable launches for boats are scarce. Various small access projects are completed in each year in the UCUSMA, which entailed validating easements, improving existing trails, and replacing or installing signs for local roadside lakes.

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and emergency orders for the UCUSMA can be found at the Department of Fish and Game website (www.state.ak.us/local/akpages/FISH.GAME). In addition, many of these publications as well

as some additional publications regarding fishing opportunities in the UCUSMA can be found at the area ADF&G office in Glennallen and the regional ADF&G office in Fairbanks. Information regarding the Gulkana Wild River (BLM) and Wrangell-St. Elias National Park (USNPS) can be obtained from the respective agency offices in Glennallen and Copper Center. The Ahtna Native Corporation has its headquarters located in Glennallen and can be visited for information regarding access to native-owned lands. The Greater Copper Valley Chamber of Commerce can be a source for commercial operators located in the UCUSMA. A listing of the addresses and contact numbers for these information sources can be found in Appendix A.

SECTION II: FISHERIES

The following text discusses the major sport fisheries in the UCUSMA. Discussion of each fishery will center on harvest and catch data presented in the 2005 SWHS (Jennings et al. *In prep*). Survey results for 2006 will not be available until the summer of 2007. However, observations or research data regarding these fisheries in 2006 will be presented when available. A summary of the historical sport harvest and catch of fish in the UCUSMA by species is presented in Table 5 and Table 6, respectively.

KING SALMON SPORT FISHERIES

Only the Copper River drainage supports anadromous runs of king salmon in the UCUSMA. No anadromous runs of king salmon return to the Upper Susitna River drainage, upstream of the Oshetna River. Although at least one king salmon stock has been documented above Devils Canyon (located downstream of the Oshetna River), the canyon presents a velocity barrier that limits upstream migration of salmon.

King salmon returning to the Copper River drainage pass through the Copper River Delta and enter the Copper River during early May. The peak migration is from mid-May to mid-June, with the return essentially complete by July 1. However, small numbers of king salmon continue to enter the Copper River through August. King salmon make their way to spawning areas in Copper River tributaries through June and July and spawn mid-July through August. Inriver returns of king salmon have been estimated by a mark-recapture project using fish wheels located at Baird Canyon (above Miles Lake) and near Haley Creek since 2003. The project, conducted by the Native Village of Eyak (NVE) and LGL, Inc., provides a post-season estimate of total escapement (Smith et al. 2003, Smith 2004, Smith and van den Broek 2005a, 2005b).

King salmon are distributed throughout the Copper River basin occurring in at least 40 tributaries. Aerial escapement surveys have been conducted in 35 of these systems, with nine of these systems surveyed consistently since 1966 (Roberson and Whitmore 1991). Unfortunately, the variability of the proportion of total escapement between years and that the majority of the nine index streams represent early run stocks make aerial surveys an unreliable index of king salmon escapement in the Copper River.

Aerial survey indexes were discontinued on the Little Tonsina River, Greyling Creek, Mendeltna Creek, Kiana Creek and Indian River in 2005. The radiotelemetry study conducted by the department from 2002–2004 showed that only 45% of the returns to the Klutina River and 16% to the Tonsina River spawn in the index streams. The remainders spawn in the glacial mainstem of those rivers (Savereide 2005). The radiotelemetry study also indicated that the nine index streams represented only about 26%–46% of the total escapement. The current aerial survey streams (Gulkana River and East Fork Chistochina and Klutina River) provide an inseason index

of run strength in the major sport fishery systems, prior to the availability of the total escapement estimates post-season.

The *Copper River King Salmon Fishery Management Plan* is the primary guide to management of king salmon stocks in the Copper River drainage. Copper River king salmon stocks are harvested in a commercial gillnet fishery on the Copper River Delta, a personal use dip net fishery in the Chitina Subdistrict near Chitina, a subsistence dip net and fish wheel fishery in the Glennallen Subdistrict between the Chitina and Slana rivers, and sport fisheries along various spawning tributaries. The total harvest of king salmon in these fisheries has been estimated since 1966 (Gray et al. 2003; Roberson and Whitmore 1991). Since 1977, the total harvest of king salmon in these fisheries has ranged from 13,000 to over 85,000 (Table 7). Total harvest of king salmon from the Copper River has averaged 51,327 from 2000–2004. This average demonstrates a general decline in the harvest of king salmon from all the Copper River fisheries since the high harvest years of 1995–1999. Unfortunately, the contribution to the harvest by each spawning stock for these mixed stock fisheries cannot be quantified at present (Brady et al. 1991; Roberson and Whitmore 1991). Thus, it is not currently possible to assess productivity using stock specific spawner-recruit relationships.

The Glennallen Subdistrict subsistence fishery occurs from June 1 through September 30. Management of the fishery is guided by the *Copper River Subsistence Salmon Fisheries Management Plan*. Fish wheels and dip nets are legal gear and permits are required. The maximum harvest limit for a household of one person is 200 fish and for a household of two or more is 500 fish. There is no limit as to the number of king salmon within the annual permit limit for people using fish wheels, while a five king salmon limit is imposed on subsistence fishermen using dip nets. Subsistence harvests of Copper River king salmon averaged 3,940 fish from 2000–2004 (Table 7). King salmon are present in the fishery on June 1 and, on average, 80% of the king salmon harvest is taken by July 12 (Roberson and Whitmore 1991).

The Chitina Subdistrict personal use fishery occurs from June 1 through September 30. Management of the fishery is guided by the *Copper River Personal Use Dip Net Salmon Fishery Management Plan*. Dip nets are legal gear and permits are required. The maximum harvest limit for a household of one person is 15 salmon and for a household of two or more is 30 salmon of which no more than one can be king salmon. Fishing periods are established by emergency order. A schedule of fishery openings is published prior to the season. The schedule is designed to allow a total harvest of 100,000–150,000 sockeye salmon over the course of the entire return. Adjustments to the schedule are made inseason based on actual sonar counts compared to projected counts. Chitina Subdistrict king salmon harvests averaged 2,552 fish from 2000–2004 (Table 7). On average, 80% of the king salmon harvest is taken by July 1 and 95% by July 17 (Roberson and Whitmore 1991).

King salmon sport fisheries occur in various tributaries to the Copper River, primarily the Gulkana and Klutina rivers. Fisheries on the Gulkana and Klutina rivers account for 95% of the sport caught king salmon in the UCUSMA (Table 8). Sport harvest of king salmon increased rapidly from 1991 through 1998 and is reflected in the 1995–2004 average harvest of 6,384 king salmon in the UCUSMA. Angler catch also increased dramatically during this period (Table 9) and is reflected in the 1995–2004 average catch of 19,558 king salmon in the UCUSMA. A seasonal bag limit of five king salmon, greater than 20 inches in length, established in 1994 may have reduced effort and harvest in the Copper River drainage sport fisheries for the first two years after implementation, but both effort and harvest dramatically increased again in 1996.

Effort and harvest of king salmon declined from 1999 through 2005 when both fell to the lowest levels since 1990. The 2000–2004 average harvest of 4,937 king salmon and 17,218 fish caught reflect this decline.

The increased sport harvest between1991–1998 coincided with high harvests in the commercial and personal use fisheries during the same period (Figure 3). Management of the Copper River drainage king salmon fisheries has become more restrictive as fishing effort has increased. The following is a chronological list of regulatory changes that have altered the overall harvest of king salmon, over 20 inches, from the Copper River drainage especially after 1998:

1970: Bag limit is one king salmon per day, one in possession. Season open year round.

1989: Bag limit is one king salmon per day, one in possession. Season open January 1–July 19 to protect spawning fish, exceptions in Lower Klutina (January 1–August 10) and Gulkana (January 1–July 31) rivers. Five king salmon household limit implemented for Chitina Subdistrict.

1991: Bag limit is one king salmon per day, one in possession. Fish, Indian, Bernard, Ahtel, and Natat creeks and Little Tonsina River are closed to king salmon fishing to protect spawning stocks.

1994: Annual sport bag limit of five king salmon was established.

1997: The *Copper River King Salmon Fishery Management Plan* was established. The plan prohibited sport fish guiding on Tuesdays, reduced the Chitina Subdistrict king salmon limit to four per household, and allowed for commercial fishery restrictions in the inside waters of the Copper River District during the first two weeks of the season.

In addition, Manker Creek, Klutina Lake and its tributaries, Tonsina Lake and its tributaries, all tributaries to the Tonsina River, Tazlina Lake and its tributaries (except the mouth of Kaina Creek), the Chokosna and Gilahina rivers and the clearwater tributaries of the Gakona River were closed to king salmon fishing.

Open season reduced from August 10 to August 1 on Klutina River below mile 19.2 of the Klutina Lake Road.

Only unbaited, single-hook artificial lures may be used on the Tonsina River.

2000: The *Copper River King Salmon Fishery Management Plan* was amended to reduce the annual sport bag limit to four king salmon. Sport fish guide restrictions were lifted due to ineffectiveness in reducing sport harvests. Measures were put in place to allow for additional restrictions in the commercial fishery during the first three weeks of the fishery. The Chitina Subdistrict king salmon limit was reduced to one per household in conjunction with the reclassification of the fishery as subsistence to maintain king salmon harvests at historic levels.

The bait restriction on Tonsina River was modified to allow for bait to be used with a hook gap of 3/8 inches or less. This regulatory modification was made to permit fisheries for Dolly Varden and Arctic grayling using traditional gear to harvest these species, while still reducing the harvest of king salmon.

2003: Allowed the use of bait with multiple hooks in the mainstem of the Tonsina River. New data from ADF&G indicated the king salmon run was larger than previously believed and of sufficient size to withstand additional sport fish harvest.

2006: The *Copper River King Salmon Fishery Management Plan* was amended to allow only one commercial opening per week within the inside waters of the Copper River District during the first two weeks of the season to reduce king salmon harvest.

Under the *Copper River District Salmon Management Plan* (5 AAC 24.360, 2006), the department is directed to manage the commercial fishery to achieve an inriver goal of 15,000 salmon, annually, for the sport fishery in the Copper River tributaries. Strong sockeye runs coupled with increased development of the sockeye sport fishery led to a doubling of the sockeye sport harvest and an overall sport salmon harvest that exceeded the 15,000 salmon allocation from 1996–2000. Since 2000, the total sport harvest has averaged 12,368 salmon. It is likely that the sport fish salmon allocation will be exceeded in the future as the area's fisheries increase in popularity and access to the fisheries is improved. This trend will be exacerbated if other state salmon fisheries are restricted due to poor returns or increased fishing pressure. As the harvest increases the department will need to take actions to reduce harvest or the inriver escapement goal will need to be raised to accommodate the growth in the fishery. Under the revised *Copper River King Salmon Fishery Management Plan* (5 AAC 24.361, 2006), the department is directed to manage the commercial and sport fisheries to achieve a sustainable escapement goal of 24,000 king salmon or more. Implementation of this plan has reduced king salmon harvest since 2000.

To more accurately assess king salmon abundance, research was initiated during 1995 to estimate the timing and contribution of king salmon stocks from major tributaries to the Copper River. Marking wild king smolt with coded wire tags proved an ineffective method to assess returns due to a low tag recovery rate (Sarafin 2000, Brase and Sarafin 2004). From the data collected during the king salmon radiotelemetry studies, distribution of king salmon in the spawning tributaries of the Copper River was determined, as well as timing of entry into the spawning streams and through the personal use fishery (Evenson and Wuttig 2000; Wuttig and Evenson 2001; Savereide and Evenson 2002; Savereide 2003, 2004, 2005). As part of these studies from 1999–2002, estimates of total escapement were obtained from a mark-recapture experiment through marking all king salmon captured during the radio-transmitter deployment and the recapture of the marked fish in the Chitina Subdistrict personal use fishery. A separate mark-recapture study using fish wheels, conducted by the Native Village of Eyak and LGL, Inc. beginning in 2002, has also provided estimates of king salmon escapement to the Copper River since 2003 (Smith 2004). They estimated total in-river escapement for 2004 at 40,564 king salmon (30,682 spawning escapement; Smith and van den Broek 2005a*)* and for 2005 at 30,333 king salmon (21,693 spawning escapement; Smith and van den Broek 2005b).

Conflicts among users and concerns over king salmon resources have been a contentious issue in previous Board of Fisheries meetings, and will likely continue to be in future meetings. In the past, Copper River king salmon stocks have been considered healthy (Roberson and Whitmore 1991). Large harvests over the past decade have been supported by apparently large returns. However, strong returns of king salmon are unlikely to continue indefinitely, while participation in upriver fisheries is likely to increase. More accurate assessment of escapement will be needed to maintain high sustainable yield in Copper River king salmon fisheries.

Gulkana River King Salmon Sport Fishery

Background and Historic Perspective

The Gulkana River drainage has historically supported the largest sport fishery for king salmon in the UCUSMA. This drainage originates in the Alaska Range and flows south to join the Copper River near the community of Gulkana (Figure 4). The section of the Gulkana River upstream from Sourdough has been designated by the U.S. Congress as "wild" under the Wild and Scenic Rivers Act of 1968. Access to the river is available from various secondary roads and trails off the Richardson Highway, which parallel much of the river. Anglers use rafts, canoes, and powerboats to gain access to the more remote sections of the river. Raft and canoe anglers frequent the various sections of the river from Paxson Lake downstream to the Richardson Highway Bridge. Powerboat operators generally launch at Sourdough and use the river from approximately 2 miles below Sourdough upstream to the confluence of the West Fork. More recently powerboat operators have begun launching from the Richardson Highway Bridge and fishing the 5-mile reach of the river above the bridge. Powerboat operators also access the mouth of the Gulkana River using powerboats launched from Gakona and the Richardson Highway Bridge.

King salmon begin entering the Gulkana River in early to mid-June. The sport fishery peaks during late June, but fishing for king salmon continues until the season closes in mid-July. Spawning begins in mid-July and continues through late August. Most spawning occurs upstream of the confluence of the West Fork.

Regulations used to manage the Gulkana River fisheries are somewhat complex to accommodate concurrent fisheries on other species and to provide maximum opportunity for the wide variety of fishers who target king salmon. All waters above the Middle Fork confluence with the mainstem Gulkana River are closed to fishing for king salmon year-round to protect spawning fish. The remainder of the river is open to king salmon fishing from January 1 through July 19. The closure date is intended to offer protection to spawning fish. The Gulkana River from the Richardson Highway Bridge downstream to a department marker 500 yards downstream of its confluence with the Copper River is an area where only single-hook, artificial flies may be used from June 1 through July 31. In all waters of the Gulkana River drainage, upstream of a marker 7.5 miles upstream of the West Fork confluence with the mainstem, only unbaited, single-hook artificial lures may be used. This regulation is intended to protect rainbow trout stocks that inhabit this area.

The sport harvest of king salmon in the Gulkana River averaged 3,206 fish from 2000-2004 and 3,808 fish from 1995–2004 (Table 8). Harvest of Gulkana king salmon has declined since 1997, but this may reflect a decrease in effort as much, or more so, than a decrease in run strength. Annual sport harvest of king salmon on the Gulkana generally mimics the sport fishing effort, which has also dropped since 1997 (Table 4). Due to the nature of the mail survey, effort is not assigned to individual species, but observations suggest that the majority of effort is directed toward king salmon. Sport fishing effort on the Gulkana River during 2005 was the lowest since 1989.

A roving creel survey conducted in 1989 (Potterville and Webster 1990) and an on-site survey conducted in 1996 (LaFlamme 1997) showed the majority of effort and harvest of king salmon from the Gulkana River occurs from the Richardson Highway Bridge upstream to the confluence of the West Fork. Potterville and Webster (1990) reported that sport anglers expended 29,103

angler-hours to catch 2,398 king salmon. Sixty-one percent (1,461 fish) of the catch was estimated to be harvested. This estimate verified the accuracy of the SWHS by closely matching that year's statewide harvest mail survey estimate of 1,630 king salmon harvest in this fishery. LaFlamme (1997) reported 35,080 angler-hours were expended to catch 4,920 king salmon with 50% of the catch harvested. These estimates were not consistent with the 1996 SWHS estimates of 17,815 king salmon catch and 5,260 harvest due to bias created by surveying too few access points.

Potterville and Webster (1990) and LaFlamme (1997) reported the majority of sport harvest occurred in the 5-mile reach directly upstream of the Richardson Highway Bridge and the 10-mile reach near the Bureau of Land Management campground and boat launch at Sourdough. Few anglers appear to fish the single-hook, artificial fly-fishing-only area. Although many anglers float the upper river, the harvest of king salmon appeared minimal in this reach due to the July 19 spawning season closure. Anglers that were guided or used bait had higher catch and harvest rates. Shore anglers caught as many king salmon as boat anglers, but harvested more and expended greater effort to catch a king salmon. Approximately 50% of the harvest occurred on weekends.

Spawning escapement of king salmon in the Gulkana River upstream of the West Fork has been documented since 1966 by aerial surveys of index sites in the drainage (Brady et al. 1991, Roberson and Whitmore 1991). Escapement counts appear to have increased from 1977 through 2005 averaging 1,515 fish over the past ten years (1996–2005) versus an average count of 725 fish for the ten year period of 1977–1986. A weir was operated on the Gulkana River in 1996 to provide a count of king escapement concurrent with the creel survey conducted that same year. The estimated total inriver run in 1996 was 13,840 and estimated spawning escapement was 11,399 (LaFlamme 1997). The aerial survey spawning escapement count in 1996 was 2,321.

In a joint project with the Bureau of Land Management, the Department installed a counting tower on the Gulkana River upstream of the West Fork in 2002 to estimate the escapement of king salmon. Estimated escapement past the tower from 2002–2005 was 6,355, 4,890, 4,788, and 2,688 respectively (Taras and Sarafin 2005, Perry-Plake and Taras *In prep*a,b). The observed escapement passing the counting tower in 2006 was 3,990 king salmon (Perry-Plake and Taras *In prep*b). From 2002–2004, a radiotelemetry tracking station was installed at the tower site to provide data in conjunction with the Copper River king salmon radiotelemetry project that enabled the estimation of the proportion of radio-tagged king salmon migrating past the tower to the total entering the Gulkana River. The radio tag data indicated 50–86% of the Gulkana River king salmon run passed the counting tower during these years (Taras and Sarafin 2005, Perry-Plake and Taras *In prep*a). A long-term goal of this project is to establish a king salmon Sustainable Escapement Goal (SEG) for the Gulkana River.

Recent Fishery Performance and Outlook

Total effort (angler-days), catch and harvest for king salmon have all declined on the Gulkana River since peaking between 1993 and 1996 (Figure 5). A total of 15,277 angler-days were expended fishing on the Gulkana River and streams in 2005 with a catch of 6,584 kings and harvest of 2,573. The averages for the previous 5 years (2000–2004) were 18,820 angler-days, catch of 11,559 and harvest of 3,206. The average for the previous 10 years (1995–2004) was 23,424 angler-days, catch of 12,607 and harvest of 3,808. Escapement counts and aerial surveys

of king salmon on the Gulkana River have not indicated either a decreasing or increasing trend for king salmon escapements from 2000–2005.

It is anticipated that effort and harvest of king salmon in the Gulkana River will remain at current levels in the near future. The increased effort and harvest that resulted in the early 1990s may have been a result of restrictions on the Cook Inlet fisheries (Kenai, Susitna catch-and-release and closures). As these restrictions were lifted effort on the Gulkana River declined. Recent data indicate a potential for overharvest of the Gulkana River king salmon stocks, if river conditions such as water clarity and water level are conducive to fishing success. The Copper River drainage harvest trends and aerial survey indices indicate strong king salmon returns in past years, but based on returns since 1999, it is realistic to assume runs will decrease over the next several years.

Management Objectives

The underlying goal of past and current management has been to ensure sustained yield, but there is currently no spawning escapement goal specific to the Gulkana River. An annual spawning escapement objective of 1,200 fish has been established, based on enumeration of spawning fish by aerial surveys. The *Copper River King Salmon Fishery Management Plan* was developed in 1996 to provide for king salmon escapement at or above average historic levels (the escapement objective range of 28,000–55,000 king salmon was established by the BOF in 2000) for the entire Upper Copper River. The plan has since been modified at BOF meetings and a sustainable escapement goal of 24,000 king salmon has been in place since 2003. Since the plan was implemented, escapement counts have been above the 1987–1996 average (using only years surveyed between July 17 and August 31) of 951 king salmon 75% of the time and exceeded the aerial survey escapement objective of 1,200 for the Gulkana River 62% of the time.

Fishery Management

Fishing effort for king salmon on the Gulkana River is influenced by water level and clarity, reported inseason run strength, and management actions on other roadside king salmon fisheries (such and the Kenai and Deshka rivers). Declines in effort may continue, but should be anticipated to increase simply due to population increases within Anchorage and Fairbanks. Inseason management depends on reports from sport fishers, guides, Copper River subsistence and personal use fishers and aerial surveys. The counting tower also provides an indication of run strength and timing.

In 2005, king salmon arrived earlier (June 3) and counts at the tower were below those observed through June 30 during the three previous years. An aerial survey conducted downstream of the counting tower on June 29 counted fewer than 20 king salmon under marginal survey conditions. This low count supported sport angler and guide reports of few fish in the lower river and in conjunction with counting tower counts substantially below two of the previous three years and resulted in an Emergency Order on July 2 that reduced the seasonal bag limit from four to one king salmon for the remainder of the season. Aerial surveys flown on July 22 were conducted to assess the king salmon spawning escapement and run strength in the Gulkana River. For the Gulkana River the 2005 survey index was 824, 30% below the recent 10 year average escapement level.

In 2006, king salmon returns were late, perhaps due to below average flows in the Copper River. The first kings were counted at the Gulkana tower on June 12, the latest recorded. Counts were hindered by high water events on 10 days, but the preliminary number past the weir was 3,990 without adjusting for poor count days. High water, generally poor fishing conditions and reports of poor catches most likely reduced overall effort for 2006. Observe effort over Fourth of July weekend (generally highest effort period) was extremely low due to poor fishing conditions in the lower river. Guides and anglers fishing waters above the West Fork reported excellent fishing where water was clear. Overall effort was low and the final harvest from the Gulkana River in 2006 is expected to be below the last 5-year average.

Current Issues

Since 1991 there has been a significant increase in the use of powerboats above the Richardson Highway on the Gulkana Rivers. Also, a notable increase in the number of guides specializing in targeting king salmon has occurred. Prior to the 1986 season, only one individual specialized in guiding anglers for king salmon on the Gulkana River. Fourteen guides registered with the Bureau of Land Management to operate on Upper Gulkana River (Wild River Corridor) in 2005 (Denton Hamby, BLM, personal communication). Available data indicate that guided anglers are more successful than unguided anglers.

Increased use by float and powerboat operators on the Gulkana River is intensifying conflicts between users. Float-boat operators fish primarily from the bank casting and drifting lures through the holes while powerboats back troll. Additionally, reports have been made by float-boat operators that powerboats have bumped into them. The Bureau of Land Management initiated the process of updating the management plan for the Wild portion of the Gulkana River upstream of Sourdough in 1998. Preliminary recommendations for the management plan have been distributed for agency and public comment, but as of early 2005 the plan has not been finalized. There were two proposals submitted for the 1999 BOF meeting regarding motorized use on the Gulkana River and one proposal submitted for the 2003 BOF meeting requesting the prohibition of motorized boats for fishing and transporting on the entire Gulkana River drainage. None of these were addressed, as they fell outside the purview of the BOF.

Access to the Lower Gulkana River complicates management of the king salmon fishery and will continue to be an issue, if fishing pressure begins to increase. The Ahtna Native Corporation fee program has shifted effort from Sailors Pit and Poplar Grove to the Richardson Highway Bridge ROW, but overall fishing effort has not been reduced as a result of the access fee. Ahtna Corporation, in conjunction with the Department of Transportation, is planning the development of a public use area on its lands near the Richardson Highway Bridge, a popular site for fishing and camping where land ownership is in dispute. This may help reduce overall user impact to the area, but will not increase overall access to the river.

Ongoing and Recommended Research and Management Activities

The department has determined that the mail survey accurately estimates the harvest of king salmon in this drainage; therefore, we do not recommend that creel surveys be conducted on an annual basis. If individual fisheries change in angler composition (guided/unguided, shore/boat) or in gear and methods (bait/no bait, different terminal gear) a creel survey can be initiated to document the impacts of these changes.

Managers depend on aerial surveys to index the escapement of king salmon. The surveys are post-season indicators of relative spawning abundance due to their dependence on survey conditions, surveyor, and the residence of fish in the survey area. The initiation of the Gulkana River counting tower project in 2002 will hopefully result in an escapement goal set for the Gulkana River king salmon stocks, but a 5–10 year database needs to be collected. The operation of the counting tower does provide inseason data, which once a historic record is built, will provide managers with data previously unavailable. Aerial surveys will be continued to index numbers of spawning salmon, and the results compared to counting tower counts.

Recommended research projects are the continuation of the Gulkana River counting tower project and support of the NVE/LGL king salmon estimation project. The Gulkana River counting tower data can provide the information necessary to determine what proportion of king salmon spawners are indexed by aerial survey and lead to the development of an escapement goal for king salmon in the Gulkana River. The king salmon estimation project provides data necessary to evaluate whether Copper River fishery management has complied with the Copper River king salmon management plan. Management projects should include continued aerial survey data collection.

Klutina River King Salmon Sport Fishery

Background and Historical Perspective

The Klutina River supports the second largest sport fishery for king salmon in the UCUSMA. This semi-glacial river drops rapidly out of Klutina Lake to enter the Copper River at the community of Copper Center. Access to the river is available along the Richardson Highway and from the Klutina Lake Road (also called the Brenwick-Craig Road), which parallels the river. Shore anglers participate in the fishery adjacent to the Richardson Highway and the Klutina Lake Road. The distance between the Klutina Lake Road and the river varies along the course of the road, with the road running along the ridge above the river. Jet riverboats are used by experienced operators to access the upstream portions of the river. Jet boats are launched from private land adjacent to the highway or from a site within the highway ROW along the new Richardson Highway Bridge. The river has considerable stretches of whitewater and is considered to be very challenging to jet riverboat operators. The fast water of the Klutina River limits the number of resting pools for king salmon; therefore there are less than two dozen good fishing sites in the lower portion of the river accessible to most anglers.

King salmon begin entering the Klutina River in late June, with the run continuing into August. The sport fishery peaks during the second week of July, but fishing for king salmon continues until the season closes on August 1. Peak spawning occurs from late July through August. Most spawning occurs upstream of a point adjacent to mile 19.2 on the Klutina Lake Road.

King salmon spawning season closures were established in the UCUSMA during the 1989 BOF meeting to allow king salmon to spawn unperturbed. On the Klutina River upstream of a department marker located adjacent to Mile 19.2 of the Klutina Lake Road, king salmon may be taken only from January 1 through July 19. Downstream of this marker, the king salmon season is from January 1 through July 31. The current daily bag and possession limit for sport caught king salmon over 20 inches is one fish. The Upper Copper River drainage-wide annual bag limit of four king salmon per year includes the Klutina River.

The sport harvest of king salmon in the Klutina River averaged 1,551 fish from 2000–2004 and 2,283 fish from 1995–2004 (Table 8). Fishing effort and harvest of kings increased greatly from 1983 through 1999 when both peaked (Figure 6). Decreased effort after 1999 was in response to regulatory changes affecting bag and possession limits and guide restrictions. Sport fishing effort rebounded in 2004 and 2005. Due to the nature of the mail survey, effort is not assigned to individual species, but observations suggest that the majority of effort is directed toward king salmon. However, increased effort in 2004 and 2005 may reflect effort directed toward strong returns of sockeye. Even at lower harvest levels the Klutina River still accounted for over 30% of the sport harvest of king salmon in the UCUSMA in 2005.

Results of a 1988 creel survey (Roth and Delaney 1989) indicated that sport anglers caught a total of 1,048 king salmon of which 43% were retained. The estimated harvest (450) was close to that reported in the mail survey for 1988 (483), indicating that the mail survey accurately estimates sport harvest in this fishery. A 1989 creel survey (Potterville and Webster 1990) estimated 1,587 king salmon caught of which 65% were retained. The estimated harvest (1,031 fish) was again close to that reported in the mail survey for 1989 (652 fish).

Roth and Delaney (1989) reported that guided boat anglers accounted for nearly 90% of the catch and 80% of the harvest of king salmon. The following year, Potterville and Webster 1990 reported boat anglers accounted for 88% of the estimated total catch and exhibited significantly higher catch (3.3 fish per hour) and harvest (2.1 fish per hour) rates than did shore anglers (0.5 and 0.4 fish per hour, respectively). The vast majority of boat anglers that participated in the fishery were guided and therefore insufficient data were available to determine if guided boat anglers had different catch or harvest rates than unguided boat anglers. Daily estimates of CPUE from the 1988 survey were used to estimate the timing of king salmon into the fishery. These data indicate that CPUE peaks during mid-July, with 50% of the run having entered the river by late July. Approximately 12 guides operated on the Klutina River during 1989 and 1990, all of which conducted boat trips. The vast majority of shore anglers fished downstream from the Richardson Highway Bridge.

The spawning escapement of king salmon to the Klutina River has been documented by aerial surveys of St. Anne and Manker creeks since 1966 (Brady et al. 1991, Roberson and Whitmore 1991). Spawning escapement index counts have been generally consistent for the Klutina River system averaging 387 for all years that surveys were conducted between July 17 and July 31. Escapement indices spiked in 1997 and 1998 averaging 1,362. No escapement surveys were flown on the Klutina River index areas in 1993. Radiotelemetry indicated that the aerial surveys only accounted for about 45% of the spawning population of the Klutina system (Evenson and Wuttig 2000, Wuttig and Evenson 2001, Savereide and Evenson 2002, Savereide 2003, 2004, 2005). Additionally, these fish constitute the early portion of the run only. The majority of Klutina king salmon spawn in the mainstem and generally later than those in the clear water tributaries of the river. Thus, the surveys provide an indication of the strength of the early component of the run to these systems and in conjunction with other data (angler reports, fish wheel study CPUE, personal use/subsistence harvests) may provide the manager a general idea of the inseason run strength to the Klutina River.

Recent Fishery Performance and Outlook

Total effort (angler-days), catch and harvest for king salmon steadily increased on the Klutina River from 1977 through 1999 (Figure 6). Catch statistics declined through 2005 while harvest

levels remained generally stable from 2000–2005. The higher levels of effort and harvest in the 1990s may have resulted from restrictions on the Cook Inlet fisheries (such as catch-and-release restrictions and closures for the Kenai and Susitna rivers). As these restrictions were lifted, effort on the Klutina king salmon declined.

Radiotelemetry data, improved river access and increasing angler proficiency indicate the potential for over harvest of the Klutina River king stocks, particularly if fishing conditions on the Gulkana River are poor and effort is shifted to the Klutina River where water conditions do not impact king salmon fishing as significantly as the Gulkana River. The Copper River drainage harvest trends and aerial survey indices indicate strong king salmon returns through the late 90s, but based upon returns since 1999, it is realistic to assume run size and harvests will decrease or remain stable over the next several years.

Management Objectives

Although no specific fishery objectives have been established for this stock, an underlying goal of past and current management has been to ensure sustained yield. Continued aerial surveys will be used to monitor king salmon returns inseason along with fisher reports from the subsistence, personal use and sport fisheries as well as commercial catch data from the Copper River gillnet fishery.

Fishery Management

In 2005, king salmon were reported by sport anglers in the Klutina River earlier than normal. Anglers targeting sockeye salmon in early June reported hooking king salmon. This was somewhat unusual, as king salmon are generally not present in the Klutina River much before July 1. By the 2nd week of July, when king salmon are near peak numbers in the Klutina River, angler success was poor and many guides were fishing the Upper Klutina River since few fish were in the lower river. By the end of the season on the Klutina River on August 1, many guides expressed concern over the low numbers of king salmon. Weather prevented aerial surveys of the index streams and if surveys had been flown they would only provide data on the early portion of the run. No inseason management action was taken on the Klutina River due to lack of sufficient justification.

In 2006, guides and sport anglers reported king salmon entered the river later than normal. The sockeye return to the Klutina was strong in 2006, so fishing effort was extensive. Despite this effort few king salmon were reported until late July. Aerial surveys were below average for the king stocks in St. Anne and Manker Creeks verifying the weak early component of the Klutina run. Angler reports from the Klutina River in late July indicated increasing numbers of king salmon moving into the river, but without a means to enumerate king salmon in the mainstem Klutina River or radio-tags to estimate the percentage of the run that came into the river after July 31, it is uncertain what level of escapement occurred in the Klutina River in 2006.

Many guides continue to report abuse of the daily and annual bag limits by shore-based anglers fishing between the Richardson Highway Bridge and the mouth of the Klutina River. Concerns over high fishing pressure in the mainstem Copper River, just downstream of the Klutina River were not an issue in 2005 as the gravel bar that shore anglers accessed in previous years was not accessible due to the Copper River creating a channel between the bank and the gravel bar that was not accessible without a boat. There are increasing conflicts between float anglers and

motorized boat anglers, as well as between guides and non-guided anglers. There are limited king salmon holding areas on the Klutina River and it is anticipated that these conflicts will not diminish, particularly as effort increases.

Current Issues

The Klutina River represented from 10–12% of the total Copper River return from 2002–2004, compared to the 17–27% represented by the Gulkana River during the same period (Savereide 2005). The Klutina River cannot be expected to sustain harvests or effort at the same level as the Gulkana River. Prior to 1994, the Klutina River harvest generally comprised 25% or less of the overall Copper River Drainage sport harvest, while the Gulkana made-up about 69% of the sport harvest. Popularity of the Klutina River fishery, improved access, and increased guiding activity has increased the proportional king salmon harvest to 35% for that river. Greater exploitation rates on the Klutina River increase the risk of over harvest during years of low production and high angler effort. Further harvest increases may make further restrictions to the fishery necessary.

Fishing effort increased on the Klutina River in 2004 and 2005 and appeared to continue this trend in 2006. In addition to the popularity of the fishery itself, several Copper River Basin projects may be attracting additional users who do not come to the area specifically to target the Klutina River fisheries. Princess Lodge opened along the Klutina River in May of 2002. The lodge and its clientele have the potential to increase fishing pressure not only on the Klutina River, but possibly the Gulkana River and other Copper River tributaries. Wrangell-St. Elias National Park completed a new park visitor center (located in Copper Center) in summer 2002. Following the first season, there was an increase in river traffic (float trips and motorized boat tours) on the Klutina River, Copper River mainstem and other tributaries. During fall 2001, the Department of Transportation improved the access road and parking area at the Klutina River boat launch within the Richardson Highway ROW. DOT requires additional funding to make any further improvements on the launch itself, but if funds become available increased boat use on the Klutina can be expected.

Increasing use of the swift Klutina River by powerboats and limited use by rafts creates a greater hazard to users. Many sections of the river are not wide enough to allow boats to pass and result in conflicts between the two user groups. Members of the Klutina River Association (members include the guides, charter operators and businesses on the river) have voiced their opposition to improved access which would increase the number of inexperienced boaters operating on the river, citing safety concerns. However, the general public and the department support improved public access to the river.

The majority of the land adjacent to the Klutina River upstream of the Richardson Highway is owned by Ahtna Native Corporation. Ahtna allows access across its lands along the Klutina Lake road with the purchase of access passes. If fees increase without increased access this may result in conflicts between fishery users and the corporation or increased congestion in areas of the Klutina River that are not corporation lands.

Ongoing and Recommended Research and Management Activities

A creel survey was conducted in 2006 to qualify the current king salmon fishery on the Klutina River and to determine the distribution of fishing effort and harvest on the river (Schwanke and Taras *In prep*). The department has determined that the mail survey accurately estimates the

harvest of king salmon in this drainage; therefore, we do not recommend that creel surveys be conducted on an annual basis.

Recommended research and management projects include a hooking mortality study. A portion of the king salmon hooked in the Klutina River is lost in the fast water before they can be landed. It is suspected that many of these fish may not survive to spawn. The hooking mortality of these fish needs to be evaluated.

The NVE/LGL king salmon estimation project should continue to be supported. The king salmon estimation project provides data necessary to evaluate whether Copper River fishery management has complied with the Copper River king salmon management plan.

Management projects should include continued aerial survey data collection. Aerial surveys on the Klutina clearwater systems provide valuable inseason insight on the early component of the Klutina king salmon return. Timely information will be needed if in-season adjustments must be made to ensure adequate escapement of king salmon in this system.

Other Copper Basin King Salmon Sport Fisheries

Background and Historical Perspective

Less than 10% of the harvest of king salmon in the UCUSMA occurs in systems other than the Gulkana and Klutina rivers. The majority of this harvest occurs in the Tonsina River. The glacial Tonsina River flows from Tonsina Lake into the Copper River downstream of the Klutina River confluence. The Tonsina River crosses under the Richardson Highway at mile 79 and the Edgerton Highway at mile 19. Shore anglers participate in the fishery adjacent to the Edgerton Highway; some angling is conducted by raft between the Richardson and Edgerton highways; and some angling is conducted by fly-in anglers fishing the outlet of the Tonsina River at Tonsina Lake. King salmon run-timing to the Tonsina River drainage occurs in late-June through August, similar to that of the Klutina River.

The sport harvest of king salmon in the Tonsina River averaged 76 fish over the last five years (2000–2004), and 142 fish over the last 10 years (1995–2004) (Table 8). Creel surveys or fishery monitoring of catch or catch rates have not been conducted on the Tonsina River due to low fishing effort and low king salmon catches within this drainage. U.S. Fish and Wildlife Protection and Alaska Department of Fish and Game personnel do, however, conduct enforcement monitoring of this fishery on a sporadic basis.

The spawning escapement of king salmon to the Tonsina River has been documented by aerial surveys of the Little Tonsina River and Greyling Creek since 1966 (Brady et al. 1991, Roberson and Whitmore 1991). The spawning escapement to these index sites averaged 465 fish from 1977 to 1986, but the average index count has declined to 310 for 1996–2004. Aerial surveys on the Tonsina River tributaries were discontinued after 2004, due to minimal sport fishing effort and harvest and based upon the radiotelemetry study which indicated that the majority of spawning occurred in the glacially occluded mainstem.

Current regulations allow sport fishing for king salmon in the Tonsina River from January 1 through July 19. The July 19 closure date was established in 1989 to allow king salmon to spawn unimpeded. Tonsina Lake and all tributaries to the Tonsina River are closed to king salmon fishing. Current daily bag and possession limits for king salmon over 20 inches in this

drainage are one and one, respectively, with an annual bag limit of four for the Copper River drainage.

A limited fishery for king salmon also occurs in the Tazlina River drainage. Most effort is expended at the mouth Kaina Creek which flows into Tazlina Lake. Average catch from the Tazlina drainage from all years reported (1983–1999) is 81 and average harvest is 32 (1983–1999). Effort has dramatically dropped since 1999 and no catch or harvest has been reported since 1999. Average escapement index for the Tazlina drainage is 576 king salmon from 1977–2004 (65% from Kaina Creek 35% from Mendeltna Creek). Aerial surveys on Kaina and Mendeltna creeks were discontinued after 2004, due to minimal sport fishing effort and harvest and based upon the radiotelemetry study that indicated the Tazlina River represented less than 5% of the total Copper River return.

Management and Fishery Objectives

No specific fishery objectives have been established for the Tonsina or Tazlina stocks. The underlying goal of past and current management is to ensure sustained yield. The aerial survey index has been used as a post-season escapement index, but has limited utility to describe overall escapement on these systems or add to an escapement assessment for the Copper River Drainage as a whole.

Current Issues

Fishing effort within the Copper River drainage can be expected to remain at current levels or increase further. As effort increases on the area's major king fisheries on the Gulkana and Klutina Rivers and begins to exceed access opportunities, effort may shift to secondary systems, particularly the Tonsina River. These secondary systems have relatively small king salmon returns and any significant development of a fishery on these systems could put these small king salmon stocks at risk. The recent strong king salmon returns to the Copper River have prevented the overexploitation of king salmon stocks. However, if the Copper River experiences below normal king salmon returns, managers will need to take inseason action to prevent potential overexploitation.

Ongoing and Recommended Research and Management Activities

From 1999–2004, a radiotelemetry study on the Copper River provided annual estimates of total upriver escapement, as well as migratory timing through the Chitina Subdistrict personal use fishery, timing into the spawning tributaries, and distribution and proportion of king salmon in spawning tributaries (Evenson and Wuttig 2000, Wuttig and Evenson 2001, Savereide and Evenson 2002, Savereide 2003, 2004, 2005). Data from 2002–2004, indicates that the Tonsina River king salmon return represents approximately 12% of the total Copper River return, similar to the Klutina River return.

Assessment of the genetic make-up of Copper River king salmon stocks has included sampling from the Tonsina, Tazlina and Klutina drainages (Seeb et al. 2006). These drainages appear to have a similar genetic make-up that is distinct from the Chitina, Gulkana, and Upper Copper River king stocks.

A survey of salmon habitat was initiated on Greyling Creek entering Tonsina Lake in 2006. This project is sponsored by the Copper River Watershed Project (Ralph *pers. comm*.). If funding allows, habitat assessments will be conducted on the entire Tonsina drainage.

Recommended research and management projects include support of the NVE/LGL king salmon estimation project. Continued habitat and genetic assessments should be supported. If the SWHS indicates increased effort, catch and harvest from the Tonsina or Tazlina rivers a creel census may need to be considered on these systems to document use patterns.

SOCKEYE SALMON SPORT FISHERIES

In the UCUSMA, only the Copper River drainage supports wild and enhanced stocks of sockeye salmon. Wild stocks are widely distributed and are present in approximately 125 of the Copper River tributaries, while enhanced stocks are limited to the Gulkana River from production at the Gulkana Hatchery near Paxson. The abundance of sockeye salmon migrating into the Copper River has been estimated annually since 1978 by sonar at Miles Lake. Beginning in 1966, the escapement of sockeye salmon to the Copper River tributaries has been documented by aerial surveys of index sites to monitor spawner distribution in the drainage (Brady et al. 1991). This aerial survey program conducted by Commercial Fisheries Division staff in Cordova was discontinued in 1993; however, a reduced program, which targeted high priority index sites, was reinstated during the 2000 season.

Throughout the past decade, the sockeye salmon sport fisheries of the UCUSMA have undergone expansion. From 1996 to 2000, the sockeye salmon sport harvest exceeded 11,000 fish annually, compared to a previous high of 6,533 fish harvested in 1994 (Table 10). From 2000–2004 sockeye harvest from UCUSMA waters has averaged 8,373 fish. The primary sport fisheries occur in the Gulkana and Klutina rivers. Approximately 94% of the estimated sport harvest of sockeye salmon in the UCUSMA during 2000–2004 came from these two rivers. The increased harvests these sockeye salmon sport fisheries have experienced correspond to the strong returns of sockeye salmon to the Copper River during the late 1990s (Sharp et al. 2000).

In addition to direct harvests from the recreational fishery, sockeye salmon stocks of the Gulkana and Klutina rivers are subject to harvest from a series of other fisheries that target a mixture of Copper River stocks. Specifically, the Copper River District commercial drift gillnet fishery, the Chitina Subdistrict personal use and Glennallen Subdistrict subsistence fisheries. The management of these fisheries is based on the abundance of all Copper River drainage stocks, as counted past the Miles Lake sonar station. Under the *Copper River District Salmon Management Plan* (5 AAC 24.360), the department is directed to manage the commercial fishery to achieve an inriver goal of 15,000 salmon (all species) for sport fishery harvest, 61,000 to 82,500 sockeye salmon (wild stocks only) for subsistence harvest, 100,000–150,000 (including hatchery stocks) for personal use harvest, 300,000 sockeye salmon for spawning escapement, and an amount determined annually for hatchery brood and surplus stocks. The direct impact from these downstream fisheries on specific stocks of this mixture is unknown.

Gulkana River Sockeye Salmon Sport Fishery

Background and Historic Perspective

The Gulkana River has historically supported one of the largest sockeye salmon recreational fisheries in the UCUSMA (Table 10). Sockeye salmon are one of the various species within the drainage that are targeted by sport fishers. While the Gulkana River fishery accounted for over 60% of the king salmon harvested from 2000–2004 in the UCUSMA, it accounted for only 25% of the sockeye harvest during those years. The return to this system is composed of both wild and hatchery stocks. The Gulkana Hatchery has been producing sockeye salmon since the early

1970s and in the late 1990s produced enhanced returns up to 800,000 adult salmon (Sharp et al. 2000). Hatchery produced sockeye salmon are available to the sport fishery prior to reaching the hatchery for brood stock.

The sockeye salmon run timing to this system begins in early June and continues into September. The hatchery enhanced return has a run timing that overlaps the late wild stock component. Beyond basic run timing, life history and stock status information is limited. A weir was operated downstream of the West Fork in 1996 (LaFlamme 1997). Emphasis of the weir project was directed at king salmon and the escapement counts provide only a partial count for the season's sockeye salmon return. An estimated 183,461 sockeye salmon passed the weir from June 11 to July 31. The proportion of the total return that this count represents is unknown, as the weir was operated through only a portion of the sockeye salmon run. Escapement of sockeye salmon to the Gulkana River has been documented by aerial surveys of index sites since 1966 (Brady et al. 1991). This aerial survey program was discontinued in 1993; however, a reduced program that targets high priority index sites, including the Gulkana River, was reinstated during the 2000 season.

The primary source of information regarding the sport fishery is the SWHS (Mills 1979–1980, 1981a-b, 1982–1994, Howe et al. 1995–1996, 2001a-d, Walker et al. 2003, Jennings et al. 2004, 2006a-b, 2007, *In prep*). Creel surveys were performed in 1988, 1989, and 1996 (Roth and Delaney 1989, Potterville and Webster 1990, and LaFlamme 1997). As with the weir, these surveys were directed primarily at king salmon. The 1988 and 1996 creel surveys did not report sockeye salmon data. The 1989 creel survey did include sockeye salmon, but was limited to the fishery downstream of the West Fork, and estimated a harvest of 327 sockeye (Potterville and Webster 1990). Due to the limited coverage of the creel survey for sockeye salmon, the estimated harvest cannot be compared to the SWHS estimates for 1989.

In 2002, a counting tower project was initiated on the mainstem Gulkana River upstream of the West Fork (Taras and Sarafin 2005, Perry-Plake and Taras *In prep*a, b). The primary objective of this project is to estimate king salmon escapement. Sockeye salmon passage is also recorded, but sockeye are still entering the system after the tower is closed down. Between 2002 and 2006, an estimated 13,650 to 34,428 sockeye salmon (including hatchery fish) passed the tower from May 27 to August 14 each year. This estimate does not include that portion of the hatchery return that migrates up the West Fork of the Gulkana River to Crosswind Lake.

Recent Fishery Performance

Based on the SWHS, the estimated 2005 sport harvest of sockeye salmon from the Gulkana River was 1,169 fish, the second lowest since 1980. This harvest was slightly above the 2004 harvest. However, harvest, catch and effort on the Gulkana have declined since 2000 (Figure 7). Observations in recent years suggest that most of fishing effort on the Gulkana is directed towards king salmon rather than sockeye. Harvest declines following 1999 likely reflect more frequent high water conditions and poor Gulkana hatchery returns that occurred in the Gulkana River during that time.

Reports by anglers and guides and observations of river condition suggest that the downward trend in fishing effort, catch and harvest of sockeye on the Gulkana River continued through the 2006 season. Water levels on the Lower Gulkana were generally high during the fishing season discouraging anglers from fishing during those periods when the river was muddy.

Management Objectives

Sockeye salmon fisheries in the Gulkana River are managed to ensure that the harvests do not threaten sustained yield; that a diversity of public fishing opportunities and access are maintained; and to achieve public benefits from the fishery that outweigh the costs of associated management and research. Escapement objectives for this drainage have not yet been established.

Fishery Management

Sport fish harvests are monitored with the SWHS. Present sport, commercial, and subsistence harvests are thought to be sustainable. The present management guidelines of the commercial and subsistence fisheries are also thought to provide sustainability of the Gulkana River sockeye salmon stocks. If future estimates indicate significant decreases in abundance or if harvests increase to the point that the ADF&G believes that sustained yields are threatened, then regulatory actions will be considered.

Fishery Outlook

It is anticipated that recent levels of effort and harvests of sockeye salmon in the Gulkana River will continue in the near future. The current regulations appear to be maintaining the stocks at historic levels.

Recent Board of Fisheries Actions

Beginning in 1999, the bag and possession limit for sockeye salmon was increased from three to six fish from August 1 to December 31, on the West Fork of the Gulkana River upstream of a department marker located ½ mile upstream of the confluence with the mainstem. This action was taken to provide additional opportunity to harvest surplus hatchery salmon. A similar proposal was submitted to the 2002 BOF meeting, requesting that bag and possession limits be increased in the mainstem Gulkana River on July 20 to increase harvest opportunity of hatchery stocks, but this was not adopted by the Board.

Current Issues

Issues and conflicts involving the Gulkana River sockeye salmon fishery are similar to those noted for the king salmon fishery.

Ongoing and Recommended Research and Management Activities

Sockeye salmon sport fish harvests will continue to be monitored with the SWHS. An aerial survey program was reinstated in 2000 for index escapement estimates on priority spawning areas of the drainage. The present management guidelines of the commercial and subsistence fisheries are also thought to provide sustainability of the Gulkana River sockeye salmon stocks.

Since 2002, a counting tower has been operated upstream of the West Fork of the Gulkana River. The primary objective of this project is to estimate king salmon escapement. If funding becomes available, extending the operation of the tower to estimate sockeye salmon escapement could lead to the establishment of an escapement goal for Gulkana River sockeyes salmon.

The management and research activities associated with the Gulkana River sockeye salmon sport fishery have not been extensive. Given the present lack of information, future research should be directed towards a better understanding of harvest, effort, and fishing patterns, in addition to specific life history of Gulkana River sockeye salmon and migratory timing of wild and hatchery

stocks through the Lower Gulkana River. There are presently no plans for sockeye salmon research.

Klutina River Sockeye Salmon Sport Fishery

Background and Historical Perspective

The Klutina River (Figure 2) supports the largest sockeye salmon sport fishery in the UCUSMA (Table 10). The Klutina River accounted for about 73% of the sockeye salmon sport harvest from 2000–2004. The proportion of the UCUSMA sockeye salmon harvested from the Klutina River has risen steadily since 1993. From 1983–1993 the sockeye harvest from the Klutina River averaged only 28% of the overall harvest of sockeye from the UCUSMA.

The sockeye salmon run timing to this system begins in mid-June and continues through August. Beyond basic run timing, the life history and stock status information for Klutina River sockeye salmon is very limited. Spawning activity is known to occur in various locations of the river, lake, and tributaries.

The primary source of information regarding the sport fishery is the SWHS (Mills 1979–1980, 1981a-b, 1982–1994, Howe et al. 1995–1996, 2001a-d, Walker et al. 2003, and Jennings et al. 2004, 2006a-b, 2007, *In prep*), which is performed each year with mail out questionnaires. Creel surveys, which emphasized king salmon, were conducted in 1988, 1989 and 2006 (Roth and Delaney 1989 and Potterville and Webster 1990, Schwanke and Taras *In prep*). Of these, only the 1989 survey provides information related to sockeye salmon, with an estimated catch of 361 (Potterville and Webster 1990). This creel survey was conducted only during the king salmon fishery and the estimated sockeye salmon harvest is not directly comparable to the SWHS estimate.

Recent Fishery Performance

Based on the SWHS, the estimated 2005 sport harvest of sockeye salmon from the Klutina River was 6,646 fish and the second highest on record (Table 10). The 2005 catch of sockeye on the Klutina River was the highest ever recorded at 13,394 fish. Sockeye salmon harvest and catch from the Klutina River has shown a steady increase through 2000 and has remained relatively stable through 2004 (Figure 8). From 1995–2004 harvest has averaged 5,219 fish (Table 10).

Sport effort on the Klutina River has rebounded from a drop after 1999 (Table 4). Effort in 2005 was nearly at average for 1995–2004 and exceeded the average for 2000–2004. Traditionally most of the effort expended on the Klutina River was directed towards king salmon. However, observation suggests recent surges in effort may be driven more by sockeye than king salmon. Sockeye salmon harvest since 2001 has generally tracked with effort during the same period (Figure 8)

Management Objectives

Sockeye salmon fisheries in the Klutina River are managed to: 1) ensure that the harvests do not threaten the sustained yield; 2) ensure that a diversity of public fishing opportunities and access is maintained; and, 3) achieve public benefits from the fishery that outweigh the costs of associated management and research.

Fishery Management

Sport fish harvests are monitored with the SWHS. Escapement objectives for this drainage have not been established. Present sport, commercial, and subsistence harvests are thought to be sustainable. The present management guidelines of the commercial and subsistence fisheries are also thought to provide sustainability of the Klutina River sockeye salmon stocks. If future estimates indicate significant decreases in abundance or if harvests increase to the point that the ADF&G believes that sustained yields are threatened, then regulatory actions will be considered.

Fishery Outlook

It is anticipated that effort and harvests of sockeye salmon in the Klutina River will remain at recent levels or rise somewhat in the near future. The current regulations appear to be maintaining the stocks at historic levels.

Recent Board of Fisheries Actions

No proposals regarding Klutina River sockeye salmon have been submitted to the BOF for the current or in previous board meetings.

Current Issues

Reports by guides and sport anglers of snagging and over limits of sockeye salmon appear to have increased over the last several years. Enforcement of both king and sockeye salmon regulations has also increased and ABWE officers patrol the Klutina River access points on a regular basis during the fishing season.

Ongoing and Recommended Research and Management Activities

Sport fish harvests will continue to be monitored with the SWHS. An aerial survey program was reinstated in 2000 for index escapement estimates on priority spawning areas of the drainage. The present management guidelines of the commercial and subsistence fisheries are also thought to provide sustainability of the Klutina River sockeye salmon stocks. If effort or harvest increases to the point that the ADF&G believes that sustained yields are threatened, then regulatory actions will be considered.

Given the present lack of information, future research should be directed towards a better understanding of harvest, effort, and fishing patterns, in addition to specific life history of Klutina River sockeye salmon.

COPPER RIVER PERSONAL USE AND SUBSISTENCE SALMON FISHERIES

Background and Historical Perspective

There is a long history of salmon harvest for food consumption or use as bait in the Copper River drainage. The Ahtna natives took salmon, mostly king and sockeye, with funnel traps and spears in clearwater tributaries. Weirs, gillnets, and dip nets were used in the turbid mainstem Copper River and at its delta. Haley Creek was the site of one of the many traditional fishing camps along the Copper River. With Anglo settlement, fish wheels were introduced to the Copper River. By 1920, fish wheels and dip nets took over as the means of capturing salmon for personal needs in this river. The popularity of the fishery increased substantially with the introduction of this gear.

Historically, the taking of salmon for consumption as food or use as bait in the Copper River drainage was governed under subsistence regulations. In 1978, Alaska passed its first subsistence law. This legislation guaranteed the "customary and traditional use" of fish and game harvest in Alaska and gave this harvest a priority in terms of allocation. Under this law, the Board of Fisheries adopted the *Copper River Subsistence Salmon Fisheries Management Plan* (5 AAC 01.647). This management plan established seasons, open areas, legal gears, permit requirements, and bag limits for a subsistence salmon fishery in the Copper River. The plan also directed the department to manage the Copper River commercial salmon fishery to ensure that an adequate escapement reaches the spawning areas and to provide for subsistence harvest.

In 1980, with the passage of the Alaska National Interest Lands Conservation Act (ANILCA), the federal government mandated subsistence hunting and fishing preference for "rural" residents on federal lands. Subsequent rulings by the federal government stated that if the state failed to meet this requirement, the federal government would take over management of fish and game on all federal lands. To comply with this requirement and prevent federal takeover, the joint Boards of Fish and Game adopted a regulation in 1982 stating that only "rural" residents had "customary and traditional use" of fish and game and established eight criteria for identifying "customary and traditional uses." Under this plan, subsistence fishers were given one of four classes of permits depending upon their locality to the fishery, income, age, and past use. During times of low escapement, Copper River Basin residents received priority over non-basin residents. Due to growth in the fishery, the board eliminated non-basin residents from the Copper River subsistence fishery based on analyses of the eight-point criteria in 1984.

This decision precluded many individuals from participating in the Copper River subsistence fisheries, thereby precluding them from harvesting fish for their personal use. This led the Board of Fisheries to establish a new category of fisheries, personal use fisheries in 1982 (5 AAC 77.001). These fisheries were created to provide Alaskans who became ineligible to harvest fish under new subsistence regulations the opportunity to harvest fish for consumption as food or use as bait. Personal use fisheries, like commercial and sport fisheries, were not given a "priority" in terms of allocation as were subsistence fisheries. In 1984 the BOF created a personal use salmon fishery in the Copper River drainage under the *Copper River Personal Use Dip Net Salmon Fishery Management Plan* (5 AAC 77.590). This fishery was changed to a subsistence fishery by the BOF in 2000 (5 AAC 01.647(k)). In 2003, the BOF reversed this decision and reinstated the *Copper River Personal Use Dip Net Salmon Fishery Management Plan* (5 AAC 77.591). The BOF viewed this as a name and allocation priority change only, management of the fishery continued as it had prior to the 1999 ruling, based upon the number of fish passing the Miles Lake sonar.

Personal use fisheries differ from sport fisheries in both their objective and management. Both fisheries provide Alaskans the opportunity to harvest fish for personal consumption (in either fishery fish cannot be sold or bartered), but personal use fisheries are managed to maximize harvest potential whereby sport fisheries are managed to provide diversity of opportunity and to maximize economic benefit to Alaska. Anyone can participate in Alaska's sport fisheries (provided they have a sport fishing license), only Alaska *residents* may participate in personal use fisheries. The Division of Sport Fish manages the personal use fishery, while the Division of Commercial Fisheries manages most subsistence fisheries. The Glennallen Subdistrict subsistence fishery in the Upper Copper River is managed by the Division of Sport Fish.

Harvests in the subsistence and personal use fisheries are dominated by sockeye salmon (Table 2). King salmon comprise the second largest harvest, while a nominal harvest of coho salmon also occurs. The subsistence and personal use salmon fisheries in the Copper River drainage have undergone changes since their inception. Currently, all Alaskans are eligible to participate in the subsistence fishery based on the McDowell decision in 1989. The Glennallen Subdistrict Subsistence Salmon fishery occurs upstream of the Chitina-McCarthy Bridge to Slana and can be prosecuted with fish wheels and dip nets. The season is from June 1 through September 30, unless closed by emergency order. Only Alaska residents can participate in this subsistence fishery. A special permit, which is free, is required to participate in the fishery. Anglers must record their harvest on their permit and return the permit upon completing fishing. The limits are 30 salmon for a household of one, 60 salmon for a household of two, and 10 salmon for each additional person in a household of more than two people. Individuals may request additional salmon up to a maximum of 200 salmon and households may request up to 500 salmon. For people using dip nets, only five of the salmon may be king salmon. A subsistence fishery is also allowed in a portion of Tanada Creek, near the traditional Native fishing site of Batzelnetas, with spears and dip nets.

The Chitina Subdistrict Personal Use Fishery is opened each year by emergency order. Both a valid Alaska sport fishing license and a special permit are required to participate in the personal use fishery. Anglers must record their harvest on their permit and return the permit after the close of the season. The limits are 15 salmon for a single person and 30 salmon for a household of two or more, only one of which may be king salmon. Only dip nets may be used to harvest salmon. The entire mainstem Copper River between the downstream edge of the Chitina-McCarthy Bridge and a department marker located about 200 yards upstream of Haley Creek (in Wood Canyon) is open to personal use fishing. The BOF has mandated that Alaskans can participate in either the subsistence or personal use fishery in the Copper River drainage, but not both.

From 1991–1999 a fee of $10 was attached to the permit and from 2000–2003 the permit fee was $25. A portion of the fee was transferred to the Ahtna and Chitina Native Corporations, whose lands were adjacent to the fishery, for access to the river. A survey conducted by the state in 2002 indicated that the O'Brien Creek Road Right of Way (ROW) provided access to the majority of the river along the west bank and the Alaska legislature removed the fee prior to the 2004 fishing season. Copper River Personal Use Dip Net Salmon Fishery permits are currently free and available at multiple locations.

The BOF has authorized the department to manage the commercial salmon fishery to provide the following inriver goal of salmon, measured at the Miles Lake Sonar (5 AAC 24.360(b)):

Spawning escapement (sockeye salmon)	300,000
Spawning escapement (other salmon)	17,500
Glennallen Subdistrict Subsistence harvest (salmon)	61,000–82,500
Chitina Subdistrict Personal Use harvest (salmon)	100,000–150,000
Sport fishery harvest (salmon)	15,000
Hatchery brood stock (sockeye salmon)	Estimated annually
Hatchery surplus (sockeye salmon)	Estimated annually
TOTAL	Announced annually

The subsistence guideline is adjusted annually in order to accommodate the anticipated subsistence harvest. The hatchery brood stock and hatchery surplus are also adjusted annually based on the anticipated return of wild and hatchery stocks.

From 1997–1999, the maximum harvest for the personal use fishery was 100,000 salmon, excluding fish provided in excess of the inriver goal and not including any salmon harvested after August 31. Prior to 1997, this amount was 60,000 salmon. From 2000–2002, as a subsistence fishery, the Chitina Subdistrict had a harvest range of 100,000–150,000 salmon, of which 85,000–130,000 are wild salmon. This harvest range remained in place, following the change of the Chitina Subdistrict back to a personal use fishery in 2003.

Harvests from the Glennallen Subdistrict subsistence fishery have been estimated since 1965. The fishery experienced rapid growth from 1980 through 1983, when a peak harvest of about 119,000 salmon were taken (Table 11). Under the subsistence fishery management plan, harvests decreased substantially in 1984 to about 29,000 salmon. Subsistence harvests gradually increased from 1984 through 2001 and have held between 60,000 and 80,000 fish annually including that portion of the harvest taken through federal subsistence permits.

In 1999, federal management of the Copper River subsistence fisheries was initiated, but as federal and state regulations were identical, both federal and state subsistence users participated in the fisheries under the state subsistence permit. In 2001, federally qualified subsistence users were able to begin fishing on May 15 in the Glennallen Subdistrict. Federal subsistence limits remained identical to state limits so federal subsistence users still fished under state subsistence permits. In 2002, the FSB established a federal subsistence fishery in the Chitina Subdistrict with a cumulative limit of 200 salmon for a household of one and 500 salmon for a household of two or more for both the Chitina and Glennallen subdistricts. Federal subsistence users are able to participate in both fisheries, while state subsistence users must select either the Chitina Subdistrict or Glennallen Subdistrict in which to participate. As a result, the National Park Service issued separate federal subsistence fishing permits to federal subsistence users beginning in 2002. Although this change did not appear to affect overall subsistence harvest from the Copper River, the number of state permits issued decreased after 2001, with at least of portion of the federally qualified people opting for a federal rather than state permit.

The percentage of non-Copper River Basin participants has increased from less than 20% prior to 1991 to an average of 79% over the last five years (2002–2006). This increase can be attributed to those participants from Anchorage (38%), Fairbanks (15%) and Mat-Su Borough (17%) communities that entered the fishery following the McDowell decision. With this influx of users from outside the Copper River Basin and the increase in harvest, concern has been expressed of significant underreporting of salmon harvest in this fishery. However, harvest level has tracked closely with the total number of permits (state and federal) issued since 1984 (Table 11).

Harvests in the Chitina Subdistrict fishery have been estimated since establishment in 1984 (Table 12). From 1984 through 1988, harvests remained relatively stable, averaging about 47,000 salmon annually. After 1988, harvests in the personal use fishery increased annually until 1998. The harvest from the Chitina Subdistrict fishery declined from 1998 through 2003 to levels similar to 1993. Over the last 4 years (2003–2006) the harvest has increased steadily. Overall harvest from the Chitina Subdistrict Personal use fishery also tracks closely with the number of permits issued in respective years (Table 12).

Recent Fishery Performance

The number of subsistence fishing permits issued for the Copper River Glennallen and Chitina Subdistricts has increased steadily since 1990 (Figure 9). This includes all state permits for the Glennallen Subdistrict and federal permits for the Glennallen Subdistrict and Chitina Subdistrict. The rise in permit numbers has been generally matched by an increase in harvest numbers as well, when both state estimated and federal reported harvests are combined. Harvests declined substantially in the Glennallen Subdistrict in 2002 and 2003 and have risen since then. King salmon make up less than 5% and coho salmon less than 1% of the Glennallen Subdistrict harvest (Table 11). In 2005, 961 permits harvested 66,615 salmon in the Glennallen Subdistrict. This was the largest harvest since 2001, when all Glennallen Subdistrict permits were issued by the state. In 2006, 984 permits harvested 60,775 salmon.

A total of 8,230 permits were issued for the Chitina Subdistrict personal use fishery in 2005 (Table 12). This level of participation yielded a harvest of 124,403 salmon, which is the largest harvest since 2001. A stronger than expected passage past Miles Lake allowed for two supplemental harvest periods during the 2005 fishing season

A total of 8,633 permits were issued for the Chitina Subdistrict personal use fishery in 2006. This level of participation yielded a harvest of 129,103 salmon, which is the largest harvest since 2001 (Table 12) A large return of sockeye and stronger than expected passage past Miles Lake allowed for one supplemental harvest period during the 2006 fishing season.

Participation in the Chitina Subdistrict peaked at 10,006 permits in 1998. Participation declined drastically in 2000 and has been gradually increasing since. The decline observed in 2000 was probably related to the reduction in the king salmon limit from four to one and the permit fee increase from $10 to $25 that were both instituted in 2000. An increase of approximately 150 permits occurred in the Glennallen Subdistrict in 2000, which may have been a shift of previous Chitina Subdistrict permits holders to the Glennallen Subdistrict. In 2004, with the repeal of the permit fee, permit numbers began to increase.

Management Objectives

The Glennallen Subdistrict subsistence fishery is managed under a BOF adopted management plan, the *Copper River Subsistence Salmon Management Plan* (5 AAC 01.647, 2004). This plan stipulates management objectives and guidelines, with allocations for each fishery outlined in the *Copper River District Salmon Management Plan* (5 AAC 24.360, 2006). In 2005, the BOF determined amounts necessary for subsistence (ANS) for the Glennallen Subdistrict and established these amounts in 5 AAC 01.616. These amounts are 25,500–39,000 salmon for the portion of the Subdistrict from the Chitina-McCarthy Bridge upstream to the mouth of the Tonsina River; from the Tonsina River to the mouth of the Gakona River the amount is 23,500–31,000; and from the Gakona River to the mouth of the Slana River (and including the Batzulnetas fishery) the amount is 12,000–12,500 salmon.

In-season management of the Chitina Subdistrict Personal Use Dip Net Salmon fishery follows the objectives and guidelines in the *Copper River Personal Use Dip Net Salmon Fishery Management Plan* (5 AAC 77.591, 2003). The weekly fishing periods and limits established by emergency order are based on the projected inriver returns. Actual inriver returns are estimated inseason by sonar located at Miles Lake. The harvest is distributed throughout the season, based upon on the projected sonar counts. Adjustments are made to the preseason schedule based on

the actual sonar counts, by increasing or decreasing fishing time. When the department determines that a weekly harvestable surplus of 50,000 salmon or more will be present in the Subdistrict a supplemental permit for 10 additional fish is available to a permit applicant that has already met their annual limit. The maximum harvest level for the Chitina Subdistrict is 100,000–150,000 salmon.

Fishery Management

The 2005 Copper River Chitina Subdistrict personal use fishery was opened by emergency order for a 104 hour opening on June 1. Based on numbers of fish passing the Miles Lake sonar (41,000 surpluses to the weekly escapement goal) this first period was increased by 80 hours. The fishery remained open the following week (June 6–12) due to sonar counts in excess of anticipated counts by 67,000, and as a result of greater than 50,000 salmon surplus, this second period was also a supplemental period. Sonar counts remained above weekly anticipated counts and the third, fourth, and fifth fishing periods remained open for 168 hours each. The sonar counts continued to be strong and over 54,000 fish above the anticipated counts passed the sonar resulting in a second supplemental period and 168 hours of fishing time for the sixth period (July 4–10). Sonar counts continued above anticipated counts through July 10th, resulting in 168 hours of fishing time in each the seventh, eighth, and ninth periods. Sonar numbers declined during the following week resulting in a 32 hour reduction of fishing time during the tenth period (August 1–7). Sonar numbers rebounded and remained above anticipated sonar counts for the remainder of the season and the fishery was open to continuous fishing on August 15th through August 31st and remained open by regulation through September 30th.

The 2006 Copper River Chitina Subdistrict personal use fishery was opened by emergency order for a 56 hour opening on June 9. The fishery remained open with consecutive 168 hour periods each week through August 6th. As a result of greater than 50,000 salmon surpluses, the second period (June 12–18) was also a supplemental period. The fishery was open to continuous fishing on August 7th through August 31st and remained open by regulation through September 30th.

No inseason estimation of weekly harvest and participation has occurred for the Chitina Subdistrict personal use fishery since 2000, due to a change in the permitting process. Permit holders are no longer required to return permits at the end of each fishing trip. Lack of this information has not influenced management decisions during this time. However, it has resulted in a lower percentage of returns and less timely harvest information.

Fishery Outlook

The subsistence fisheries in the Upper Copper River District continue to be popular and permit numbers have remained relatively stable for the last three years (2004–2006). The ANS designations established in 2006 increased the overall allocation for subsistence harvest from 75,000 salmon to 82,500 salmon. The 2006 harvest was 94% of this upper allocation figure. The popularity of the Copper River subsistence fisheries is unlikely to diminish and should be expected to increase under current management guidelines. If decreasing returns or additional regulations restrict the Chitina Subdistrict personal use fishery, a portion of those using this fishery may shift to the subsistence fishery. However, increased pressure in the subsistence fishery, access conflicts and conflicts between rural and non-rural users of the fishery may limit further growth of the fishery.

Harvests of sockeye salmon in the Chitina Subdistrict personal use fishery are dependent on sockeye salmon run strength and is evidenced by the moderate three year rise in permits from 2004–2006. Many participants in the Cook Inlet personal use fishery also participate in the Copper River personal use fishery. If the Cook Inlet fishery is poor, then there is potential for an increase of participation in the Copper River fishery from the Cook Inlet users. Participation in the Chitina Subdistrict personal use fishery also depends on access opportunity. Since 2002 landslides along the Copper River highway easement (O'Brien Creek Road) have limited access to fishing spots downriver of O'Brien Creek and are likely responsible for the reduced participation since these occurred.

During the 2005 season, Chitina Native Corporation opened a fee station at O'Brien Creek to provide access to the river and camping areas outside the DOT ROW. While some dipnetters paid the fee, observations by department staff indicate a minority of dipnetters participated in the fee program.

Personal use permit holders, who have filled their original limit, may harvest 10 additional sockeye salmon in weeks when a harvestable surplus of 50,000 salmon or greater will be available in the Chitina Subdistrict. Although harvest numbers resulting from the issuance of supplement permits have been relatively low, the supplemental period is a likely an attractant to participants who anticipate high catch rates owing to the escapement surplus. Any increased effort and catch, however, are not measurable.

Recent Board of Fisheries Actions

Although the Chitina Subdistrict personal use fishery is primarily a sockeye salmon fishery, most BOF issues that affect the fishery are concerned with king salmon harvests. The king salmon bag limit of one, provides for an opportunity to harvest a king salmon, but will continue to maintain harvests at historic levels. The board has consistently complied with the Copper River king salmon management plan (5 AAC 24.361) to see no increase in king salmon harvest potential.

Current Issues

Whether the Chitina Subdistrict is a subsistence or personal use fishery continues to be a primary issue. There was some resentment among the Native community towards urban participants in the Chitina Subdistrict regarding the subsistence classification. The repeal of the 1999 subsistence determination at the 2003 BOF meeting was not well received by the Chitina Dipnetters Association and the Alaska Outdoor Council. They feel the priority for the dipnetters should be above the commercial fishery. This priority was provided under the subsistence classification. The BOF upheld the personal use classification for the Chitina Subdistrict at its 2005 meeting.

Issues for the Chitina Subdistrict (whether subsistence or personal use) are likely to include uninterrupted fishing time and increased king and sockeye bag limits. In May 2004, the Upper Copper River villages of Chistochina, Mentasta and Slana requested the Federal Subsistence Board to restrict the lower river fisheries as they felt that the early component of the sockeye salmon return was being intercepted by these fisheries and their subsistence needs had not been met in recent years. No action was taken against the state fisheries, but the federal subsistence fishery in the Glennallen Subdistrict was closed from May 15–30, in 2004 and 2005 to allow Upper Copper River salmon stocks to move through the Lower Glennallen Subdistrict.

On October 1, 1999 the Federal government assumed management responsibilities for subsistence fisheries on all nonnavigable waters on public lands and navigable and nonnavigable waters within and/or adjacent to the boundaries of the wild-designated portion of the Gulkana River and Wrangell-St. Elias National Park. This includes the waters of the Upper Copper River District. The Federal Register adopted the state regulations, but modified the federal regulations in 2000 and 2001. As the federal and state regulations continue to diverge there is potential for conflicts between state (all Alaska residents) and federally qualified (rural residents) subsistence users This has occurred between federal subsistence and state sport hunting, which has resulted in more restrictive state management as the federal hunts are liberalized. In 2005, the National Park Service–Wrangell-St. Elias National Park and Preserve enforced NPS regulation 36 CFR 2.3 that allows fishing to be conducted within national park boundaries only with closely attended rod and reel. Part 13 of the NPS regulations does allow subsistence uses by rural resident zone community residents within national park boundaries. The enforcement of these regulations prohibited the subsistence fishing by non-rural residents in that portion of the Copper River upstream of Indian River (which includes approximately 15 river miles of the Glennallen Subdistrict and the Batzulnetas fishery) and required a federal subsistence fishing permit to use a fish wheel or dip net within the boundaries of Wrangell-St. Elias National Park and Preserve. Only those rural residents that qualified for federal subsistence salmon harvest in the Glennallen Subdistrict were issued permits to fish in this area. As a result, no state subsistence fishing permits were issued for this portion of the Glennallen Subdistrict in 2005. Approximately 10–12 non-rural households had fished state permits in this portion of the Glennallen Subdistrict, but in 2005 were required to fish downstream of Indian River.

Access to the Chitina Subdistrict fishery is an ongoing issue. Public access to fishing sites is available along the Copper River highway easement (O'Brien Creek road) and along the Chitina-McCarthy Road where the road right-of-ways meet the Ordinary High Water (OHW) line of the Copper River. The Copper River highway easement is officially closed about one mile below O'Brien Creek due to landslides, but people continue to access the river along this road all the way to Haley Creek. Land outside of the road ROW is owned by the Chitina Native Corporation (CNC) or Ahtna Native Corporation (ANC). This includes a large portion of the O'Brien Creek outwash delta. Access across these private lands has varied over the years from open access, fee based access and a complete ban on access. Currently, access is allowed across CNC lands with payment of a $15 daily fee paid directly to CNC.

Ongoing and Recommended Research and Management

At present, the Division of Sport Fish conducts a program to issue permits, monitor the fishery, and estimate harvests for both Upper Copper River District salmon fisheries. From 1995 through 2003 Sport Fish staff collected king and sockeye salmon age and length data and heads of adipose fin clipped sockeye salmon from the Chitina Subdistrict fishery to estimate the proportion and timing of sockeye salmon produced by the Gulkana Hatchery from coded wire tag (CWT) recoveries in the personal use fishery. Beginning in 2000, hatchery sockeye salmon fry were marked with strontium. The last year CWT marked fish returned was in 2003. Strontium marked fish began to return in 2004 and sampling for hatchery contribution has occurred through collection of a subsample of Otoliths from the sockeye harvest which are examined for strontium marking. In time, this monitoring will allow managers to better target hatchery stocks while protecting wild fish.

In 2005, in conjunction with the Native Village of Eyak and LGL, Inc., the department initiated a radiotelemetry study on sockeye salmon to examine distribution of sockeye salmon throughout the Upper Copper River drainage. This should also provide information on sockeye salmon stock migration through the Chitina Subdistrict.

Continued refinement of the criteria for opening and closing the Chitina Subdistrict fishery is needed. The relationship between the sonar count and fish passage rate through the fishing area is poorly understood. Comparison of sonar counts to harvest rates has been attempted with poor success. Time series analysis of the factors affecting fish passage is necessary. Difficulties in shifting effort from the early sockeye stocks continue and result in less fishing time in the early portion of the season as participation increases.

Annual review of the permitting process should be continued to insure quality harvest data that is cost effective.

ARCTIC GRAYLING SPORT FISHERIES

Arctic grayling have been the most heavily harvested fish in the UCUSMA (Table 5) having the highest single harvest number annually from 1977 through 1995. Harvests declined after 1988 and have been surpassed annually by sockeye salmon since 1996 and by king salmon in 2005. The 2005 harvest of 3,716 grayling is the lowest on record. Reduced harvests are primarily the result of more restrictive regulations adopted to assure the sustained yield of the area's grayling stocks.

The largest grayling fishery in the UCUSMA has historically occurred in the Gulkana River drainage (Table 13). From 2000-2004 the harvest from the Gulkana River drainage has averaged 34% of the UCUSMA harvest. Other UCUSMA drainages that have supported significant Arctic grayling fisheries include various Upper Susitna River drainage lakes and streams (20%), the Tazlina River drainage (5%), and the Klutina drainage (6%) (Table 13). Various lakes stocked with grayling catchables also provide fishing opportunity for this species.

Daily bag and possession limits for grayling, in all flowing waters in the UCUSMA, were reduced from 15 daily and 30 in possession to 10 fish daily and in possession in 1988. In 1989, the bag and possession limit for grayling in rivers was further reduced to five grayling. For the Gulkana River, anglers were permitted five grayling per day, of which only one may be over 14 inches. This action was taken to maintain historic size compositions in this drainage. In 2003, the bag and possession limit in lakes was reduced to five per day and in possession. The bag and possession limit in stocked lakes remained at 10 fish per day and in possession of all stocked species combined.

In 2004, a Regional Wild Arctic Grayling Management Plan (5 AAC 52.055) was established. The plan created three management categories with associated regulatory options. The three management categories are the Regional Management approach, Conservative Management approach, and Special Management approach. The regulations adopted under the regional management approach (5 AAC 52.055(d)) (five fish bag and possession limit, season open year round) do not change the general Arctic grayling regulations in the UCUSMA. Currently, four fisheries within the UCUSMA are classified under the other categories. Mendeltna Creek, Moose Lake, Our Lake, and the Gulkana River, upstream of Paxson Lake are managed under the conservative management approach regulations (5 AAC 52.055(g)). Under these regulations, most grayling stocks in the UCUSMA are currently considered healthy.

Mendeltna Creek is a small stream, west of Glennallen, in the Tazlina River drainage and drains into Tazlina Lake. Main access points are at the Glenn Highway wayside and a single lane gravel road (Oil Well Road) off Lake Louise Road. Harvests increased significantly between 1992 and 1993, 255 to 867 grayling, and peaked in 1995 at 1,041 (Table 13). There is little baseline data on the grayling population in Mendeltna Creek, stock assessment began on this system in 1998 and resulted in an abundance estimate for July 1999 of 845 fish ≥ 200 mm (Fish 1999, Scanlon and Fish 2000).

Management of the grayling population in Mendeltna Creek has been limited to evaluation of the SWHS. Arctic grayling populations can sustain exploitation rates of approximately 10%. Stock assessment conducted on Mendeltna Creek estimated the population at less than 900 grayling, with few fish greater than 12 inches (Scanlon and Fish 2000). At the current population level, only 80 grayling could be harvested annually. Based upon examination of the SWHS statistics, bag limit reductions would not reduce the harvest sufficiently to provide for sustainable yield. The department submitted a proposal for the 1999 BOF meeting to reduce the daily bag limit to two fish over a 12-inch total length. The open season was set from June 1 to March 31, to offer protection to the larger spawning grayling. The board supported this proposal and the regulation went into effect for the 2000 season. Harvest declined significantly in 2001 and has averaged only 36 fish annually since. No fish were reported harvested from the stream in 2005.

Many of the roadside-accessible streams are located in the Tazlina River drainage. Arctic grayling are know to migrate great distances between winter habitats, spring spawning sites, and summer feeding areas that can be in entirely different drainages. Tagging or telemetry studies could provide information regarding timing of grayling through the fisheries, spawning and rearing streams and distributions throughout the drainage.

Gulkana River Arctic Grayling Sport Fishery

Background and Historical Perspective

The Gulkana River drainage has historically supported the largest sport fishery for grayling in the UCUSMA. From 1977 through 1985, harvests of grayling from the Gulkana River drainage generally increased (Table 13). A peak harvest of 20,165 fish occurred in 1985 and accounted for 62% of the total harvest in the UCUSMA (Mills 1986).

The peak harvest experienced in 1985 raised concern that the grayling stocks in the drainage were in danger of overharvest. Arctic grayling stocks in several Interior Alaska streams were depressed when subjected to similar harvest rates. Research data also indicated that the maximum size of grayling observed in the Gulkana River drainage was decreasing as the result of anglers targeting larger fish (Williams and Potterville 1983). Regulations were adopted in 1988 that reduced the bag and possession limit to five fish per day and restricted anglers to only one grayling over 14 inches.

A research program was initiated by the Division of Sport Fish in 1986 to assess the status of the various grayling stocks of the Gulkana River drainage. Beginning in 1988, the study was conducted in conjunction with the University of Alaska and formed the basis of an M.S. thesis. Objectives of the research program were to determine stock structure, growth, annual abundance, survival, and recruitment; sustainable yields under a variety of management scenarios; and future monitoring strategies. This project was completed in June 1993 and the final report/thesis was completed in 1995 (Bosch 1995).

Recent Fishery Performance

The restrictions placed on the fishery during 1988 significantly reduced the total harvest of grayling in the Gulkana River drainage (Table 13). No stock assessments have been conducted on the Gulkana River since 2002 (Wuttig 2007); however, catch and harvest data indicate the Arctic grayling population remains stable.

Previous estimates of abundance indicate that current exploitation rates on the major stock units of grayling in the Gulkana River drainage appear sustainable given current harvest levels. Data from the research program also indicate that the restriction limiting anglers to only one grayling over 14 inches is allowing the population to reach and maintain historic levels (Fish and Roach 1999).

Management Objectives

Grayling fisheries in the Gulkana River drainage are managed to maintain sustained yield and historic age and size composition and stock abundance while producing satisfactory catch rates for anglers (Roth and Alexandersdottir 1990). Harvest and catch of Arctic grayling are monitored by the SWHS.

Fishery Outlook

It is anticipated that harvest levels of Arctic grayling will remain at current levels. The existing regulations appear to be maintaining the population at historic levels.

Data collected through the statewide mail survey suggest that many anglers fishing grayling in the Gulkana River drainage are practicing catch-and-release. Anglers have released over 90% of their catch on average since 1990 and 96% of their catch for the past ten years (1996–2005). Assuming a 5% release mortality rate, this appears acceptable given current harvest and abundance levels.

Recent Board of Fisheries Actions

During the 1996 meetings the BOF passed a proposal submitted by the department to establish a catch-and-release grayling fishery in the Upper Gulkana River drainage (upstream of Paxson Lake). The intent of this regulation was to protect a small population of large sized grayling (> 18 in) in the Gunn and Fish Creek drainages. The Upper Gulkana River above Paxson Lake is easily accessible from the Richardson Highway by foot and ATV. Bosch (1995) determined that the Upper Gulkana grayling population was independent from the Middle Fork and mainstem populations, and though the population was small, the fish were large. There was dissatisfaction with the BOF action in 1996 on the Upper Gulkana River. Anglers, who had fished the Upper Gulkana River prior to 1996 and harvested Arctic grayling, still desired to do so. In 2005, the BOF adopted a proposal to allow a harvest of two Arctic grayling per day with only one greater than 14 inches. This change provided for a limited harvest from these waters while still achieving the goal of protecting the larger fish component of the population.

Current Issues

Overall, Gulkana River drainage Arctic grayling stocks appear healthy. The current management strategy and regulatory regime is within the guidelines of the regional management plan to manage for long-term sustained yield.

Ongoing and Recommended Research and Management

An objective of the Arctic grayling research program was to develop a plan for monitoring the status of grayling stocks in the Gulkana River drainage. This consisted of monitoring of the three identified stocks (mainstem, Middle Fork and waters upstream of Paxson Lake) for abundance, age and length composition every three to five years. Stock assessment was conducted in the mainstem in 1998, to determine age and length composition (Fish and Roach 1999). A similar assessment and abundance estimates for Gunn Creek and Fish Lake was conducted in 2002 on the upper reaches to determine the impacts of the 1996 regulatory change and provide background information for future BOF meetings (Wuttig 2007). It is recommended that the monitoring program continue to assure the sustained yield of the fishery.

LAKE TROUT SPORT FISHERIES

Background and Historical Perspective

The UCUSMA is the only area in Alaska where numerous lake trout fisheries exist along the road system (). Lake trout are mainly harvested from lakes within the Susitna drainage (Lake Louise and Susitna and Tyone lakes) and the Gulkana River drainage (Paxson, Susitna, and Crosswind lakes) (Table 14). Harvests from the Susitna drainage averaged 41% of the annual harvest from 2000–2004 and harvests from the Gulkana River drainage made-up 35%. Lake Louise (27%), Paxson Lake (14%), Crosswind Lake (13%), Susitna Lake (6%), and Summit Lake (5%) accounted for over half the annual average of the lake trout harvest in the UCUSMA from 2000–2004.

Prior to 1987, anglers fishing UCUSMA waters were allowed a daily take of two lake trout over 20 inches and 10 lake trout under 20 inches. Under these regulations, lake trout harvests from UCUSMA waters were relatively stable, averaging about 7,400 fish (Table 14). However, it was found that eight of nine lake populations in the Upper Copper and Delta River drainages were being harvested well over the annual harvest estimated to be sustainable based on lake trout populations in Canada and the Great Lakes (Burr 1987). As a result of these research findings, the daily bag limit for UCUSMA waters was reduced to two fish and a minimum size limit of 18 inches was adopted for Summit and Paxson lakes, Lake Louise, and the remainder of the Tyone River drainage in 1987. The minimum size limit was imposed to allow female lake trout to spawn once before reaching harvestable size.

A research program was initiated in 1990 to evaluate the status of lake trout fisheries in the UCUSMA. The goal of the research program was to determine appropriate management strategies that assure the sustained yield of lake trout in UCUSMA lakes. The study was conducted primarily in Paxson Lake and Lake Louise. Annual results of the research project are summarized in Szarzi (1992, 1993), Szarzi and Bernard (1994, 1995, and 1997).

In 1994, the minimum size limit for lake trout was increased from 18 to 24 inches in the Tyone River drainage, Crosswind, Paxson and Summit lakes; the bag limit was reduced from two to one lake trout in the Tyone River drainage and Crosswind Lake. The minimum size limit was increased to better protect female lake trout spawning for the first time in the Tyone River drainage and Crosswind Lake and to reduce the harvest to a sustainable level in Paxson and Summit lakes. The bag limit reduction was imposed on lakes with lake trout of greater than average length to prevent effort from being concentrated on these size classes.

Recent Fishery Performance

Since adoption of the new regulations in 1987 and further restrictions in 1994, lake trout harvests from UCUSMA lakes and streams have declined. Average annual lake trout harvest for 2000–2004 was 10% less than the 10 year average (1995–2004) indicating a decreasing trend in overall harvest. In general, harvests from both the Gulkana River and Tyone River drainages have remained relatively stable since 1994 (Table 14).

Following the 24" minimum size restriction, the number of lake trout released in Crosswind, Paxson, and Summit lakes and the Tyone River drainage lakes (Lake Louise, Susitna and Tyone lakes) increased from an average of 63% release prior to the restriction (1990–1993) to an average 80% for all the years following (1994–2005) (Table 15). Concerns arose that hooking mortality in combination with harvest was exceeding the sustainable yield levels in the larger UCUSMA lake trout fisheries. The department initiated a regional review of lake trout regulations and management in 2002 and developed a lake trout management plan which was adopted by the BOF in 2005. A separate proposal was adopted that removed the minimum size limit for lake trout in Paxson Lake, but reduced the bag limit to one per day. This action was intended to reduce fishing mortality below the sustainable yield estimates for these lakes. Additionally, bait was allowed from November 1 through April 15 to provide for a more effective burbot fishery.

Management Objectives

Two methods are available to assess the current status of lake trout fisheries in the UCUSMA. The first involves estimating the level of sustainable harvests for lakes based on an observed lake trout production-lake surface area relationship for northern latitude lakes (Evans et al. 1991). Because estimates of the average weight of lake trout from most lakes in the UCUSMA are unavailable, the sustainable harvest of lake trout has been estimated based on the probable range of lake trout weights (1.0 to 4.0 kg) depending on the area of the lake. Based on Evans et al. (1991) and these assumed weights, lakes in the UCUSMA which are less than 500 ha appear capable of sustaining harvests of 147 to 231 lake trout annually. Based on these estimates, the harvest of lake trout from lakes smaller than 500 ha appears to be below estimates of sustainable yield. For lakes larger than 500 ha which are not road accessible (e.g., Crosswind, Tanada, and Copper lakes), harvests also appear below estimates of sustainable yield. These larger lakes appear capable of sustaining annual harvests from about 340 to 400 lake trout, or specifically 361 lake trout from Crosswind Lake (for 24" minimum size), 341 lake trout from Copper Lake and 399 lake trout from Tanada Lake. For lakes larger than 500 ha which are road accessible (e.g., Paxson, Summit, Susitna lakes and Lake Louise), the Evans et al. (1991) method provides yield estimates of 585 lake trout from Paxson Lake and 413 lake trout from Summit Lake (based on no size limit), and 540 lake trout from Lake Louise and 321 lake trout from Susitna Lake (based on current regulations of 24" minimum size). Current harvests of lake trout appear to be at or below sustainable levels for Paxson, Susitna and Summit lakes, but slightly above for Lake Louise.

An alternate approach based on the volume of water in the preferred temperature range for lake trout (8° to 12°C), termed the thermal habitat volume (THV), was examined to estimate the current status of lake trout stocks in these lakes. Based on the THV approach, the sustainable yield for Paxson Lake is 0.92 kg ha-1 y-1, for Lake Louise 0.89 kg ha-1 y-1, and for Susitna Lake 0.90 kg ha^{-1} y^{-1} (Szarzi and Bernard 1997). Thermal habitat volume information is not available for Summit Lake. Using the average weight of lake trout harvested in each lake to

convert yields to numbers of fish, the sustainable harvest from Paxson Lake is approximately 800 lake trout, Lake Louise 2,123 lake trout, and Susitna Lake 1,191 lake trout. These yields are more than double the yields based on Evans et al. (1991) approach. In addition, measurements of THV in the three lakes sampled varied greatly between years, as much as a factor of three. As a result of this variation in the THV model, it has not been used to estimate potential yield from UCUSMA lakes.

Estimates of maximum sustainable yield based on a Lake Area model (Evans et al. 1991) and the THV model have the potential for overestimating sustainable harvests. Both models were developed in Ontario, Canada. Ontario lakes have greater productivity than Alaskan lakes, and as a result the estimates of sustainable yield are biased high for UCUSMA lakes, and must be used only as a signal for regulatory adjustments or stock assessment. Lake trout are slow to mature and have low reproductive potential. Overexploitation could result in population declines that would take multiple years for recovery. Therefore, a conservative management strategy is desired for the UCUSMA lakes, maintaining harvest levels below the lowest estimates of maximum sustainable yield determined by the methods described above. As a result of the low reproductive potential and late age at maturity (lake trout in UCUSMA lakes do not spawn until 6 years of age), impacts of regulatory actions may not be observed for 8-10 years after the regulation is in place.

Fishery objectives have yet to be defined for specific UCUSMA lake trout fisheries. Regulations have been written to assure that the sustained yield of the UCUSMA lake trout resource is not exceeded. It is likely that as fishery objectives are defined for specific lake trout fisheries, they will focus on assuring optimum, rather than maximal, sustained yield. For some lakes, optimum sustained yield will equal maximum sustained yield; for other lakes, however, optimum sustained yield will be lower than maximum sustained yield to accommodate angler's wishes for trophy or other types of special fisheries.

Fishery Management

Under a conservative management strategy many of the regulations in the UCUSMA area have conservative bag limits and size restrictions. The size restrictions provide an opportunity for the majority of lake trout to spawn at least once prior to harvest. Assessment of lake trout stock status is currently based on evaluation of the SWHS. Stock assessment was discontinued in 1995 for Paxson Lake and Lake Louise, but assessment in Paxson Lake was again conducted from 2002–2004 (Scanlon 2004, Scanlon *In prep*). Since the majority of Alaskan lakes do not get the temperature stratification seen in Ontario lakes, the department has adopted the Lake Area Model as the method for estimating maximum sustained yield.

Fishery Outlook

Under the current regulations, it is anticipated that harvests of lake trout will remain stable. Harvests have declined with the 1994 regulation changes. The overall average harvest for the last 10 years (1996–2005) is 68% less than the average harvest for the years 1984–1993. This trend is matched for the Lake Louise and Susitna Lake fisheries. Average harvest from Paxson and Summit Lakes dropped 80%, perhaps reflecting the bait restriction on those lakes. Crosswind Lake had a noticeably lesser drop in harvest with the average harvest for the last ten years only dropping 22% from the average for 1984–1993. The effect of the 1994 regulation changes on Crosswind Lake may have been dampened by improved access, increased private

land ownership and recreational cabin construction that occurred between the two comparison periods.

Recent Board of Fisheries Action

Four proposals were submitted to the BOF for the 2003 meeting, three requesting increases in the lake trout bag limits on Paxson, Summit and Crosswind lakes, and one requesting a bait restriction on Paxson and Summit lakes. None were adopted. A fifth proposal requesting the bait restriction adopted in 1999 to be removed for fisheries that were impacted by the regulation change, including Paxson and Summit lakes, was adopted excluding Paxson and Summit lakes. The BOF determined that unbaited, single-hook, artificial lures reduced hooking mortality associated with bait for lake trout released under the current 24" minimum size regulation and additional harvest or mortality would likely exceed MSY for those lakes.

The BOF adopted a Wild Lake Trout Management Plan at its 2005 meeting. This plan sets bag and possession limits and management strategies to guide the department for lake trout management and the board and public for addressing future proposals. A second proposal allowed the use of bait in Paxson and Summit lakes from November 1 to April 15, and reduced the bag and possession limit of lake trout from two fish over 24 inches to one fish any size, to align those regulations with the Lake Trout Management Plan guidelines. Previously, bait had been prohibited in Paxson and Summit lakes to reduce hooking mortality in released lake trout. Under the new regulations, hooking mortality should be reduced and harvests maintained at sustainable levels. The seasonal use of bait allows the burbot fishery to continue with minimal restriction and without adversely impacting the lake trout population.

Current Issues

The present regulatory regime should protect all UCUSMA lake trout stocks from overharvest and allow abundance to increase. However, angler preferences for small lake trout to eat and trophies to admire are not being met in the larger lakes in the UCUSMA. A protected slot limit would achieve such an end.

Protected slot limits theoretically increase abundance by protecting the most productive fish while allowing a harvest of abundant small fish and less abundant, but larger trophy-sized fish. Protected slot limits are in use on lake trout fisheries in Ontario, but their effect has not been determined (Hicks and Quinn 1990). Inappropriate application of slot limits was found to crop off larger fish and create a stockpile of small fish in a brown trout population studied by Barnhart and Engstrom-Heg (1984).

Anglers in the UCUSMA lakes support slot limits, but managers feel that a slot limit is not appropriate for these lakes at this time, as the abundance of immature lake trout has not been estimated. Increasing effort on this element of the population might reduce abundance by removing too much of the potential spawning stock needed to rebuild or sustain the population.

Management measures to ensure sustainable lake trout production may conflict with concurrent burbot fisheries. Anglers who wished to harvest burbot with bait in Paxson and Summit lakes expressed their dissatisfaction with the no bait, single-hook artificial lure regulations. Undoubtedly this will remain an issue for all lakes in which a minimum size is instituted and both lake trout and burbot populations exist. Hooking mortality must be considered when examining lake trout harvests in a lake when determining whether harvests are approaching MSY.

Recommended Research and Management

Research on lake trout has resumed on a limited basis. Fall sampling at Lake Louise and Paxson Lake ended in 1995, a final spring/summer sampling event occurred in 1997 (Szarzi and Bernard 1997). Sampling occurred at Paxson Lake in fall 2002–2004 and spring 2003 and 2004 to collect length and weight data, and conduct a mark-recapture study to estimate abundance (Scanlon 2004, Scanlon *In prep*). Length and weight data provided specific information for Paxson Lake in application with the Lake Area model and in conjunction with the estimates of abundance resulted in the regulatory change. Length and weight data were collected from Lake Louise in the fall of 2006 and assessment to estimate abundance will continue in 2007 and 2008. Lake trout research in Alaska lakes has provided a length-weight relationship and future sampling can focus on collecting lengths alone. Length data for Susitna Lake and Crosswind Lake needs to be collected to update the Lake Area Model yield estimates. Current regulations for Susitna and Crosswind lakes and Lake Louise need to be assessed, as harvests have exceeded MSY estimates in some years over the past ten years. The feasibility of slot limits needs to be examined in select fisheries (Tyone drainage lakes, Crosswind Lake), in conjunction with a monitoring program to determine length and age composition changes. More information is needed regarding the characteristics of the life history and harvest of other lake trout stocks which have the potential to be overexploited including: size and age structure, maturity schedules, abundance and yield, and the contribution of the winter fishery to the lake trout harvests. Lakes of particular interest for stock assessment are Copper and Tanada lakes, accessed from the Nabesna Road via a 12-mile trail, Kimball Pass Lake, accessed on a 16-mile trail from the Richardson Highway, and Crosswind Lake, east of Lake Louise and accessed by float plane or snowmachine.

BURBOT SPORT FISHERIES

Background and Historical Perspective

The many lakes and rivers of the UCUSMA support some of the largest populations of burbot in Alaska (Figure 11). Prior to 1990, these waters supported an average of 56% of the statewide sport harvest of this species. The largest fishery has historically occurred in the Lake Louise complex (consisting of Lake Louise, Susitna and Tyone lakes) (Table 16). Other significant fisheries occur in the various lakes of the Gulkana River drainage (e.g., Paxson, Summit, and Crosswind lakes), Tolsona and Moose lakes, and various smaller remote lakes scattered throughout the UCUSMA. The fishery occurs primarily during the winter months from November to April using closely attended set or hand jig lines.

Prior to 1979, there was no daily bag or possession limits or gear restrictions governing the harvest of burbot in the UCUSMA. In recognition of burbot as an important sport species to be managed for sustained yield, a daily bag and possession limit of 15 burbot was enacted prior to the 1979 winter fishery. Anglers were allowed to harvest burbot by fishing multiple hand lines and unattended setlines with no more than a total of 15 hooks plus two hand-held jig hooks. Under these regulations, the sport harvest of burbot from UCUSMA waters increased dramatically, peaking in 1985 when record harvests of 19,355 burbot were taken (Table 16).

The rapid growth in the fishery raised concern that several UCUSMA burbot stocks were in imminent danger of being overexploited. To prevent this, in 1987 daily bag limits and the number of hooks an angler could fish in area lakes were reduced to five, whether fished on unattended setlines or hand held jig-lines. In several road accessible lakes (Lake Louise, Tyone, Susitna, Tolsona, Moose, and Summit lakes), the daily bag and possession limits were further

reduced to two fish and anglers were restricted to using only two hooks. Also, the sport fishery for burbot in Hudson Lake was closed by emergency order based on findings that this burbot stock had been severely overexploited and was depressed (Lafferty and Vincent-Lang 1991).

During its 1988 meeting, the Board of Fisheries adopted the Lake Burbot Management Plan (5 AAC 52.045) for the burbot fisheries in lakes of the UCUSMA. The plan was adopted as regulation to ensure that the department had the necessary tools through which to manage the area's lake burbot fishery for *maximum sustained yield and opportunity to participate*. In order to achieve this management objective, the plan gave the department the authority to use time and area closures *and* method and means restrictions to manage the area's lake burbot sport fisheries. In adopting the plan, the BOF stated its desire to not have the bag limits for burbot reduced to less than two for road accessible lakes and five for remote lakes, as it was considered unreasonable by board members to participate in these fisheries at lower bag limits.

Further actions were implemented during 1989 under the newly adopted management plan. An emergency order was issued that closed the burbot fishery in Lake Louise based on research findings that showed the lake's burbot stocks had become severely depressed due to overfishing. In addition, an emergency order was issued to keep the burbot fishery in Hudson Lake closed, as research showed that burbot in this lake remained depleted. Emergency regulations were also enacted that eliminated set-lines from the sport fishery in all remaining lakes of the Tyone River drainage, given that anglers had begun to seek out previously unexploited lakes in the Tyone River drainage in response to restrictions and closures placed on other area lakes (Lafferty and Vincent-Lang 1991). A research program was initiated in 1986 to evaluate the life history of interior Alaska burbot and to determine stock status and sustained yields of burbot fisheries in the UCUSMA. The goal of the research program has been to determine appropriate management strategies that assure the maximum sustained yield of burbot from UCUSMA lakes. The study has been conducted in a variety of lakes. Results to date have provided managers with the tools to determine stock status using a variety of assessment methods and an estimate of the productivity of the area's burbot fisheries. Annual results of the research project are summarized in Lafferty et al. (1990–1992), Lafferty and Bernard (1993), Parker et al. (1987–1989), Schwanke and Bernard (2005), Schwanke and Perry-Plake (2007), Schwanke and Craig, *In prep*, Taube et al. (1994, 2000), and Taube and Bernard (1995, 1999, 2001, 2004).

Although the more restrictive regulations greatly reduced harvest in the burbot fisheries of the UCUSMA, managers remained faced with a number of biological and social concerns regarding the management of the area's burbot fisheries. For this reason, managers supported a new approach to the management of the UCUSMA lake burbot fisheries. Various options were considered; however, managers submitted a proposal to the board at its 1991 meeting calling for the elimination of *unattended* set lines from all burbot fisheries in the UCUSMA. This proposal was intended to reduce angler efficiency, thereby providing protection from overexploitation to small burbot stocks in the area. Managers believe this action should assure the long-term opportunity to fish for and harvest burbot in the UCUSMA.

Lake Louise and Hudson Lake were also closed to burbot fishing at the 1991 board meeting. Both lakes had been closed through emergency orders for the past several years and were expected to be closed through additional emergency orders into the future. A decision was therefore made to close these fisheries through regulation.

Following stock assessment in 1993, the burbot population in Hudson Lake had recovered sufficiently to open the lake to harvest. In the fall of 1993, Hudson Lake was opened by emergency order, with a bag limit of two burbot. During the December 1996 BOF meeting, the board adopted proposals to reopen Hudson Lake by regulation to a two fish bag limit and allow limited use of unattended setlines in the Copper River.

In 2003, the BOF adopted a proposal reopening Lake Louise to a limited burbot fishery. Stock assessment work conducted from 1986–1996 and again in 1999 demonstrated the burbot population had stabilized at below historic abundance levels (Taube et al. 2000). It was theorized that a portion of the niche formally occupied by burbot had become occupied by lake trout and that the carrying capacity for burbot was reduced. The 12-year closure of the burbot fishery had not resulted in increased abundance. During the same meeting the BOF closed Tolsona Lake to burbot harvest by regulation. Tolsona Lake had been closed by emergency order since 1998.

Stock assessment on Tolsona Lake has continued on an annual basis. Sampling in 1997 indicated a drastic decline in abundance between 1996 and 1997. This was attributed to environmental conditions, summer kill in 1990 and 1991, and possibly in 1992, 1994, 1995, and not a result of overfishing. Closure of the fishery by emergency order occurred in early 1998 (Taube and Bernard 1999) and by regulation in 2003. Stock assessment will continue in Tolsona Lake and the fishery will reopen when the population rebuilds to 1,500 mature burbot (Taube and Bernard 2001).

Recent Fishery Performance

With the adoption of the more conservative regulations in 1987, harvests of burbot from UCUSMA waters decreased (Table 16). The harvest of 793 burbot during 1991 was the lowest on record. Burbot harvest has averaged 1,721 fish from 1995–2004 and appears to have stabilized around this average. Crosswind Lake has supported the largest average for 1995–2004 (327) and the past five years (2000–2004) (419). Burbot harvest at Crosswind Lake in 2005 was 859 fish, the highest since 1978. An abundance survey of the burbot population in Crosswind Lake was begun in 2006 (Schwanke and Craig *In prep*.) to determine if the population has remained stable under current regulations.

Reductions in harvest have allowed some previously overexploited burbot stocks to recover to levels at which sustainable fisheries can occur. However, the sustainable yields from many of these lakes are substantially lower than maximum sustained yields the fisheries are capable of supporting and are far less than historic harvest levels. Larger lakes which were severely overexploited (e.g., Lake Louise) in the early to mid 1980s remain depressed. Stocks in larger lakes take longer to recover from overexploitation than do smaller and moderately-sized lakes. In Lake Louise, historically the largest burbot fishery in Alaska, the burbot stock remains low. The number of mature burbot in this lake appears to have leveled off at 4,000 (Taube et al. 2000). The current level of burbot abundance in this lake has remained stable since 1991.

Management Objectives

As outlined in the lake burbot management plan (5 AAC 52.045), the burbot fisheries in lakes of the UCUSMA are to be managed for *maximum sustained yield and opportunity to participate.* The management goal is to develop an orderly fishery. As these fisheries rebuild, it is hoped to

provide between 10,000 to 15,000 angler days of ice fishing opportunity with a harvest of about 5,000 burbot on an annual basis in the UCUSMA.

Fishery Management

The majority of burbot fisheries in the UCUSMA are assessed through the SWHS. Several lakes of concern are sampled on a yearly or three to five year rotation. These lakes currently include Tolsona Lake, Lake Louise and Crosswind Lake. Assessment includes estimation of abundance, catch per unit effort (CPUE), and length composition.

Fishery Outlook

Based upon current regulations the harvest of burbot in the UCUSMA should remain stable. Winter weather conditions can dictate ice fishing effort in a given year; mild winter or late winter conditions can result in increased ice fishing effort. There is increasing snowmachine activity in the UCUSMA each year and undoubtedly some snowmachiners may include ice fishing in their trips. This may account for the increasing burbot harvest in recent years, especially on Crosswind Lake.

Recent Board of Fisheries Actions

In addition to the 2003 closing of Tolsona Lake and reopening of Lake Louise to burbot fishing the BOF allowed burbot to be harvested on the Copper River mainstem and the lower portions of its tributaries with unattended setlines, with the exception of the Gulkana River, which remains closed to setlines to protect steelhead trout. The upper boundaries to which setlines are permitted are the Richardson Highway bridges to the west and the Tok Cutoff (Glenn Highway) bridges to the north. The bag and possession limit was increased from two to five burbot per day. The total number of hooks used may not exceed five and gear must comply with that specified for burbot in the general sport fishing regulations.

Current Issues

Many anglers have been averse to what they perceive as rapid and drastic changes made to the burbot fisheries of the UCUSMA in the late 1980s and early 1990s, and some remain convinced that the actions were unduly restrictive and unfair. This is particularly true with the action taken to eliminate *unattended* setlines from the burbot fisheries of the UCUSMA. Many anglers do not support this action and are choosing to not participate in this fishery because they cannot use this gear type. To promote participation, staff have encouraged anglers to shift to alternative gear types that are legal (attended setlines or tip ups); however, angler participation continues to remain low.

The use of unattended setlines in the mainstem of the Copper River was legalized during 1996 but no permits were issued during the three winters the personal use fishery was in effect. There has been minimal harvest on the Copper River since 1999 when the personal use fishery was repealed and two setlines were permitted and the fishery was further liberalized in 2003 to encourage participation. Historically, a few anglers using unattended setlines overharvested several UCUSMA lake burbot populations within a short time. Once overexploited, these fisheries were restricted or closed. Given life history characteristics of burbot, recovery of a depressed stock is slow, often taking many years to rebuild to a condition capable of sustaining a fishery. Creation of the lake burbot management plan gave managers the necessary tools to restrict a fishery that had overexploited a burbot stock. However, actions taken under this management plan promote reactive management where the department bears the burden of

detecting overexploited stocks with costly assessment programs. This fragments the burbot fisheries of the UCUSMA and leads to regulations that can be confusing due to superseding emergency orders.

Ongoing and Recommended Research and Management

The burbot stock assessment program has resumed on a limited scale. A monitoring program has been proposed for Lake Louise on a three to five year schedule. Lake Louise was last assessed in 1999 and was again in 2005 to assess the impact of the fishery reopening in 2003 (Taube et al. 2000, Schwanke and Perry-Plake, 2007). Catch per unit effort was estimated with baited hoop traps to monitor population trends. The Tolsona Lake population should continue to be sampled for abundance and length composition on a yearly basis, as well as for water quality. The lakes that were assessed during the mid to late 1980s should be revisited to determine if the populations have recovered to historic levels. Baseline data was collected on the Copper River burbot population in 2003, dependent on future harvest levels, this population should be monitored (Schwanke and Bernard 2005). Staff should continue to try to educate the angling public and seek their input to managing these important ice fisheries.

WILD RAINBOW AND STEELHEAD TROUT SPORT FISHERIES

Background and Historical Perspective

The UCUSMA is the northernmost extent of the natural range of rainbow and steelhead trout in North America. The area's widely distributed stocks of wild rainbow and steelhead trout display generally low and variable production. To assure that these stocks are not overexploited, a conservative regulation package has been developed to manage the fisheries targeting these stocks. This package has been guided by the *Upper Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy*. This policy was adopted by the Board of Fisheries during 1986 and provides the department with:

1. management policies and implementation directives for Copper River Basin rainbow and steelhead trout fisheries;
2. a systematic approach to developing sport fishing regulations that includes a process for rational selection of waters for special management such as catch-and-release, trophy areas, or high yield fisheries; and,
3. recommended research activities needed to meet these goals.

Under this policy, the entire Gulkana River drainage has been managed as a catch-and-release fishery for rainbow and steelhead trout since 1990. Managers believe that the abundance of rainbow/steelhead trout in this drainage is low and that the stocks are incapable of supporting any level of long-term sustainable harvest. Additional protection was provided in 1990 through the establishment of an unbaited, artificial lure only area in all flowing waters of the Gulkana River drainage upstream of an unnamed creek flowing into the Gulkana River 7.5 miles upstream of the confluence of the West Fork. During the 1996 BOF meeting the identified rainbow/steelhead trout spawning areas on the Middle Fork of the Gulkana River were closed to all sport fishing during the adult spawning and egg incubation period of April 15 through June 14. Also in 1996, the retention of rainbow or steelhead trout incidentally taken in the Copper River Personal Use Fishery was prohibited. At the 2003 BOF meeting, Twelvemile Creek was closed during the spawning and egg incubation period. This site was identified as a spawning area during research conducted in 2000–2001 (Fleming 2004).

The policy has guided development of regulations for the Tebay River drainage. In Summit Lake and Bridge Creek in the Tebay drainage, special regulations were established in 1988 to provide anglers the opportunity to harvest a "trophy trout" in the UCUSMA. These regulations stated that rainbow/steelhead trout less than 32 inches in length could not be possessed or retained and the daily bag and possession limit for those over 32 inches was one. Research had once shown that these waters contained the largest nonanadromous rainbow trout in the Copper River drainage, with individual fish measuring over 32 inches in length and weighing up to 20 pounds. However, more recent research (Fleming 2000) reported that only 27% of all rainbow trout sampled (> 3,000 fish) were greater than 12 inches, with a maximum size of 18 in. These results indicate a drastic change in the size composition of this population. As a result, the "trophy trout" regulations were repealed by a department proposal which was adopted at the 1999 BOF meeting to change to a daily bag and possession limit of 10 per day, maximum size limit of 12 inches, and an open season of July 1 through May 31. In addition, the department initiated a research study in 2002 to remove a percentage of rainbow trout from Summit Lake on an annual basis to reduce the population density to determine if growth can be promoted (Wuttig *In prep*).

The waters of Lower Hanagita Lake and the Hanagita River from Lower Hanagita Lake to the Tebay River have been managed as a catch-and-release fishery since 1988. In all these waters, only unbaited, artificial lures have been permitted. This special regulation was adopted in 1988 to afford additional protection to these stocks. Research conducted by Fleming (1999), indicated a smaller than previously thought spawning population.

All other waters supporting wild rainbow/steelhead trout stocks are managed under a two fish daily and two fish possession limit of which only one fish may be over 20 inches. The season is year-round with the exception of the Middle Fork Gulkana River and Twelvemile Creek spawning closure of April 15 through June 14 and Our Creek (tributary to Moose Lake), which is closed from April 1 through May 31 to protect spawning grayling. Under this regulation package, the harvest of wild rainbow and steelhead trout has been reduced.

In 2003, the BOF adopted a statewide *Policy for the Management of Sustainable Wild Trout Fisheries* (5 AAC 75.222). This policy provides guidelines to the board and department for developing regulations and managing wild trout populations.

Recent Fishery Performance

A total of 467 wild rainbow trout were reported harvested from the UCUSMA in 2005, which is the lowest harvest since 2000 (Table 17). The overall catch of wild rainbow trout rose slightly in 2005 over 2004 (Table 18), while the catch rate in the major wild rainbow trout fisheries on the Gulkana River continued their 4-year drop since 2002. The average overall catch of wild rainbow trout was 8,326 from 2000–2004 and 10,037 from 1995–2004. For the Gulkana River drainage fisheries wild rainbow trout catch averaged 5,514 from 2000–2004 and 6,234 from 1995–2004. .

No steelhead trout have been reported harvested since 1999 (Table 19). Steelhead catch has decreased steadily since 1999 with no steelhead reported caught in 2005 (Table 20). Historically, the Gulkana River drainage represents the largest proportion of steelhead catch in the UCUSMA. Historic trends in the area's wild rainbow/steelhead fishery are difficult to ascertain, as annual harvest and catch estimates have been small and fluctuate markedly.

Management Objectives

The wild rainbow trout and steelhead populations are managed under the guidelines in the *Upper Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy.*

Fishery Management

In 1998, the first directed assessment by the department of wild rainbow trout and steelhead trout was conducted on the Gulkana River (Fleming 1999). Length, age and genetic data were gathered from rainbow trout and steelhead within the spawning area on the Middle Fork and mainstem Gulkana. In 1999, the Middle Fork spawning areas were sampled again and aerial surveys of the West Fork were conducted to locate other spawning areas (Fleming 2000). In addition, Fleming (2000) sampled Summit Lake in the Tebay drainage for abundance, age and length composition, and water quality. These studies were conducted to provide data regarding proposals submitted by the department for the 1999 BOF meeting, which were adopted by the board. These proposals addressed several fishery regulations and offered replacement language so that the UCUSMA regulations regarding rainbow and steelhead trout would comply with the *Upper Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy.*

Fishery Outlook

With the passage of the department submitted proposals in 1999, it is anticipated that the harvests of rainbow and steelhead trout will remain stable or decline slightly from the historic average. These actions will protect existing stocks and allow those that may be depleted to recover and provide the opportunity to catch rainbow and steelhead trout.

Recent Board of Fisheries Actions

Two changes to the UCUSMA rainbow and steelhead trout regulations were adopted at the December 1999 BOF meeting. A new regulation providing additional protection permits the use of only unbaited, single-hook, artificial lures in all flowing waters of the UCUSMA, with the exception of the Klutina River drainage and other drainages specifically listed in the regulations. The second change applies to Summit Lake in the Tebay River drainage, where the bag and possession limit became 10 per day, with a maximum size limit of 12 inches. This action is taken to re-establish large rainbow trout in Summit Lake. The Board adopted a department proposal at the 2003 BOF meeting to close Twelve Mile Creek, a tributary of the Gulkana River, from April 15–June 14 to protect spawning rainbow trout and steelhead trout. This proposal was submitted as a result of research conducted during 2000–2001 to locate rainbow trout spawning areas in the Gulkana River (Fleming 2004). At the 2005 meeting the BOF adopted two proposals specific to rainbow trout/steelhead. The first reduced the bag and possession limit for rainbow trout/steelhead in Lake Louise, Susitna, Tyone lakes and the Tyone River drainage to two fish, of which only one may be over 20 inches. This aligned the regulations on those lakes with the background regulations recommended by the *Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy.* The second proposal established catch-and-release regulations in the entire Hanagita River drainage. Previously, a harvest of two fish, one over 20 inches was allowed upstream of Lower Hanagita Lake. This action was taken to protect the relatively small population of steelhead that spawns above Lower Hanagita Lake.

Current Issues

Public concern over poor stock condition and no rainbow trout greater than 20 inches in the trophy fishery at Summit Lake increased during the 1990s. Stock assessment was conducted in

this system in 1999 to determine if this is the case. A proposal was passed at the 1999 BOF to allow a liberal harvest of small stunted rainbow trout to encourage growth of large fish. If this regulation, in itself, does not provide additional harvest, the department has examined alternative methods of fish removal to encourage larger size rainbow trout in the population. Catch was reported at Summit Lake in 2000, but no harvest was reported. Neither harvest nor catch have been reported at Summit Lake from 2001–2005. The department implemented a project in 2003 to reduce the population density of rainbow trout. Approximately 2,500 rainbow trout were removed in 2003 and 7,000 rainbow trout each in 2004 and 2005. These fish were outstocked into Silver Lake, a popular stocked lake on the McCarthy Road.

Ongoing and Recommended Research and Management Activities

Two rainbow/steelhead trout projects were conducted during 2002 and 2003 in the UCUSMA (Fleming 2004, Wuttig et al. 2004). These were conducted on the Gulkana and Hanagita (Tebay River Drainage) rivers. A weir was operated on the Gulkana River downstream of Dickey Lake to enumerate rainbow trout and steelhead spawners in spring of 2002 and Hungry Hollow Creek (an Upper Middle Fork Gulkana River tributary) in spring 2003. The second involved a weir operated on the Hanagita River in fall 2002 to enumerate migrating steelhead. An estimated 115 steelhead (SE = 17) and 244 rainbow trout (SE = 27) were on the spawning areas near Dickey Lake in 2002. No estimated abundance was determined for Hungry Hollow Creek, but 63 steelhead and 81 rainbow trout passed through the weir. On the Hanagita River, 119 steelhead passed the weir between August 31 and September 27, 2002. Genetic samples were also taken from each site. There was no genetic difference between rainbow trout and steelhead spawning below Dickey Lake, but there were significant genetic differences between those steelhead and rainbow trout spawning at Dickey Lake and Hungry Hollow Creek. There were even greater genetic differences between the Gulkana River rainbow trout and steelhead and those steelhead spawning in the Hanagita River. Based on the data collected from the Hanagita River study, the department submitted a proposal to the 2005 BOF meeting to expand the catch-and-release regulations to the entire Hanagita River drainage.

Stock assessment of the Gulkana River rainbow trout population was initiated in 2004. This project objective was to estimate abundance of rainbow trout from Paxson Lake to two miles downstream of Sourdough. Feasibility work was conducted in August and September of 2004 and a mark-recapture study was conducted in 2005 (Schwanke and Taras *In prep*). A steelhead trout distribution study was initiated in 2004. The project objective was to determine steelhead distribution in the Upper Copper River using radiotelemetry. Steelhead captured with a fish wheel or dip nets were implanted with radio tags and tracked via aircraft and tracking stations. Feasibility work was conducted in September in 2004 and the full project was conducted in fall 2005 and 2006 (Savereide *In prep*).

DOLLY VARDEN SPORT FISHERIES

Background and Historical Perspective

Dolly Varden is a popular sport fish species in the UCUSMA, particularly among local residents fishing in the Klutina and Tonsina river drainages. Resident and anadromous populations are found throughout the Upper Copper River drainage. Dolly Varden are not present in the Gulkana River drainage, no juvenile or adult fish have been captured during any of the department stock assessment projects on the river. A single report of a Dolly Varden caught through the ice in the lower river during the 1999/2000 winter, is the only documentation of any

Dolly Varden in the Gulkana River. Dolly Varden are found in the Copper River tributaries upstream of the Gulkana River, in the Chitina River drainage, and in drainages downstream of the Gulkana River. There is no explanation as to why this species is not present in the Gulkana River. Based upon harvest and catch reports from the SWHS, a minor harvest occurs in the Upper Susitna River drainage, though due to the barrier at Devils Canyon it is believed these are resident populations.

There is limited knowledge regarding the Dolly Varden populations in the UCUSMA, there have been only two projects directed towards this species. A University of Alaska Fairbanks graduate study was conducted on the Tiekel and Little Tonsina rivers in 1985 and 1986 (Gregory 1988). This study documented the biological characteristics of Tiekel River Dolly Varden and compared these to the characteristics of a sample of Little Tonsina River Dolly Varden. A second graduate study collected aquatic habitat data on the Tiekel River and identified habitat important to Dolly Varden (Martin 1988).

There has been a directed sport fishery in the Klutina and Tonsina river drainages for Dolly Varden. These occur primarily in the Little Tonsina River and the Upper Klutina River near the outlet of the lake, generally before the king salmon fishery begins in late June and after the king salmon fishery closes at the end of July. Harvests of Dolly Varden, in the UCUSMA, peaked at 6,001 in 1985 (Table 21). Harvests from the Klutina and Tonsina river drainages accounted for an average of 72% of Dolly Varden harvested in the UCUSMA over the last 10 years (1995–2004. The bag and possession limit for Dolly Varden has been at 10 per day and 10 in possession since at least the early 1970s.

Recent Fishery Performance

Harvests of Dolly Varden have been declining since 1985 (Table 21). The 2005 harvest of 742 Dolly Varden is the lowest reported harvest since 1977. The past 10 year (1995–2004) harvest average was 1,646 while the past five year (2000–2004) harvest average was 1,424.

Management Objectives

There are currently no specific management objectives for Dolly Varden. The underlying goal of the department, however, has been to assure sustained yield and provide fishing opportunity on fish resources.

Fishery Management

The Dolly Varden fisheries of the UCUSMA are assessed through the SWHS.

Fishery Outlook

With little biological or stock assessment data on the Dolly Varden stocks of the UCUSMA, it is uncertain whether the recent decline in harvests is a result of stock decline or reduced fishing effort. The SWHS does not distinguish effort between individual species, but in the Klutina River sport fisheries, it is assumed that most effort is directed at king salmon. The recent regulatory restrictions towards king salmon in the Tonsina River may have resulted in effort shifting towards other species, such as Dolly Varden or Arctic grayling. Without a creel survey to assess the proportion of effort directed at individual species, the current effort data is only specific to drainage or system trends. If fishing effort in the UCUSMA as a whole increases, it is anticipated that Dolly Varden harvest will increase also.

Recent Board of Fisheries Action

As a result of biological concern regarding the Tonsina River king salmon stock, the use of bait was restricted and only unbaited, single-hook, artificial lures were permitted following the 1996 BOF meeting. At the March 1999 BOF meeting, the bait restriction was modified to allow bait to be used with a hook gap of 3/8 inch or less. This regulatory modification was made to permit fisheries for Dolly Varden and Arctic grayling in the Tonsina River using traditional gear to harvest these species, while still reducing the harvest of king salmon. At the January 2003 BOF meeting the mainstem Tonsina River downstream of Tonsina Lake was open to the use of bait and treble hooks in response to the department radiotelemetry study that indicated the Tonsina River king salmon return was larger than previously thought and of sufficient size to withstand additional sport fish harvest.

Current Issues

There is a lack of biological and stock data for UCUSMA Dolly Varden populations. It is not known whether both resident and anadromous populations exist within individual systems. It is assumed, based upon the observed size of Dolly Varden harvested from the Klutina and Tonsina river drainages, that these fish are anadromous Dolly Varden. In addition, there is no data, aside from the SWHS, and auxiliary data from the CWT king salmon project and lake and stream evaluation data on distribution of Dolly Varden from the 1960s and 1970s in the UCUSMA. Based on harvest and catch data from the SWHS, there is a significant fishery for Dolly Varden in the UCUSMA and a need for data concerning these exploited stocks.

Ongoing and Recommended Research and Management

Since there is a lack of baseline data on Dolly Varden stocks, future research projects in the UCUSMA that may capture Dolly Varden should record biological data for incorporation into an area database. If creel surveys are conducted on the Klutina or Tonsina rivers for king or sockeye salmon, Otoliths should be collected for microprobe analysis from any Dolly Varden that may be sampled. This will determine if the fish are anadromous or resident. Creel surveys will also provide data on fishing effort directed toward Dolly Varden.

UPPER COPPER / UPPER SUSITNA MANAGEMENT AREA SPORT FISHERY ENHANCEMENT

The Alaska Department of Fish and Game stocks approximately 28 lakes in the UCUSMA to provide fishing opportunities for popular game species in locations where fishing opportunities don't exist or are limited (Table 22). The lake stocking program serves a segment of the public who want to fish, but must remain on or near the road system. This program provides increased fishing opportunities and offers a diversity of species in rural areas where minimal or no opportunities exist for sport fishing. It also diverts effort from wild populations in areas for which the department has conservation concerns. These lakes vary in size from 1.5 to 500 acres.

ADF&G stocks fingerling size fish (2–4 inches) in some lakes and catchable size fish (6–12 inches) in other lakes. Most large lakes can produce sufficient numbers of catchables from stockings of fingerling to meet angler demand. Smaller lakes or the more popular large lakes are stocked with catchables because stockings of fingerlings can not provide sufficient numbers of catchables to meet angler demand. Catchables are stocked as soon as the ice is gone, helping to accommodate angler enthusiasm for spring fishing.

Daily bag and possession limits for stocked fish in lakes are 10 fish in any combination for rainbow trout, Arctic grayling, Arctic char, and landlocked salmon with only one over 18 inches and two fish any size for lake trout.

Objectives

Manage important endemic fish populations, when present, according to sustained yield principles:

1. Provide a minimum of 5,000 angler-days of sport fishing effort.
2. Provide sport angling diversity by stocking a mix of game fish.
3. Publicize and promote the fishing opportunities available to anglers.
4. Improve public access where needed.

Actions

Fish stockings for specific lakes are listed in Table 22. Projected fish stockings for 2007 and 2008 are summarized in Table 23.

Evaluations

1. Sport fishing effort and harvest are estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Fishery Statistics

Angler effort on stocked waters averaged 3,059 days fished over the last five years (2000–2004) and 3,384 over the last ten years (1995–2004) (Table 24). This level of effort has produced an average catch of 11,784 stocked fish and an average harvest of 3,294 fish over the last five years. The average catch per effort for the last five years has been 4.0 fish per day fished. Rainbow trout are the predominant stocked species making up 79% of the catchable sized fish and 76% of the fingerling sized fish stocked from 2000–2004. Rainbow trout also dominated the stocked lakes catch and harvest, comprising 67% of the catch and 70% of the harvest from 2000–2004. Rainbow trout comprised 72% of the catch and 85% of the harvest from stocked waters in 2005. Arctic grayling comprised the remaining 28% of the catch and 15% of the harvest.

The total number of anglers and the number of angler-days has generally decreased from the early 1990s through 2005 (Table 24). The number of stocked fish caught and harvested also declined during this period. Whether these declines are actual is uncertain, due to the low number of harvest survey respondents for the area stocked waters the differences between years are likely statistically insignificant.

Of all the stocked lakes in the UCUSMA, Silver Lake has been the most popular. Over the last five years (2000–2004) Silver Lake has accounted for an average 60% of the catch from all UCUSMA stocked waters and 53% of the harvest. When added with the five year average from Two and Three Mile lakes in Chitina on the Edgerton Highway and Sculpin and Strelna lakes on the McCarthy Road they accounted for an average of 83% of the catch and 75% of the harvest from UCUSMA stocked lakes from 2000–2004.

Recent Board of Fisheries Action

During the January 2004 AYK Board of Fisheries meeting the board adopted a Regional Stocked Waters Management Plan (5 AAC 52.065). The plan created three Management Categories: High Yield Lakes, Conservative Yield Lakes, and Special Management Lakes. All stocked lakes in the UCUSMA are categorized under the plan as High Yield. The regulations for High Yield Lakes are applied regionwide, and changed the general regulations for stocked waters in some areas. All regulations for stocked waters previously under special regulations remained unchanged.

SECTION III: INVASIVE SPECIES

BACKGROUND AND CONCERNS

Invasive species are species that are non-native to a particular ecosystem (Fay 2002). Their introduction and establishment in that ecosystem causes environmental and economic harm by directly and indirectly competing with and displacing natural species within those ecosystems. Invasive species may also be a source of non-native disease organisms that may cause even greater harm than the original host species. The major invasive freshwater or anadromous fishes of concern for Alaska include the northern pike (*Esox lucius*), Atlantic salmon (*Salmo salar*), and yellow perch (*Perca flavescens*). Northern pike are indigenous to Alaska north and west of the Alaska Range, but when introduced to other parts of the state can decimate local salmon and trout populations. Atlantic salmon, as their name implies, are not native to Alaska and enter state waters after escaping farming operations in British Columbia, Canada. Yellow perch have been identified in a single lake on the Kenai Peninsula and must be illegally imported and released. Ornamental fishes have also been released into Alaska waters, and although they do not generally survive winter water temperatures, some species do have the potential to become established.

In addition to invasive species of fish, invasive aquatic plants and invertebrates also threaten fish populations in Alaska and UCUSMA. Potential invasive aquatic invertebrates that could affect freshwater and anadromous fish in the UCUSMA include the New Zealand mudsnail (*Potamopyrgus antipodarum*), the catadromous Chinese mitten crab (*Eriocheir sinensis*), signal crayfish (*Pacifastacus leniusculus*), and the planktonic spiny water flea (*Daphnia sp*). These species, if established, could directly affect local fish populations through direct predation of eggs and alevin or indirectly by reducing overall productivity of the systems. Potential invasive aquatic plants to the UCUSMA include water thyme (*Hydrilla verticillata*), dotted duckweed (*Landoltia punctata*), Eurasian water-milfoil (*Myriophyllum spicatum*), and reed canary grass (*Phalaris arundinacea*).

The potential for any invasive species to become established in the UCUSMA depends upon the proper combination of environmental factors. Species may be introduced several times over many years before establishing self-sustaining populations. Species, such as northern pike, well adapted to the conditions found in UCUSMA waters can establish self sustaining populations quickly. Other species such as yellow perch or ornamental species may be difficult to establish in the UCUSMA, but if current climatic warming trends continue, conditions may become favorable for these species. The same is true for Atlantic salmon which has had multiple introductions over the last decade without establishing in Alaska waters. However, once established a species can spread quickly. The Chinese mitten crab spread from an isolated

portion of San Francisco Bay to several hundred miles of inland waterways in just four years (Rudnick et.al. 2000). Northern pike have spread widely through the Cook Inlet area since being introduced to a single lake in the Susitna River drainage in the 1950s (Fay 2002).

ADF&G has completed an Aquatic Nuisance Species Management Plan (Fay 2000) in response to past introduction and the increased potential of future introduction of invasive species. The main goal of this plan is to coordinate with the public and with federal, state, local, and tribal governments for the prevention and monitoring of invasive species. The department has also completed a Management Plan for Invasive Northern Pike in Alaska[1] which outlines the department's strategy for controlling non-native northern pike populations.

MONITORING FOR NORTHERN PIKE IN THE UCUSMA

Northern pike populations have become established within the lakes and flowing waters of the Lower Susitna River drainage. A velocity barrier in Devil's Canyon is assumed to prevent upstream migration into the Upper Susitna River system. Northern pike are not known to exist within the Copper River drainage. Neither state nor federal fisheries staff have ever examined a northern pike caught within the UCUSMA or been able to verify a catch report.

A public information drive began in 2005 to educate the public on what a northern pike looked like and to encourage the public to retain any northern pike caught and deliver it to the Glennallen ADF&G office for verification. Posters were placed around the area with pictures of northern pike and descriptions of the problems associated with their introduction to the area. The posters provided phone numbers for the Glennallen office and the toll-free invasive species hotline and encouraged people to report catches or sightings of northern pike. Although anecdotal reports were received, no catch of northern pike could be confirmed. In 2006 the Copper River Northern Pike Studies were initiated to sample lakes with the highest probability of containing northern pike.

Copper River northern pike studies

Objectives

Northern pike have been reported being caught in the Upper Susitna drainage (Lake Louise and Hidden Lake) and in the Upper Copper River drainage (Copper River, Yetna Creek, Gulkana River, and Paxson Lake), but have not been confirmed in these waters (Figure 12). A study was implemented in 2006 to determine whether northern pike are present in Paxson Lake or in Tyone Lake. If the abundance of northern pike was 50 fish there would be a 20% chance of detection in Paxson Lake and a 40% chance of detection in Tyone Lake. If the abundance was 500 fish, there would be a 90% chance of detection in Paxson Lake and a 99% chance of detection in Tyone Lake.

Procedures

In the spring, shortly after ice-out, a two person crew identified weed beds in Paxson and Tyone lakes for sampling. Fyke traps were then distributed based on the number of available sampling days for each lake, the number and size of weed beds, and the number of available fyke nets. A total of 8 fyke traps were set daily with one per small weed bed and two set adjacent to large

[1] This document can be located at http://www.adfg.state.ak.us/special/invasive/invasive.php

weed beds. Traps were set perpendicular to shore and GPS coordinates were recorded for each trap. Traps were fished for 24 hours and then moved to new locations.

Small mesh (1/2 inch bar mesh) gillnets were deployed around shallow weed beds. The crew would then disturb the weed bed by splashing or walking through the bed to chase fish into gillnets. Gillnet sets were made systematically around each lake after fyke nets were pulled and redeployed. GPS coordinates were recorded for each gillnet deployment site.

A catchability coefficient of 0.00140 was used to establish the probability of capturing northern pike in the study lakes. This catchability quotient was the lowest attained in other Alaska interior lakes when a combination of fyke traps and gillnets was fished (Pearse and Burkholder 1993, Skaugstad and Burkholder 1992, Hansen and Pearse 1995, Roach 1997, 1998, Scanlon 2001).

Results

No northern pike were collected or observed in Paxson Lake after expending 519 fyke trap hours and 33 gillnet sets over four days (Table 25). No northern pike were collected or observed in Tyone Lake after expending 1,009 fyke trap hours and 75 gillnet sets over six days. Round whitefish (*Prosopium cylindraceum*), humpback whitefish (*Coregonus pidschian*), Arctic grayling, burbot, lake trout, and longnose sucker (*Catostomus catostomus*) were captured in both lakes, additionally mottled sculpin (*Cottus bairdii*,) and unidentified salmon smolt were captured in Paxson Lake.

Monitoring for Atlantic salmon in the UCUSMA

ADF&G initiated a statewide information program to illicit reports of Atlantic salmon caught in state waters and encouraging anglers and commercial fishers to turn in any suspected Atlantic salmon for positive identification. No program specific to the UCUSMA has been implemented as the statewide program has been successful in increasing awareness of Atlantic salmon. No Atlantic salmon have been confirmed in the Upper Copper River fisheries as of 2006.

Ongoing and Recommended Research and Management

Currently, there are no research projects planned to identify or confirm the presence of any invasive species within the UCUSMA. Posters and placards continue to be distributed to increase the public awareness of invasive northern pike and Atlantic salmon. Since early identification of invasive species is critical to preventing them from becoming established, future projects should be implemented to survey UCUSMA waters for invasive plants, invertebrates and fish.

Invasive species management in the UCUSMA will concentrate on public education and enforcement of fish transport regulations. The general public will continue to be informed of invasive species and the issues associated with them.

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TABLES

Table 1.–Commercial harvests of king and sockeye salmon in the Copper River District, 1977-2006.

Year	King Harvest	Sockeye Harvest
1977	21,722	602,737
1978	29,062	249,872
1979	17,678	80,528
1980	8,454	18,908
1981	20,178	477,662
1982	47,362	1,177,632
1983	52,500	626,735
1984	38,957	900,043
1985	42,214	927,553
1986	40,670	780,808
1987	41,001	1,180,782
1988	30,741	576,950
1989	30,863	1,025,923
1990	21,702	844,778
1991	34,787	1,206,811
1992	39,810	970,938
1993	29,727	1,398,234
1994	47,061	1,152,220
1995	65,675	1,271,822
1996	55,646	2,356,365
1997	51,273	2,955,431
1998	68,827	1,341,692
1999	62,337	1,682,559
2000	31,259	880,334
2001	39,524	1,323,577
2002	38,734	1,248,503
2003	47,721	1,188,052
2004	38,191	1,048,004
2005	34,624	1,331,664
2000–2004 average	39,086	1,137,694
1995–2004 average	49,919	1,529,634

Table 2.–Reported subsistence and personal use (Glennallen and Chitina Subdistricts) harvests of king, sockeye, and coho salmon in the Copper River, 1977–2005.

Year	King	Sockeye	Coho	Total
1977	2,213	36,349	454	39,016
1978	1,947	22,416	587	24,950
1979	2,515	23,599	752	26,866
1980	2,256	21,437	639	24,332
1981	1,913	53,008	849	55,770
1982	2,532	96,799	1,246	100,577
1983	5,421	100,995	1,690	108,106
1984	2,007	65,078	789	67,874
1985	1,673	50,488	544	52,705
1986	2,916	64,684	785	68,385
1987	3,280	61,900	498	65,678
1988	3,417	58,905	719	63,041
1989	2,913	80,557	890	84,360
1990	3,221	94,001	1,544	98,766
1991	5,164	111,788	3,477	120,429
1992	4,705	127,670	1,817	134,192
1993	4,037	138,211	1,428	143,676
1994	5,423	153,049	1,958	160,430
1995	6,330	125,573	5,547	137,450
1996	4,881	141,337	3,817	150,035
1997	7,798	224,499	334	232,631
1998	8,334	195,567	2,607	206,508
1999	8,807	209,917	3,160	221,884
2000	7,819	161,570	4,051	173,440
2001	6,176	200,421	3,486	210,083
2002[a]	5,748	132,202	2,317	140,267
2003[a]	4,584	130,165	2,472	137,221
2004[a]	5,897	164,157	2,987	173,041
2005[a]	4,128	182,985	1,729	188,843
2000–2004 average	6,045	157,703	3,063	166,810
1995–2004 average	6,637	168,541	3,078	178,256

[a] Includes Federal fishery harvests in the Glennallen and Chitina Subdistricts, and Batzulnetas.

Table 3.–Number of angler-days of sport fishing effort expended by recreational anglers fishing UCUSMA waters, 1977–2005.

Year	Effort (angler-days)			% effort by UCUSMA	
	UCUSMA	Region III[a]	Statewide	Region III	Statewide
1977	51,485	174,646	1,198,486	29.5	4.3
1978	44,566	190,058	1,285,063	23.4	3.5
1979	57,266	183,362	1,364,739	31.2	4.2
1980	50,518	210,784	1,488,962	24.0	3.4
1981	53,499	202,385	1,447,886	26.4	3.7
1982	54,953	253,744	1,640,644	21.7	3.3
1983	51,512	250,637	1,755,408	20.6	2.9
1984	51,964	251,005	1,874,064	20.7	2.8
1985	48,707	235,590	1,953,716	20.7	2.5
1986	51,563	246,276	2,087,268	20.9	2.5
1987	52,324	269,433	2,185,359	19.4	2.4
1988	45,867	279,426	2,348,595	16.4	2.0
1989	52,262	291,888	2,297,133	17.9	2.3
1990	50,791	296,420	2,455,468	17.1	2.1
1991	64,207	284,129	2,476,588	22.6	2.6
1992	72,052	253,904	2,564,754	28.4	2.8
1993	77,870	298,842	2,559,408	26.1	3.0
1994	85,520	295,507	2,719,911	28.9	3.1
1995	102,951	373,092	2,787,670	27.6	3.7
1996	64,407	265,573	2,006,528	24.3	3.2
1997	56,257	295,113	2,079,514	19.1	2.7
1998	56,706	227,841	1,856,976	24.9	3.1
1999	77,619	304,522	2,499,152	25.5	3.1
2000	58,194	241,574	2,627,805	24.1	2.2
2001	48,879	194,138	2,261,941	25.2	2.2
2002	46,613	220,276	2,259,091	21.1	2.1
2003	52,051	206,705	2,219,398	25.2	2.3
2004	46,592	217,041	2,473,961	21.5	1.9
2005	41,782	183,535	2,463,929	22.8	1.7
2000–2004 average	50,466	215,947	2,368,439	23.4%	2.1%
1995–2004 average	61,027	254,588	2,307,204	24.0%	2.6%

[a] Values for Region III effort prior to 1997 are AYK region and UCUSMA totals combined.

Table 4.–Sport fishing effort (angler-days) in the UCUSMA by drainage, 1977–2005.

	Gulkana River Drainage			Upper Susitna Drainage			Copper River						Other Sites			Area
Year	Lakes	Streams	Total	Lakes	Streams	Total	Klutina	Tazlina	Tonsina	Upstream of Gulkana	Downstream of Klutina	Stocked Lakes	Lakes	Streams	Total	Total
1977	8,281	4,165	12,446	14,899	ND[a]	14,899	ND[a]	234	ND[a]	ND[a]	ND[a]	1,776	ND[a]	ND[a]	22,130	51,485
1978	8,917	6,570	15,487	13,161	ND[a]	13,161	ND[a]	0	ND[a]	ND[a]	ND[a]	2,584	ND[a]	ND[a]	13,334	44,566
1979	7,750	17,323	25,073	12,199	ND[a]	12,199	ND[a]	63	ND[a]	ND[a]	ND[a]	1,036	ND[a]	ND[a]	18,895	57,266
1980	7,725	13,752	21,477	10,539	ND[a]	10,539	ND[a]	129	ND[a]	ND[a]	ND[a]	1,737	ND[a]	ND[a]	16,636	50,518
1981	7,902	14,430	22,332	14,397	ND[a]	14,397	ND[a]	0	ND[a]	ND[a]	ND[a]	1,473	ND[a]	ND[a]	15,297	53,499
1982	8,855	14,979	23,834	14,024	ND[a]	14,024	ND[a]	34	ND[a]	ND[a]	ND[a]	1,810	ND[a]	ND[a]	15,251	54,953
1983	7,791	17,484	25,275	13,217	321	13,538	1,568	1,282	1,332	1,333	1,013	3,188	1,466	1,517	2,983	51,512
1984	6,906	13,031	19,937	15,186	643	15,829	3,257	1,722	1,009	2,571	1,697	2,433	1,835	1,674	3,509	51,964
1985	7,543	15,607	23,150	11,756	347	12,103	3,260	1,403	1,526	173	121	3,000	1,301	2,670	3,971	48,707
1986	4,543	14,351	18,894	16,619	415	17,034	5,346	1,853	332	410	175	3,214	2,381	1,924	4,305	51,563
1987	7,578	17,755	25,333	9,399	163	9,562	6,394	2,489	621	827	193	5,122	1,080	703	1,783	52,324
1988	7,593	11,330	18,923	9,768	418	10,186	6,192	1,907	723	1,294	217	3,528	1,796	1,101	2,897	45,867
1989	7,747	15,769	23,516	9,272	330	9,602	6,053	1,564	980	2,103	1,322	3,468	2,326	1,328	3,654	52,262
1990	7,172	19,112	26,284	8,334	860	9,194	5,556	2,082	498	1,197	537	2,599	1,804	1,040	2,844	50,791
1991	9,047	21,285	30,332	8,342	1,325	9,667	12,145	2,295	2,072	989	313	4,693	663	1,038	1,701	64,207
1992	8,816	26,039	34,855	10,594	1,408	12,002	6,398	3,486	2,240	540	1,255	7,484	1,759	2,033	3,792	72,052
1993	8,302	27,543	35,845	14,384	2,451	16,835	8,177	3,112	2,901	1,322	728	4,760	2,205	1,985	4,190	77,870
1994	9,121	25,581	34,702	16,686	1,888	18,574	10,624	3,837	2,254	1,611	1,778	5,561	3,231	3,348	6,579	85,520
1995	10,660	33,415	44,075	17,080	3,658	20,738	14,496	4,034	3,912	2,276	1,373	5,441	3,482	3,124	6,606	102,951
1996	6,298	25,727	32,025	8,749	1,110	9,859	10,699	1,775	1,514	815	695	3,759	1,475	1,791	3,266	64,407
1997	5,343	23,713	29,056	5,046	949	5,995	11,644	1,489	1,099	457	952	2,160	1,517	1,888	3,405	56,257
1998	4,560	27,349	31,909	5,135	508	5,643	9,408	1,592	1,054	540	795	3,346	1,182	1,237	2,419	56,706
1999	7,933	29,934	37,867	11,120	883	12,003	15,687	1,617	1,230	1,184	388	3,841	1,340	2,462	3,802	77,619
2000	4,825	20,896	25,721	8,899	1,747	10,646	11,125	1,583	1,182	459	780	3,689	1,717	1,292	3,009	58,194

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Table 4 .–Page 2 of 2.

Year	Gulkana River Drainage			Upper Susitna Drainage			Copper River						Other Sites			Area Total
	Lakes	Streams	Total	Lakes	Streams	Total	Klutina	Tazlina	Tonsina	Upstream of Gulkana	Downstream of Klutina[c]	Stocked Lakes	Lakes	Streams	Total	
2001	6,188	18,664	24,852	4,829	332	5,161	8,960	902	1,100	781	484	4,396	1,549	694	2,243	48,879
2002	5,910	18,060	23,970	4,991	531	5,522	9,111	751	1,381	675	301	2,377	945	1,580	2,525	46,613
2003	6,682	19,164	25,846	7,983	756	8,739	8,897	724	917	1,393	231	3,374	1,382	548	1,930	52,051
2004	3,290	17,318	20,608	6,041	819	6,860	10,472	241	1,007	1,376	2,264	1,461	1,641	662	2,303	46,592
2005	5,191	15,277	20,468	3,793	801	4,594	10,516	124	669	1,199	159	2,514	1,133	406	1,539	41,782
2000–2004 average	5,379	18,820	24,199	6,549	837	7,386	9,713	840	1,117	937	812	1,749	3,059	1,447	955	2,402
1995–2004 average	6,169	23,424	29,593	7,987	1,129	9,117	11,050	1,471	1,440	996	826	1,822	3,384	1,623	1,528	3,151

a Prior to 1983, harvest included in “other sites”.

b Not including the Tonsina drainage.

Table 5.–Number of fish harvested, by species, by recreational anglers fishing UCUSMA waters (including stocked waters), 1977 – 2005.

Year	King Salmon	Sockeye Salmon	Coho Salmon	Steelhead Trout	Rainbow Trout[a]	Dolly Varden[a]	Lake Trout	Arctic Grayling[a]	Burbot	Whitefish	Landlocked Salmon[a]	Other Fish
1977	532	3,662	269	187	2,808	2,251	7,699	25,991	5,628	2,445	1,750	236
1978	641	1,606	126	45	4,366	904	5,433	26,488	7,223	3,634	2,819	27
1979	2,948	1,599	412	55	3,372	5,890	7,271	37,232	3,808	2,408	1,918	645
1980	2,101	2,109	164	34	3,255	835	8,067	32,106	10,159	2,507	1,919	973
1981	1,717	1,523	0	76	5,358	2,452	8,337	32,982	9,007	2,420	3,251	292
1982	1,802	3,343	398	73	3,060	2,148	8,699	33,586	8,006	1,824	4,726	126
1983	2,579	2,619	84	21	2,460	4,509	7,246	27,094	6,555	2,810	4,175	63
1984	2,787	3,267	496	137	8,926	5,200	6,311	19,272	10,329	3,010	992	256
1985	1,939	4,752	410	162	8,149	6,001	8,686	32,511	19,355	3,745	2,238	417
1986	3,663	4,137	202	58	8,510	5,205	6,779	24,185	10,030	3,915	89	178
1987	2,301	4,876	330	134	7,838	2,023	6,721	27,359	4,386	2,096	0	76
1988	1,562	3,038	291	91	6,695	5,185	6,277	21,937	3,747	2,474	109	0
1989	2,356	4,509	18	84	5,835	3,979	7,147	16,629	3,396	2,991	281	0
1990	2,302	3,569	0	34	3,924	3,159	5,503	13,775	1,836	1,784	17	0
1991	4,884	5,511	69	114	6,868	2,140	4,864	13,278	793	717	111	47
1992	4,412	4,560	113	8	9,373	1,997	4,251	11,125	1,495	1,150	433	11
1993	8,217	5,288	249	0	7,245	3,173	4,569	12,504	1,694	815	56	9
1994	6,431	6,533	209	7	5,808	1,598	4,058	14,066	2,869	1,149	134	128
1995	6,709	6,068	160	10	4,671	1,695	2,934	14,289	995	898	42	30
1996	9,116	11,851	192	0	5,076	2,575	2,632	10,534	981	384	751	0
1997	8,346	12,293	96	0	2,812	1,092	1,923	8,583	1,358	134	331	56
1998	8,245	11,184	289	0	5,182	1,589	1,723	8,275	1,485	584	477	0
1999	6,742	11,101	24	8	3,842	2,390	2,135	8,245	1,861	317	232	0
2000	5,531	12,361	324	0	2,877	991	1,700	6,590	2,290	451	436	22
2001	4,904	8,169	92	0	2,416	1,612	1,185	4,450	1,506	1,135	282	207
2002	5,098	7,761	384	0	3,294	1,388	2,067	7,910	2,224	2,288	282	54
2003	5,717	7,108	277	0	3,761	1,578	1,831	5,908	1,457	422	51	104
2004	3,435	6,464	131	0	2,311	2,166	1,938	4,115	1,127	885	0	1,629
2005	4,093	8,135	72	0	1,907	742	2,513	3,716	1,374	1,089	122	16
2000–2004 Average	4,937	8,373	242	0	2,932	1,547	1,744	5,795	1,721	1,036	210	403
1995–2004 Average	6,384	9,436	197	2	3,624	1,708	2,007	7,890	1,528	750	288	210

[a] Includes rainbow trout, Arctic grayling, Arctic char, king and coho salmon harvested from stocked waters.

Table 6.–Number of fish caught, by species, by recreational anglers fishing UCUSMA waters, 1990–2005.

Year	King Salmon	Sockeye Salmon	Coho Salmon	Steelhead Trout	Rainbow Trout[a]	Dolly Varden[a]	Lake Trout	Arctic Grayling[a]	Burbot	Whitefish	Landlocked Salmon[a]	Other Fish
1990	6,057	8,474	0	136	12,312	5,639	15,335	80,300	2,872	2,276	51	0
1991	10,079	10,243	120	140	14,842	8,620	10,444	55,214	946	1,566	389	47
1992	12,340	9,344	169	39	27,412	6,243	12,886	59,051	2,222	4,074	670	22
1993	21,767	10,813	354	102	23,300	7,903	17,728	80,497	2,471	2,670	145	53
1994	11,272	11,700	417	332	25,187	5,947	13,368	80,302	4,064	3,368	550	660
1995	14,178	10,383	254	51	16,979	3,129	10,937	67,000	2,375	1,826	109	70
1996	27,195	25,265	502	121	19,935	4,595	11,209	77,381	1,639	3,017	1,244	6
1997	27,760	26,724	304	126	20,867	3,439	9,101	69,463	2,646	1,075	1,095	81
1998	22,324	21,359	1,535	196	22,283	4,156	8,184	71,625	2,849	1,612	1,708	80
1999	18,034	20,782	73	264	14,809	6,971	14,184	64,166	3,173	907	309	58
2000	18,503	19,348	596	346	18,330	3,034	9,388	50,467	4,316	2,019	800	58
2001	16,000	15,843	733	234	19,531	6,145	6,913	46,586	2,527	3,069	513	233
2002	19,497	12,181	471	129	16,605	4,535	12,197	99,458	3,878	3,756	927	100
2003	19,426	15,718	585	112	17,583	3,225	12,425	86,881	2,496	2,338	169	356
2004	12,664	10,912	478	64	12,836	5,675	8,242	50,688	1,646	1,420	0	1,637
2005	9,778	16,093	172	64	10,985	2,551	11,057	50,657	2,150	2,259	279	32
2000–2004 average	17,218	14,800	573	177	16,977	4,523	9,833	66,816	2,973	2,520	482	477
1995–2004 average	19,558	17,851	553	164	17,976	4,490	10,278	68,372	2,755	2,104	687	268

[a] Includes rainbow trout, Arctic grayling, Arctic char, king and coho salmon caught in stocked waters.

Table 7.–Copper River king salmon harvests, 1977–2005.

Year	Commercial Harvest[a]	Commercial Personal Use Harvest[a]	Sport Harvest	Subsistence Harvest[b]	Personal Use Harvest[b, c]	Total Harvest
1977	21,722	ND	532	2,555	ND	24,809
1978	29,062	ND	641	2,239	ND	31,942
1979	17,678	ND	2,948	3,416	ND	24,042
1980	8,454	ND	2,101	3,035	ND	13,590
1981	20,178	ND	1,717	2,410	ND	24,305
1982	47,362	ND	1,802	2,764	ND	51,928
1983	52,500	ND	2,579	5,950	ND	61,029
1984	38,957	ND	2,787	509	1,760	44,013
1985	42,214	ND	1,939	629	1,329	46,111
1986	40,670	ND	3,663	686	2,367	47,386
1987	41,001	ND	2,301	813	2,968	47,083
1988	30,741	ND	1,562	992	2,994	36,289
1989	30,863	ND	2,356	787	2,251	36,257
1990	21,702	ND	2,302	647	2,708	27,359
1991	34,787	ND	4,884	1,328	4,056	45,055
1992	39,810	ND	4,412	1,449	3,405	49,076
1993	29,727	ND	8,217	1,434	2,846	42,224
1994	47,061	ND	6,431	1,989	3,743	59,224
1995	65,675	ND	6,709	1,892	4,707	78,983
1996	55,646	2,169	9,116	1,482	3,584	71,997
1997	51,273	1,243	8,346	2,583	5,447	68,892
1998	68,827	1,411	8,245	1,842	6,723	87,048
1999	62,337	1,115	6,742	3,141	5,913	79,248
2000	31,259	740	5,531	4,856	3,168	45,554
2001	39,524	935	4,904	3,553	3,113	52,029
2002	38,734	773	5,098	4,218	2,056	50,879
2003	47,721	1,068	5,717	3,091	1,921	59,523
2004	38,191	525	3,435	3,980	2,504	48,649
2005	34,624	767	4,093	2,666	1,967	44,110
2000–2004 average	38,540	808	4,937	3,940	2,552	51,327
1995–2004 average	49,646		6,384	3,064	3,914	63,280

[a] Ashe et al. 2005. Commercial personal use harvest was not required to be reported until 1998, prior to this reporting was voluntary.

[b] These figures are expanded to reflect unreported permits and include reported Federal subsistence harvest figures (starting with 2002). See Table 2 for reported harvests.

[c] The personal use fishery was established in 1984.

Table 8.–Harvest of king salmon by recreational anglers fishing in the UCUSMA by drainage, 1977–2005.

Year	Gulkana River Drainage				Klutina River Drainage	Tonsina River Drainage	Tazlina River Drainage	Copper River		Other Waters	Area Total
	Upper River	Lower River	Unspecified	Total				Upstream of Gulkana	Downstream of Klutina		
1977	0	ND	421	421	ND	ND	0	ND	0	111	532
1978	0	ND	606	606	ND	ND	-	ND	0	35	641
1979	0	ND	2,440	2,440	ND	ND	0	ND	0	508	2,948
1980	0	ND	1,688	1,688	ND	ND	0	ND	0	413	2,101
1981	0	ND	1,469	1,469	ND	ND	0	ND	0	248	1,717
1982	283	ND	1,320	1,603	ND	ND	0	ND	0	199	1,802
1983	273	0	1,951	2,224	189	52	31	10	21	52	2,579
1984	513	410	975	1,898	667	0	0	17	51	154	2,787
1985	373	199	684	1,256	249	37	37	0	124	236	1,939
1986	643	587	1,603	2,833	710	16	56	32	0	16	3,663
1987	194	330	1,107	1,631	495	19	49	0	0	107	2,301
1988	313	152	568	1,033	483	0	9	9	28	0	1,562
1989	362	419	849	1,630	652	11	40	0	11	12	2,356
1990	239	525	863	1,627	583	23	17	17	0	35	2,302
1991	483	1,321	1,187	2,991	1,709	89	32	0	25	38	4,884
1992	416	1,395	1,260	3,071	1,075	152	8	18	55	33	4,412
1993	694	1,894	3,304	5,892	1,989	172	0	47	64	53	8,217
1994	1,352	2,071	279	3,702	2,189	349	105	16	20	50	6,431
1995	984	2,250	322	3,556	2,485	539	0	0	0	129	6,709
1996	1,165	3,362	733	5,260	3,142	331	64	0	64	255	9,116
1997	1,872	2,514	355	4,741	3,344	131	28	0	22	80	8,346
1998	885	3,786	732	5,403	2,608	39	63	0	15	117	8,245
1999	845	1,764	484	3,093	3,489	0	0	25	11	124	6,742
2000	1,318	2,304	555	4,177	1,303	0	0	0	10	41	5,531
2001	967	1,793	514	3,274	1,465	11	0	0	32	122	4,904
2002	715	2,125	143	2,983	1,778	230	0	13	0	94	5,098
2003	1,427	2,164	116	3,707	1,873	25	0	0	12	100	5,717
2004	64	1,670	156	1,890	1,338	115	0	0	39	53	3,435
2005	392	2,081	100	2,573	1,276	214	0	0	15	15	4,093
2000–2004 average	898	2,011	297	3,206	1,551	76	0	3	19	82	4,937
1995–2004 average	1,024	2,373	411	3,808	2,283	142	16	4	21	112	6,384

Table 9.–Catch of king salmon by recreational anglers fishing in the UCUSMA by drainage, 1990–2005.

Year	Gulkana River Drainage				Klutina River Drainage	Tonsina River Drainage	Tazlina River Drainage	Copper River		Other Waters	Area Total
	Upper River	Lower River	Unspecified	Total				Upstream of Gulkana	Downstream of Klutina		
1990	2,728	1,055	ND	3,783	1,493	35	146	17	0	583	6,057
1991	3,956	2,731	ND	6,687	3,036	146	134	0	25	63	10,079
1992	4,635	3,419	ND	8,054	3,822	222	8	18	160	56	12,340
1993	10,592	4,994	ND	15,586	4,934	614	0	283	176	174	21,767
1994	3,038	3,407	83	6,528	3,807	698	144	16	29	50	11,272
1995	2,963	4,839	46	7,848	5,081	1,102	0	0	9	138	14,178
1996	3,472	11,836	2,507	17,815	7,407	832	74	0	246	821	27,195
1997	9,658	7,385	1,080	18,123	8,677	395	94	0	22	449	27,760
1998	2,335	11,115	2,003	15,453	5,815	193	101	419	60	283	22,324
1999	3,221	4,876	937	9,034	8,637	0	104	50	22	187	18,034
2000	4,890	7,650	1,379	13,919	4,057	292	0	178	16	41	18,503
2001	2,947	6,417	1,470	10,834	4,922	21	0	53	32	138	16,000
2002	3,346	8,613	357	12,316	5,645	861	0	13	0	662	19,497
2003	4,165	8,898	293	13,356	5,418	290	0	202	12	148	19,426
2004	1,380	5,433	555	7,368	4,135	521	0	404	106	130	12,664
2005	1,596	4,771	217	6,584	2,651	483	0	0	15	45	9,778
2000–2004 average	3,346	7,402	811	11,559	4,835	397	0	170	33	224	17,218
1995–2004 average	3,838	7,706	1,063	12,607	5,979	451	37	132	53	300	19,558

Table 10.–Harvest of sockeye salmon by recreational anglers fishing UCUSMA drainages, 1977–2005.

Year	Gulkana River Drainage				Klutina River Drainage	Tonsina River Drainage	Tazlina River Drainage	Copper River		Other Waters	Area Total
	Upper River	Lower River	Unspecified	Total				Upstream of Gulkana	Downstream of Klutina		
1977	0	ND	1,180	1,180	ND	ND	0	ND	0	2,482	3,662
1978	0	ND	662	662	ND	ND	-	ND	0	944	1,606
1979	0	ND	545	545	ND	ND	0	ND	0	1,054	1,599
1980	0	ND	1,248	1,248	ND	ND	0	ND	0	861	2,109
1981	0	ND	1,447	1,447	ND	ND	0	ND	0	76	1,523
1982	660	ND	1,226	1,886	ND	ND	0	ND	0	1,457	3,343
1983	260	0	1,661	1,921	274	0	0	27	41	356	2,619
1984	633	103	958	1,694	496	0	34	120	274	649	3,267
1985	771	149	1,804	2,724	622	50	0	0	0	1,356	4,752
1986	1,069	197	1,444	2,710	1,291	0	48	0	24	64	4,137
1987	669	297	2,736	3,702	1,085	0	89	0	0	0	4,876
1988	437	127	1,055	1,619	1,419	0	0	0	0	0	3,038
1989	999	222	1,836	3,057	1,383	0	9	9	51	0	4,509
1990	681	552	1,464	2,697	802	40	0	0	30	0	3,569
1991	779	599	988	2,366	2,435	200	60	0	240	210	5,511
1992	805	255	1,068	2,128	1,356	99	0	90	649	238	4,560
1993	784	547	1,714	3,045	1,369	188	9	403	0	274	5,288
1994	1,055	884	564	2,503	3,137	66	95	37	93	602	6,533
1995	978	920	511	2,409	2,549	105	0	115	284	606	6,068
1996	1,828	4,673	917	7,418	4,215	42	25	0	17	134	11,851
1997	1,585	2,469	512	4,566	6,501	39	0	21	201	965	12,293
1998	1,591	3,460	1,319	6,370	4,264	68	58	0	11	413	11,184
1999	1,349	2,142	701	4,192	6,514	0	30	32	65	268	11,101
2000	1,162	1,194	1,951	4,307	7,219	0	35	141	317	342	12,361
2001	524	852	432	1,808	5,834	0	0	0	193	334	8,169
2002	833	1,680	32	2,545	4,704	96	0	0	13	403	7,761
2003	550	843	72	1,465	5,321	21	0	11	203	87	7,108
2004	177	776	23	976	5,069	142	0	11	0	266	6,464
2005	157	939	73	1,169	6,646	0	0	0	180	140	8,135
2000-2004 average	649	1,069	502	2,220	5,629	52	7	33	145	286	8,373
1995–2004 average	1,058	1,901	647	3,606	5,219	51	15	33	130	382	9,436

Table 11.–Number of permits issued and estimated salmon harvests during the Glennallen Subdistrict subsistence salmon fishery in the Copper River, 1977–2006 (does not include Federal subsistence fishery harvests).

Year	Number of Permits Issued	Estimated Salmon Harvest			
		King	Sockeye	Coho	Total[a,b]
1977	4,066	2,555	41,978	523	45,208
1978	3,705	2,239	25,783	675	28,715
1979	3,200	3,416	33,096	928	37,585
1980	3,203	3,035	31,041	822	35,100
1981	4,078	2,410	65,168	1,077	68,687
1982	6,090	2,764	105,432	1,361	109,726
1983	7,541	5,950	110,794	1,855	118,734
1984	475	509	27,941	167	28,631
1985	ND	629	30,666	294	31,614
1986	405	686	27,441	291	28,423
1987	445	813	33,106	161	34,142
1988	417	992	29,194	372	30,755
1989	386	787	28,360	69	29,308
1990	406	647	31,765	92	32,524
1991	712	1,328	39,599	232	41,205
1992	655	1,449	45,232	350	47,095
1993	773	1,434	53,252	77	54,854
1994	970	1,989	68,278	60	70,391
1995	858	1,892	52,516	882	55,323
1996	850	1,482	52,052	557	54,290
1997	1,133	2,583	82,807	187	85,744
1998	1,010	1,842	64,463	533	66,951
1999	1,102	3,141	77,369	1,121	81,631
2000	1,253	4,856	59,497	532	64,885
2001	1,239	3,553	83,787	1,154	88,578
2002	1,121	3,654	50,849	530	55,059
2003	1,012	2,537	47,007	467	50,055
2004	956	3,346	55,510	577	59,497
2005	961	2,229	64,213	154	66,615
2006	984	2,770	57,710	212	60,775
2000–2004 average	1,116	3,589	59,144	727	63,557
1995–2004 average	1,053	2,902	62,493	692	66,221

[a] Total harvest includes steelhead and other species.

[b] Total harvest prior to 1984 includes both harvest from the Chitina and Glennallen subdistricts.

Table 12.–Number of permits issued and estimated salmon harvested during the Chitina Subdistrict personal use salmon fishery in the Copper River, 1984–2006 (does not include Federal subsistence fishery harvests).

Year	Number of Permits Issued[a]	Estimated Salmon Harvest			
		King	Sockeye	Coho	Total[b]
1984	5,415	1,760	48,236	717	50,734
1985	ND	1,329	30,885	361	32,586
1986	4,031	2,367	41,054	538	44,047
1987	4,245	2,968	43,492	424	46,908
1988	4,251	2,994	42,331	504	45,855
1989	4,582	2,251	55,778	857	58,941
1990	5,689	2,708	66,432	1,511	70,812
1991	6,222	4,056	77,590	3,354	85,059
1992	6,385	3,405	86,724	1,517	91,683
1993	7,914	2,846	93,472	1,416	97,767
1994	7,061	3,743	94,024	1,981	99,822
1995	6,760	4,707	79,006	4,870	88,617
1996	7,198	3,584	95,007	3,381	102,108
1997	9,086	5,447	148,727	160	154,349
1998	10,006	6,723	137,161	2,145	146,075
1999	9,943	5,913	141,658	2,174	149,779
2000	8,151	3,168	107,856	3,657	114,878
2001	9,467	3,113	132,108	2,720	138,425
2002	6,851	2,023	85,968	1,934	90,241
2003	6,526	1,903	80,796	2,533	85,495
2004	8,386	2,495	107,312	2,860	113,164
2005	8,230	2,043	120,013	1,869	124,403
2006	8,633	2,663	123,261	2,715	129,103
2000–2004 average	7,858	2,487	101,528	2,718	107,088
1995–2004 average	8,375	3,614	115,021	2,332	121,215

[a] From 2000 to 2002 the Chitina Subdistrict was classified a subsistence fishery.

[b] Total estimate includes unidentified salmon.

Table 13.–Harvest of Arctic grayling by recreational anglers fishing in UCUSMA by drainage, 1977–2005.

	Gulkana River Drainage					Upper Susitna River Drainage					Klutina River Drainage			Tonsina River Drainage		
Year	Lakes	Upper River	Lower River	Other[a]	Total	Lake Louise	Susitna/Tyone Lakes	Other Lakes	Streams	Total	Lakes	Streams	Total	Lakes	Streams	Total
1977	2,574	ND	ND	3,355	5,929	ND	ND	3,557	ND	3,557	ND	ND	ND	ND	ND	ND
1978	2,125	ND	ND	7,494	9,619	ND	ND	2,278	ND	2,278	ND	ND	ND	ND	ND	ND
1979	5,063	ND	ND	8,726	13,789	ND	ND	2,936	ND	2,936	ND	ND	ND	ND	ND	ND
1980	3,754	ND	ND	6,776	10,530	ND	ND	4,477	ND	4,477	ND	ND	ND	ND	ND	ND
1981	2,775	ND	ND	9,158	11,933	ND	ND	4,892	ND	4,892	ND	ND	ND	ND	ND	ND
1982	5,124	4,150	ND	4,999	14,273	ND	ND	3,532	ND	3,532	ND	ND	ND	ND	ND	ND
1983	3,063	3,651	545	6,221	13,480	ND	ND	4,490	545	5,035	147	587	734	63	598	661
1984	3,659	2,206	274	3,882	10,021	1,505	1,111	51	547	3,214	941	17	958	34	154	188
1985	3,762	6,693	3,676	6,034	20,165	1,526	1,456	364	746	4,092	555	503	1,058	0	867	867
1986	2,493	4,116	684	5,845	13,138	1,719	1,751	742	686	4,898	0	1,702	1,702		72	72
1987	3,479	3,211	1,621	5,710	14,021	1,086	1,190	208	491	2,975	45	684	729		1,056	1,056
1988	2,382	3,893	455	1,855	8,585	1,855	455	0	473	2,783	0	1,673	1,673	0	345	345
1989	1,821	2,542	394	2,204	6,961	1,576	300	382	497	2,755		1,041	1,041	0	629	629
1990	1,461	1,850	493	1,579	5,383	1,613	119	646	815	3,193		544	544	0	289	289
1991	1,932	2,888	171	1,467	6,458	875	330	125	648	1,978	23	1,069	1,092		296	296
1992	902	1,691	188	1,210	3,991	481	639	218	706	2,044	8	338	346	30	781	811
1993	1,483	1,409	114	822	3,828	994	661	93	998	2,746	56	625	681	8	806	814
1994	1,488	2,076	384	281	4,229	1,239	949	317	1,157	3,662	0	363	363	0	363	363
1995	1,241	1,811	483	536	4,071	1,040	1,273	254	1,415	3,982	9	276	285		261	261
1996	819	1,961	192	291	3,263	689	376	805	1,079	2,949	0	183	183	0	192	192
1997	630	1,646	676	276	3,228	333	270	68	661	1,332	10	155	165		82	82
1998	499	1,622	654	200	2,975	990	249	335	223	1,797	105	412	517	0	495	495
1999	625	1,063	647	91	2,426	637	261	150	516	1,564	23	507	530		368	368
2000	709	977	134	242	2,062	632	568	71	910	2,181	0	134	134	0	123	123
2001	278	988	360	127	1,753	220	173	154	139	686	0	267	267	0	128	128
2002	512	1,761	149	224	2,646	456	223	36	213	928	0	566	566	0	180	180
2003	302	1,292	421	117	2,132	467	127	75	378	1,047	23	552	575	23	35	58
2004	202	759	370	0	1,331	249	0	0	570	819		197	197	0	112	112
2005	611	488	265	189	1,553	32	0	122	226	380	0	59	59	0	86	86
2000–2004 average	401	1,155	287	142	1,985	405	218	67	442	1,132	6	343	348	5	116	120
1995–2004 average	582	1,388	409	210	2,589	571	352	195	610	1,729	19	325	342	3	198	200

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Table 13.–Page 2 of 2.

Year	Tazlina River Drainage				Copper River Upstream of Gulkana			Copper River Downstream of Klutina			Other Waters				Area Total
	Mendeltna Creek	Lakes	Other Streams	Total	Lakes	Streams	Total	Lakes	Streams	Total	Stocked Lakes	Other Lakes	Other Streams	Total	
1977	ND	0	ND	ND	ND	ND	ND	ND	ND	ND	0	0	16,505	16,505	25,991
1978	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	0	0	14,591	14,591	26,488
1979	ND	0	ND	ND	ND	ND	ND	ND	ND	ND	0	0	20,507	20,507	37,232
1980	ND	0	ND	ND	ND	ND	ND	ND	ND	ND	0	0	17,099	17,099	32,106
1981	ND	0	ND	ND	ND	ND	ND	ND	ND	ND	0	0	16,157	16,157	32,982
1982	ND	0	ND	ND	ND	ND	ND	ND	ND	ND	0	0	15,781	15,781	33,586
1983	231	869	146	1,246	388	1,312	1,700	587	609	1,196	472	1,741	829	3,042	27,094
1984	171	1,009	239	1,419	958	513	1,471	428	0	428	222	684	667	1,573	19,272
1985	347	1,127	225	1,699	121	347	468	0	0	0	35	1,162	2,965	4,162	32,511
1986	234	137	363	734	0	395	395	0	0	0	460	1,429	1,357	3,246	24,185
1987	387	1,531	551	2,469	1,843	1,115	2,958	446	0	446	639	341	1,725	2,705	27,359
1988	1,037	91	819	1,947	909	674	1,583	327	146	473	1,401	1,346	1,801	4,548	21,937
1989	272	122	760	1,154	422	656	1,078	600	0	600	947	1,032	432	2,411	16,629
1990	170	374	204	748	883	187	1,070	136	0	136	935	1,035	442	2,412	13,775
1991	102	353	842	1,297	216	579	795	11	34	45	726	68	523	1,317	13,278
1992	255	347	128	730	113	30	143	15	0	15	1,623	767	655	3,045	11,125
1993	867	206	518	1,591	378	448	826	317	19	336	852	334	496	1,682	12,504
1994	906	734	274	1,914	234	207	441	82	41	123	1,167	1,222	582	2,971	14,066
1995	1,041	678	581	2,300	321	403	724	166	0	166	804	665	1,031	2,500	14,289
1996	570	412	437	1,419	147	182	329	121	73	194	726	608	671	2,005	10,534
1997	462	458	10	930	101	121	222	148	121	269	570	903	882	2,355	8,583
1998	579	442	48	1,069	147	263	410	150	0	150	223	266	373	862	8,275
1999	79	126	580	785	147	253	400	67	0	67	1,265	357	483	2,105	8,245
2000	245	228	46	519	48	48	96	0	0	0	521	716	238	1,475	6,590
2001	70	25	95	190	102	192	294	29	0	29	473	561	69	1,103	4,450
2002	23	292	78	393	156	371	527	0	62	62	1,939	174	495	2,608	7,910
2003	23	47	265	335	155	682	837	0	0	0	688	47	189	924	5,908
2004	65	57	16	138	41	604	645	113	11	124	62	556	131	749	4,115
2005	0	273	227	500	0	249	249	96	0	96	253	337	203	793	3,716
2000–2004 average	85	130	100	315	100	379	480	28	15	43	737	411	224	1,372	5,795
1995–2004 average	316	277	216	808	137	312	448	79	27	106	727	485	456	1,669	7,890

[a] Includes harvests not specified as taken in lower or upper river.

Table 14.–Harvest of lake trout by recreational anglers fishing UCUSMA waters by drainage, 1977 – 2005.

	Gulkana River Drainage				Upper Susitna Drainage				Copper River Drainage				
Year	Paxson Lake	Summit Lake	Crosswind Lake	Other Lakes & Streams	Lake Louise	Susitna Lake	Other Lakes & Streams	Klutina Drainage	Tazlina Drainage	Upstream of Gulkana	Downstream of Klutina	Other Sites	Area Total
1977	ND	ND	252	1,435	ND	ND	2,838	ND	0	ND	ND	3,174	7,699
1978	ND	ND	714	1,103	ND	ND	2,522	ND	-	ND	ND	1,094	5,433
1979	ND	ND	609	2,281	ND	ND	2,618	ND	0	ND	ND	1,763	7,271
1980	ND	ND	895	2,324	ND	ND	2,609	ND	0	ND	ND	2,239	8,067
1981	ND	ND	540	2,041	ND	ND	4,093	ND	0	ND	ND	1,663	8,337
1982	ND	ND	734	2,777	ND	ND	4,056	ND	0	ND	ND	1,132	8,699
1983	ND	ND	388	2,769	ND	ND	3,251	136	210	167	126	199	7,246
1984	787	581	188	188	2,018	650	240	34	34	273	86	1,232	6,311
1985	1,803	520	832	832	2,341	763	781	35	34	173	0	572	8,686
1986	944	428	137	74	2,227	1,114	702	750	0	16	97	290	6,779
1987	1,457	1,368	401	521	1,636	401	75	134	149	104	0	475	6,721
1988	1,310	528	382	1,147	1,801	418	55	163	55	400	0	18	6,277
1989	1,557	863	272	404	1,979	441	544	150	0	515	103	319	7,147
1990	2,139	968	306	170	1,036	187	119	68	51	102	238	119	5,503
1991	1,248	981	463	98	1,332	308	196	84	42	42	14	56	4,864
1992	1,118	524	378	240	1,033	324	348	39	62	23	0	162	4,251
1993	778	344	311	276	1,316	669	375	28	0	145	133	194	4,569
1994	262	353	429	110	1,463	426	477	74	15	309	22	118	4,058
1995	507	224	94	90	946	200	419	71	0	164	20	199	2,934
1996	297	120	339	336	662	381	306	22	11	81	22	55	2,632
1997	452	158	96	142	585	52	100	33	23	100	0	182	1,923
1998	205	59	238	39	625	131	135	12	56	95	0	128	1,723
1999	342	220	525	68	430	176	216	35	16	89	0	18	2,135
2000	228	79	297	27	563	131	93	18	83	27	0	154	1,700
2001	302	74	44	86	259	110	118	17	0	97	22	56	1,185
2002	328	66	299	60	458	152	138	0	122	148	26	270	2,067
2003	399	102	403	104	393	128	80	52	0	68	68	34	1,831
2004	46	107	105	30	770	30	347	14	0	303	0	186	1,938
2005	50	32	519	71	370	429	637	66	16	130	32	161	2,513
2000–2004 average	261	86	230	61	489	110	155	20	41	129	23	235	1,840
1995–2004 average	311	121	244	98	569	149	195	27	31	117	16	462	2,340

Table 15.–Percent of lake trout released in lakes with 24" minimum size limit, 1990–2005[a].

Year	Paxson	Summit	Crosswind	Louise	Susitna	Average of all lakes
1990	52	61	77	65	82	67
1991	39	47	60	37	59	48
1992	53	54	73	67	68	63
1993	68	79	76	81	67	74
1994	79	65	79	71	67	72
1995	71	81	90	66	76	77
1996	85	84	72	78	82	80
1997	78	77	79	80	89	81
1998	88	85	85	75	66	80
1999	89	67	80	91	82	82
2000	89	77	67	82	86	80
2001	84	88	93	83	87	87
2002	91	82	69	85	79	81
2003	88	84	72	88	69	80
2004	75	62	88	81	96	80
2005	96	95	77	86	56	82
1990–1993	53	60	72	63	69	63
1994–2005	84	79	79	80	78	80

[a] The 24" minimum size limit went into effect prior to the 1994 fishing season.

Table 16.–Harvest of burbot caught by recreational anglers fishing in the UCUSMA by drainage, 1977–2005.

Year	Gulkana River Drainage				Upper Susitna Drainage				Klutina Drainage	Tazlina Drainage				Copper River Drainage		Other Sites	Area Total
	Paxson Lake	Crosswind Lake	Other waters	Total	Lake Louise	Susitna/ Tyone	Other waters	Total		Tolsona/ Moose	Hudson Lake	Other Waters	Total	Upstream of Gulkana	Downstream of Klutina [a]		
1977	ND	291	216	507	ND	ND	ND	3,157	ND	ND	467	ND	467	ND	0	1,497	5,628
1978	ND	868	316	1,184	ND	ND	ND	2,947	ND	ND	-	ND	0	ND	0	3,092	7,223
1979	ND	100	418	518	ND	ND	ND	2,363	ND	ND	118	ND	118	ND	0	809	3,808
1980	ND	646	904	1,550	ND	ND	ND	6,612	ND	ND	34	ND	34	ND	0	1,963	10,159
1981	ND	367	778	1,145	ND	ND	ND	5,292	ND	ND	0	ND	0	ND	0	2,570	9,007
1982	ND	262	282	544	ND	ND	ND	5,565	ND	ND	0	ND	0	ND	0	1,897	8,006
1983	ND	178	661	839	ND	ND	ND	4,070	0	713	441	273	1,427	20	0	199	6,555
1984	86	0	598	684	2,445	1,368	0	3,813	17	1,864	1,334	1,949	5,147	360	0	308	10,329
1985	945	665	35	1,645	3,710	7,210	0	10,920	35	1,050		2,310	3,360	35	0	3,360	19,355
1986	452	48	273	773	2,954	2,704	105	5,763	0	1,243	1,211	613	3,067	210	48	169	10,030
1987	119	327	149	595	506	684	30	1,220	0	684	446	862	1,992	0	0	579	4,386
1988	200	364	91	655	655	273	200	1,128	36	73	327	546	946	746	0	236	3,747
1989	366	19	47	432	976	656	66	1,698	0	94		403	497	459	113	197	3,396
1990	221	340	17	578	255	323	0	578	0	408		0	408	238	0	34	1,836
1991	45	271	54	370	0	45	54	99	0	108		81	189	0	0	135	793
1992	127	152	152	456	0	533	8	541	0	127		220	347	8	8	135	1,495
1993	32	225	0	257	0	172	0	172	0	21	0	86	107	611	54	493	1,694
1994	21	317	291	629	0	766	145	911	0	93	31	114	238	799	42	250	2,869
1995	69	271	7	347	0	137	46	183	0	23	103	0	126	122	34	183	995
1996	65	86	48	199	0	163	49	212	0	81	0	57	138	73	41	318	981
1997	535	174	103	812	0	262	52	314	0	0		26	26	129	0	77	1,358
1998	535	139	17	691	0	149	118	267	0	0	59	401	460	50	0	17	1,485
1999	266	503	13	782	0	670	0	670	0	0		117	117	152	0	140	1,861
2000	291	539	472	1,302	0	609	0	609	0	0		222	222	12	121	24	2,290
2001	764	173	122	1,059	0	154	36	190	0	0		136	136	14	7	100	1,506
2002	401	578	259	1,238	0	437	31	468	13	0		128	128	9	0	368	2,224
2003	173	470	250	893	32	119	33	184	65	0		87	87	77	0	151	1,457
2004	20	336	0	356	317	91	10	418	0	0	0	0	0	111	0	242	1,127
2005	112	859	94	1,065	25	74	10	109	0	0	0	25	25	138	0	37	1,374
2000–2004 average	330	419	221	970	70	282	22	374	16	0	0	115	115	45	26	177	1,721
1995–2004 average	312	327	129	768	35	279	38	352	8	10	41	117	144	75	20	162	1,528

[a] Includes Tonsina River drainage harvest estimates

Table 17.–Harvest of wild rainbow trout by sport anglers fishing UCUSMA waters by drainage, 1977–2005.

Year	Gulkana River Drainage[a]				Klutina River Drainage	Tazlina River Drainage	Tonsina River Drainage	Copper River Drainage		Other Sites	Area Total
	Upper River	Lower River	Gulkana R. Other	Total				Upstream of Gulkana	Downstream of Klutina		
1977	305	ND	447	752	ND	0	ND	ND	ND	1,465	2,217
1978	316	ND	940	1,256	ND	-	ND	ND	ND	669	1,925
1979	473	ND	982	1,455	ND	0	ND	ND	ND	1,345	2,800
1980	293	ND	956	1,249	ND	0	ND	ND	ND	1,317	2,566
1981	216	ND	1,253	1,469	ND	0	ND	ND	ND	2,560	4,029
1982	565	ND	692	1,257	ND	21	ND	ND	ND	870	2,148
1983	607	83	765	1,455	0	0	0	0	26	120	1,601
1984	1,129	0	137	1,266	0	34	68	17	4,634	513	6,532
1985	1,421	589	486	2,496	347	121	0	0	0	694	3,658
1986	552	109	475	1,136	81	24	0	0	0	3,300	4,541
1987	536	238	773	1,547	208	15	595	178	149	506	3,198
1988	1,037	36	236	1,309	18	146	18	0	0	273	1,764
1989	375	0	281	656	56	9	38	0	601	366	1,726
1990	204	34	187	425	17	170	17	68	17	1,036	1,750
1991	14	0	150	164	96	0	14	0	177	259	710
1992	0	0	8	8	63	24	103	0	214	792	1,204
1993	0	0	40	40	108	0	40	0	0	730	918
1994	0	0	0	0	8	8	87	0	515	981	1,599
1995	0	0	0	0	37	0	28	0	94	260	419
1996	0	0	0	0	0	10	26	0	148	892	1,076
1997	0	0	0	0	12	36	0	0	132	955	1,135
1998	0	0	0	0	8	48	8	0	176	203	443
1999	0	0	0	0	0	73	24	0	117	584	798
2000	0	0	0	0	0	0	33	0	0	298	331
2001	0	0	0	0	81	0	0	0	56	315	452
2002	0	44	0	44	0	0	58	0	23	268	393
2003	0	0	0	0	55	18	0	0	0	1,262	1,335
2004	0	0	0	0	0	14	27	0	128	527	696
2005	0	0	0	0	9	0	11	0	116	331	467
2000–2004 average	0	9	0	9	27	6	24	0	41	534	641
1995–2004 average	0	4	0	4	19	20	20	0	87	556	708

[a] In 1991, the Gulkana River was closed to the harvest of rainbow trout.

Table 18.–Sport catch of wild rainbow trout by sport anglers fishing UCUSMA waters by drainage, 1977–2005.

Year	Gulkana River Drainage[a]				Klutina River Drainage	Tazlina River Drainage	Tonsina River Drainage	Copper River Drainage		Other Sites	Area Total
	Upper River	Lower River	Gulkana R. Other	Total				Upstream of Gulkana	Downstream of Klutina		
1990	2,344	51	ND	2,395	34	645	17	509	153	2,768	6,521
1991	1,256	14	ND	1,270	246	792	41	342	109	1,106	3,906
1992	1,496	166	ND	1,662	103	253	293	0	1,908	2,581	6,800
1993	2,468	305	ND	2,773	958	99	98	79	663	1,954	6,624
1994	3,088	149	143	3,380	95	207	290	161	3,454	4,926	12,513
1995	3,397	495	66	3,958	37	0	234	0	1,233	1,247	6,709
1996	5,140	1,371	183	6,694	42	10	26	0	1,584	2,389	10,745
1997	7,816	199	99	8,114	53	125	0	218	3,062	4,770	16,342
1998	3,429	1,317	682	5,428	8	48	25	0	4,993	557	11,059
1999	5,699	1,743	261	7,703	23	108	83	128	553	1,706	10,304
2000	5,354	1,281	194	6,829	267	0	78	0	1,496	1,622	10,292
2001	2,806	961	381	4,148	256	0	36	0	767	1,120	6,327
2002	5,166	2,525	31	7,722	7	0	105	14	349	1,538	9,735
2003	5,496	676	332	6,504	66	48	0	0	0	6,188	12,806
2004	3,995	787	0	4,782	27	26	81	0	535	761	6,212
2005	2,757	1,251	405	4,413	87	11	331	0	374	1,333	6,549
2000–2004 average	4,563	1,240	230	5,514	89	17	111	3	405	2,188	8,326
1995–2004 average	4,830	1,211	257	6,234	84	38	77	36	1,371	2,198	10,037

[a] In 1991, the Gulkana River was closed to the harvest of rainbow trout.

Table 19.–Harvest of steelhead trout by sport anglers fishing UCUSMA waters by drainage, 1977 – 2005.

Year	Gulkana River Drainage [a]				Klutina River Drainage	Tazlina River Drainage	Tonsina River Drainage	Copper River Drainage		Other Sites	Area Total
	Upper River	Lower River	Gulkana R. Other	Total				Upstream of Gulkana	Downstream of Klutina		
1977	0	ND	0	0	ND	0	ND	ND	ND	187	187
1978	0	ND	0	0	ND	-	ND	ND	ND	45	45
1979	0	ND	0	0	ND	0	ND	ND	ND	55	55
1980	0	ND	0	0	ND	0	ND	ND	ND	34	34
1981	0	ND	0	0	ND	0	ND	ND	ND	76	76
1982	21	ND	31	52	ND	0	ND	ND	ND	21	73
1983	0	0	21	21	0	0	0	0	0	0	21
1984	0	0	0	0	0	0	0	0	0	137	137
1985	75	0	62	137	0	0	0	0	0	25	162
1986	18	0	0	18	0	0	0	0	0	40	58
1987	15	15	74	104	0	0	0	0	0	30	134
1988	0	18	0	18	0	0	0	0	0	0	18
1989	0	0	47	47	0	0	0	0	0	37	84
1990	0	0	34	34	0	0	0	0	0	0	34
1991	0	0	0	0	0	0	0	0	0	114	114
1992	0	0	8	8	0	0	0	0	0	0	8
1993	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	7	7
1995	10	0	0	10	0	0	0	0	0	0	10
1996	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	8	8
2000	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0
2000–2004 average	0	0	0	0	0	0	0	0	0	0	0
1995–2004 average	1	0	0	1	0	0	0	0	0	1	2

[a] In 1991, the Gulkana River was closed to the harvest of rainbow trout/steelhead.

Table 20.–Catch of steelhead trout by sport anglers fishing UCUSMA waters by drainage, 1990 – 2005.

Year	Gulkana River Drainage[a]				Klutina River Drainage	Tazlina River Drainage	Tonsina River Drainage	Copper River Drainage		Other Sites	Area Total
	Upper River	Lower River	Gulkana R. Other	Total				Upstream of Gulkana	Downstream of Klutina		
1990	68	0		68	0	0	0	0	0	68	136
1991	26	0		26	0	0	0	0	0	114	140
1992	31	8		39	0	0	0	0	0	0	39
1993	92	10		102	0	0	0	0	0	0	102
1994	0	0	0	0	0	0	212	0	113	7	332
1995	43	8	0	51	0	0	0	0	0	0	51
1996	36	85	0	121	0	0	0	0	0	0	121
1997	23	54	49	126	0	0	0	0	0	0	126
1998	23	82	4	109	0	0	0	0	87	0	196
1999	136	120	0	256	0	0	0	0	0	8	264
2000	121	36	12	169	0	0	0	0	177	0	346
2001	116	103	0	219	15	0	0	0	0	0	234
2002	107	22	0	129	0	0	0	0	0	0	129
2003	42	70	0	112	0	0	0	0	0	0	112
2004	0	33	0	33	0	0	31	0	0	0	64
2005	0	33	0	0	0	0	0	0	0	0	0
2000–2004 average	77	53	0	130	3	0	6	0	35	0	175
1995–2004 average	65	61	7	133	2	0	3	0	26	1	164

[a] In 1991, the Gulkana River was closed to the harvest of rainbow trout/steelhead.

Table 21.–Harvest of wild Dolly Varden by sport anglers fishing UCUSMA waters by drainage[a], 1977–2005.

Year	Klutina River Drainage	Tazlina River Drainage	Tonsina River Drainage	Copper River Drainage		Other Sites	Area Total
				Upstream of Gulkana	Downstream of Klutina		
1977	ND	0	ND	ND	ND	2,251	2,251
1978	ND	-	ND	ND	ND	904	904
1979	ND	0	ND	ND	ND	5,890	5,890
1980	ND	0	ND	ND	ND	835	835
1981	ND	0	ND	ND	ND	2,452	2,452
1982	ND	0	ND	ND	ND	2,148	2,148
1983	1,742	220	1,363	640	10	534	4,509
1984	1,215	51	1,540	600	0	1,794	5,200
1985	3,069	104	2,012	0	0	816	6,001
1986	3,631	16	266	97	0	1,195	5,205
1987	1,695	60	238	0	0	30	2,023
1988	2,838	455	509	0	0	1,383	5,185
1989	2,402	188	1,023	38	234	94	3,979
1990	2,156	476	459	0	0	68	3,159
1991	1,448	0	179	26	154	333	2,140
1992	1,294	57	630	0	0	16	1,997
1993	1,818	26	689	106	0	534	3,173
1994	1,250	11	216	56	9	56	1,598
1995	712	44	500	66	48	325	1,695
1996	838	0	462	1,043	24	208	2,575
1997	549	0	107	135	44	257	1,092
1998	1,092	16	98	0	16	367	1,589
1999	1,818	22	363	32	45	110	2,390
2000	257	0	498	0	102	77	934
2001	644	54	795	0	11	65	1,569
2002	725	0	369	0	166	106	1,366
2003	1,009	54	0	0	20	0	1,083
2004	886	0	150	120	891	119	2,166
2005	423	0	82	13	0	224	742
2000–2004 average	704	22	362	24	238	73	1,424
1995–2004 average	853	19	334	140	137	163	1,646

[a] Dolly Varden are not present in the Gulkana River drainage. Data does not include stocked Arctic char.

Table 22.–Stocking schedule for remote lakes in the UCUSMA.

Area (Access)Lake	Lake Size (Acres)	Species	Stocking Years	Year Last Stocked	Number Stocked [a]
		Glenn Highway			
Arizona Lake	25	Grayling	Alternate	2003	800 F
Buffalo Lake	4	Rainbow	Annual	2006	200 C
DJ Lake	4	Rainbow	Alternate	2006	400 F
Gergie Lake	60	Rainbow	Alternate	2006	8,000 F
Little Junction Lake	5	Grayling	Alternate	2000	200 C
Ryan Lake	45	Rainbow	Annual	2006	300 C
Tex Smith Lake	15	Rainbow	Annual	2006	250 C
		Richardson Highway			
Dick Lake	40	Arctic Char	Alternate	2005	2,014 C
Pippin Lake	160	Rainbow	Annual	2006	800 C
Squirrel Creek Pit	5	Grayling	Annual	2001	800 C
		Rainbow	Annual	2006	420 C
		Lake Louise Road			
Connor Lake	18	Grayling	Alternate	2003	775 F
Crater Lake	16	Rainbow	Alternate	2006	3,000 F
Junction Lake	18	Grayling	Alternate	2003	793 F
Little Crater Lake	2	Rainbow	Alternate	2004	2,439 F
Old Road Lake	1.5	Rainbow	Annual	2005	250 C
Peanut Lake	12	Rainbow	Alternate	2006	2,300 F
Round Lake	2	Rainbow	Annual	2005	250 C
		Edgerton Highway			
Three Mile Lake	20	Rainbow	Alternate	2005	533 C
Town Lake	40	Rainbow	Annual	2005	533 C
Two Mile Lake	17	Rainbow	Alternate	2005	430 C
		McCarthy Road			
Sculpin Lake	190	Rainbow	Annual	2005	14,015 F
Silver Lake	500	Rainbow	Annual	2006	4,655 S/C
Strelna Lake	290	Coho	Annual	2004	17,147 F
		Rainbow	Alternate	2003	15,006 F
Van Lake	280	Rainbow	Alternate	2005	14,000 F
		Remote Lakes			
John Lake	160	Rainbow	Alternate	2006	6,824 F
North Jans Lake	58	Rainbow	Alternate	2006	2,388 F
South Jans Lake	100	Coho	Annual	2000	19,983 F
		Rainbow	Alternate	2006	8,059 F
Tolsona Mt. Lake	75	Rainbow	Alternate	2006	5,987 F

[a] F = fingerling, C = catchable, and S = subcatchable

Table 23.–Summary of projected game fish stockings for rural and remote lakes in the UCUSMA, 2007–2008 (these numbers are dependent on hatchery production).

Number of Lakes 2007/2008	Species	Lifestage	Target Size (in)	2007 Projected	2008 Projected
1/0	Arctic Char	Catchable	6–8	0	2,000
0/0	Coho Salmon	Fingerling	2–4	0	0
0/0	Arctic Grayling	Catchable	6–8	0	0
0/0	Rainbow Trout	Catchable	6–8	0	0
14/9	Rainbow Trout	Fingerling	2–4	124,000	67,500

Table 24.–Effort, harvest, and catch statistics by species for stocked lakes in the UCUSMA 1990–2005.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2000–2004 average	1995–2004 average
Effort																		
Number of Anglers[a]	2,429	3,417	5,161	3,375	3,079	2,952	2,307	1,670	2,370	1,654	1,908	1,795	1,661	1,662	929	1,212	1,591	1,891
Number of Days Fished (effort)	2,599	4,693	7,484	4,760	5,561	5,441	3,759	2,160	3,346	3,841	3,689	4,396	2,377	3,374	1,461	2,473	3,059	3,384
Catch																		
Rainbow trout	5,791	10,936	20,612	16,676	12,674	10,270	9,190	4,525	11,224	4,505	8,038	13,204	6,870	4,777	6,624	4,096	7,903	7,923
Coho Salmon	51	347	508	56	496	109	693	444	1,039	309	800	513	0	0	0	0	263	391
Arctic grayling	2,531	1,920	3,998	3,760	4,055	4,189	6,230	1,969	1,389	4,694	2,954	3,315	6,966	3,309	531	1,560	3,415	3,555
Arctic char	68	243	0	0	45	0	0	0	0	22	298	43	179	495	0	0	203	104
Catch rate (catch / effort)	3.2	2.9	3.4	4.3	3.1	2.7	4.3	3.2	4.1	2.5	3.3	3.9	5.9	2.5	4.9	2.3	4	4
Harvest																		
Rainbow trout	2,174	6,158	8,169	6,327	4,209	4,252	4,000	1,677	4,739	3,044	2,546	1,964	2,901	2,426	1,615	1,440	2,290	2,916
Coho Salmon	17	69	379	56	80	42	414	274	395	232	436	282	0	0	0	0	144	208
Arctic grayling	935	726	1,623	852	1,167	804	726	570	223	1,265	521	473	1,939	688	62	253	737	727
Arctic char	34	243	0	0	0	0	0	0	0	0	57	43	22	495	0	0	123	62
Stocked catchables and subcatchables																		
Rainbow trout	2,725	3,152	3,055	2,507	3,019	0	0	5,074	7,550	11,300	7,179	15,228	10,354	11,409	16,833	15,681	12,201	8,493
Coho Salmon																		
Arctic grayling	0	0	0	0	0	0	0	0	0	512	7,562	4,716	0	0	0	0	2,456	1,279
Arctic char	0	0	0	0	0	0	0	0	1,000	0	1,521	0	0	2,162	0	2,014	737	468
Stocked fry and fingerlings																		
Rainbow trout	236,296	116,022	224,514	114,268	149,254	101,765	400	74,524	14,947	208,139	0	170,000	0	66,542	58,610	28,015	59,030	69,493
Coho Salmon	84,800	26,831	49,400	25,900	30,812	60,942	49,079	35,145	34,907	53,428	35,938	0	34,000	0	17,147	0	17,417	32,059
Arctic grayling	254,386	168,500	337,100	174,200	291,000	2,000	127,100	0	0	0	0	0	0	2,368	0	0	474	13,147
Arctic char	0	0	0	900	23,200	4,000	4,000	0	0	0	0	0	4,000	0	0	0	800	1,200

[a] Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

Table 25.–Catch-per-unit-effort (CPUE) of various species captured with fyke traps and gillnets set in Paxson and Tyone lakes during June, 2006.

Species	Catch-per-unit-effort (CPUE)			
	Paxson Lake		Tyone Lake	
	Fyke Trap	Gillnet	Fyke Trap	Gillnet
Round whitefish	0.054	5.545	0.004	1.720
Humpback whitefish	0	2.879	0	0.853
Arctic grayling	0.694	0.030	0.014	0.013
Burbot	0.073	0	0.024	0
Lake trout	0	0.121	0.017	0.013
Longnose sucker	0	0	1.156	1.347
Mottled sculpin	0.013	0	0	0
Salmon smolt	2.031	0	0	0
Northern pike	0	0	0	0
Total Effort	519	33	1,009	75

FIGURES

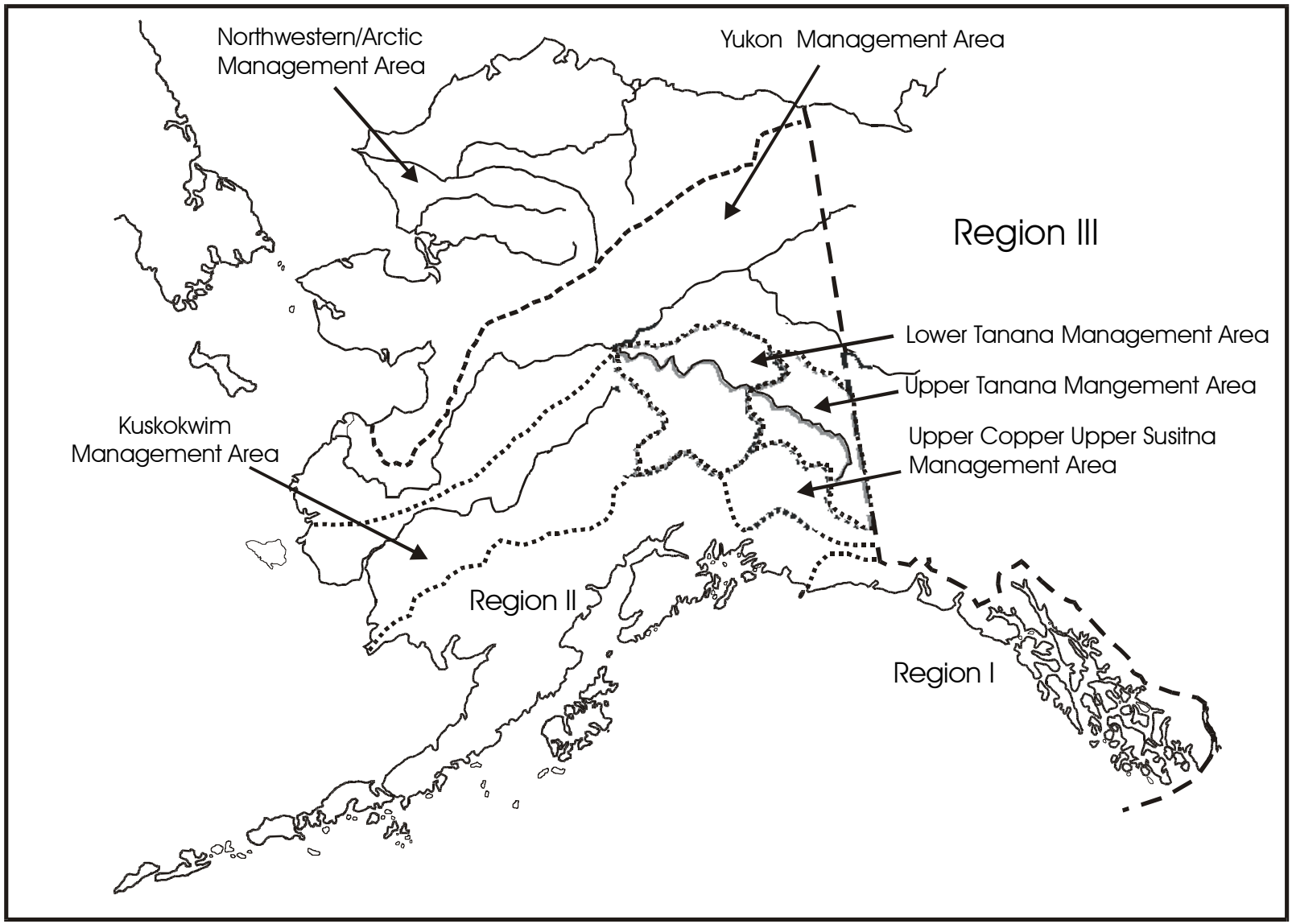

Figure 1.–Map of the sport fish regions in Alaska and the six Region III management areas.

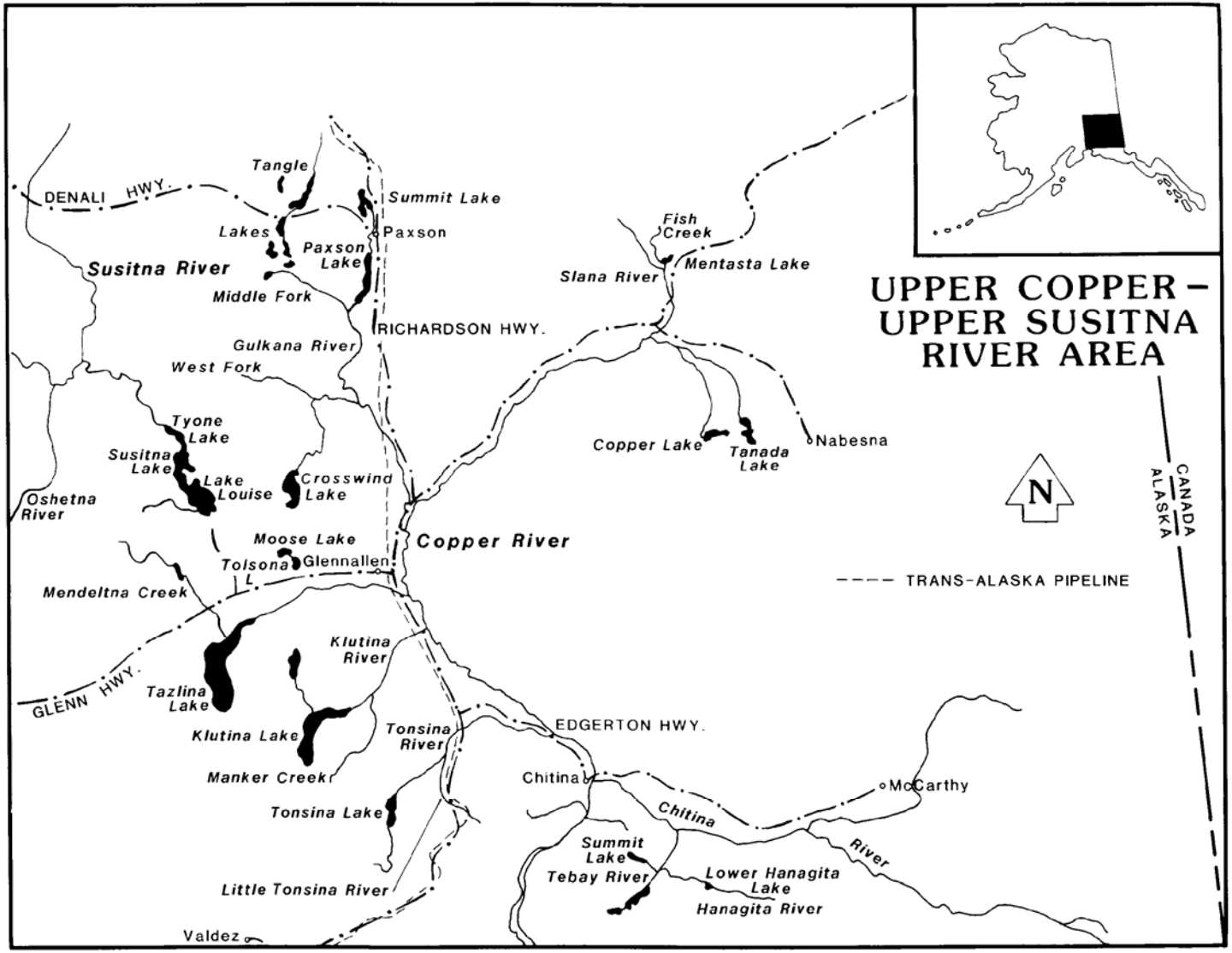

Figure 2. - The Upper Copper/Upper Susitna Management Area (UCUSMA).

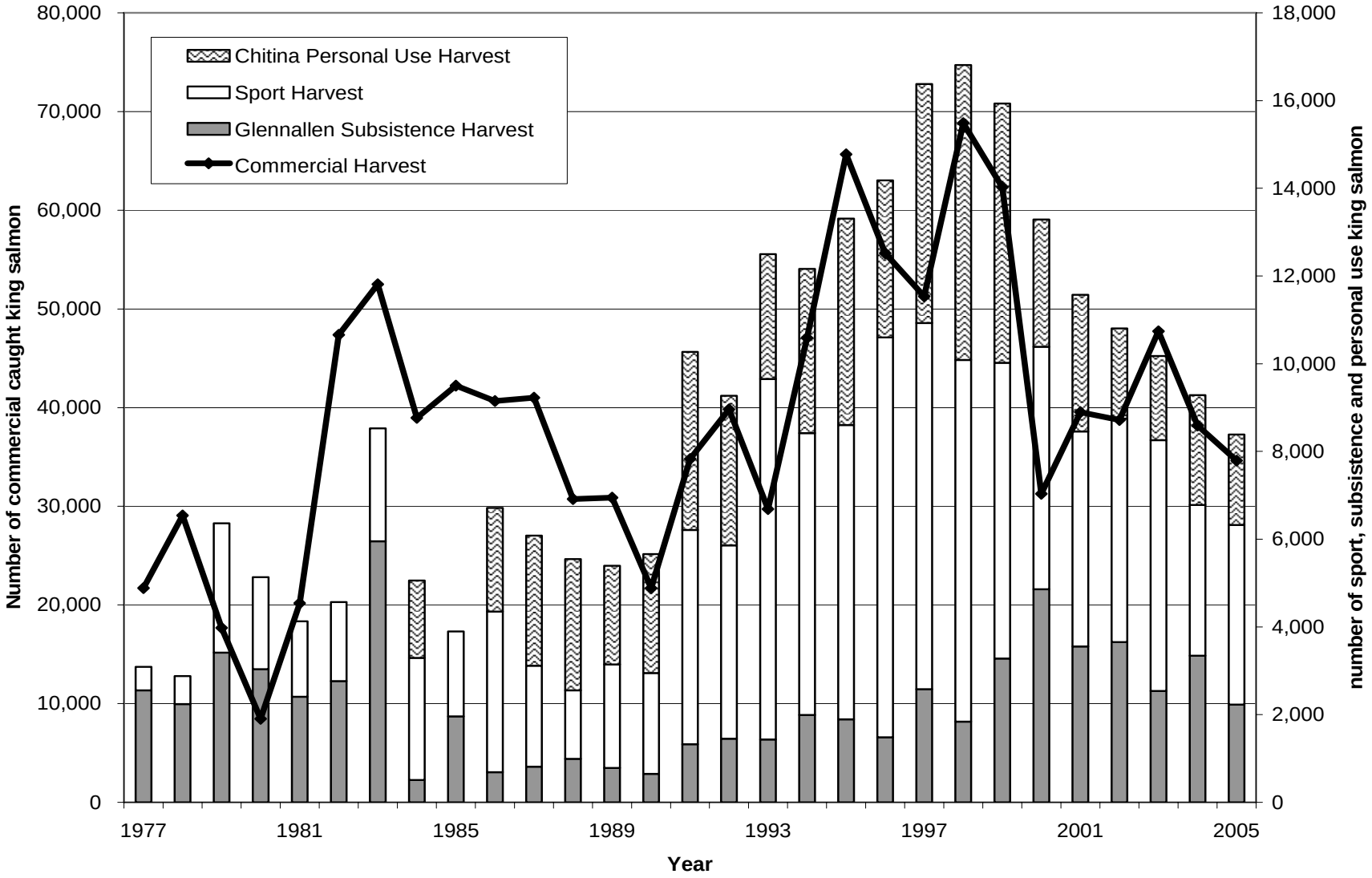

Figure 3.–Total king salmon harvest by fishery in the Copper River drainage, 1977 – 2005.

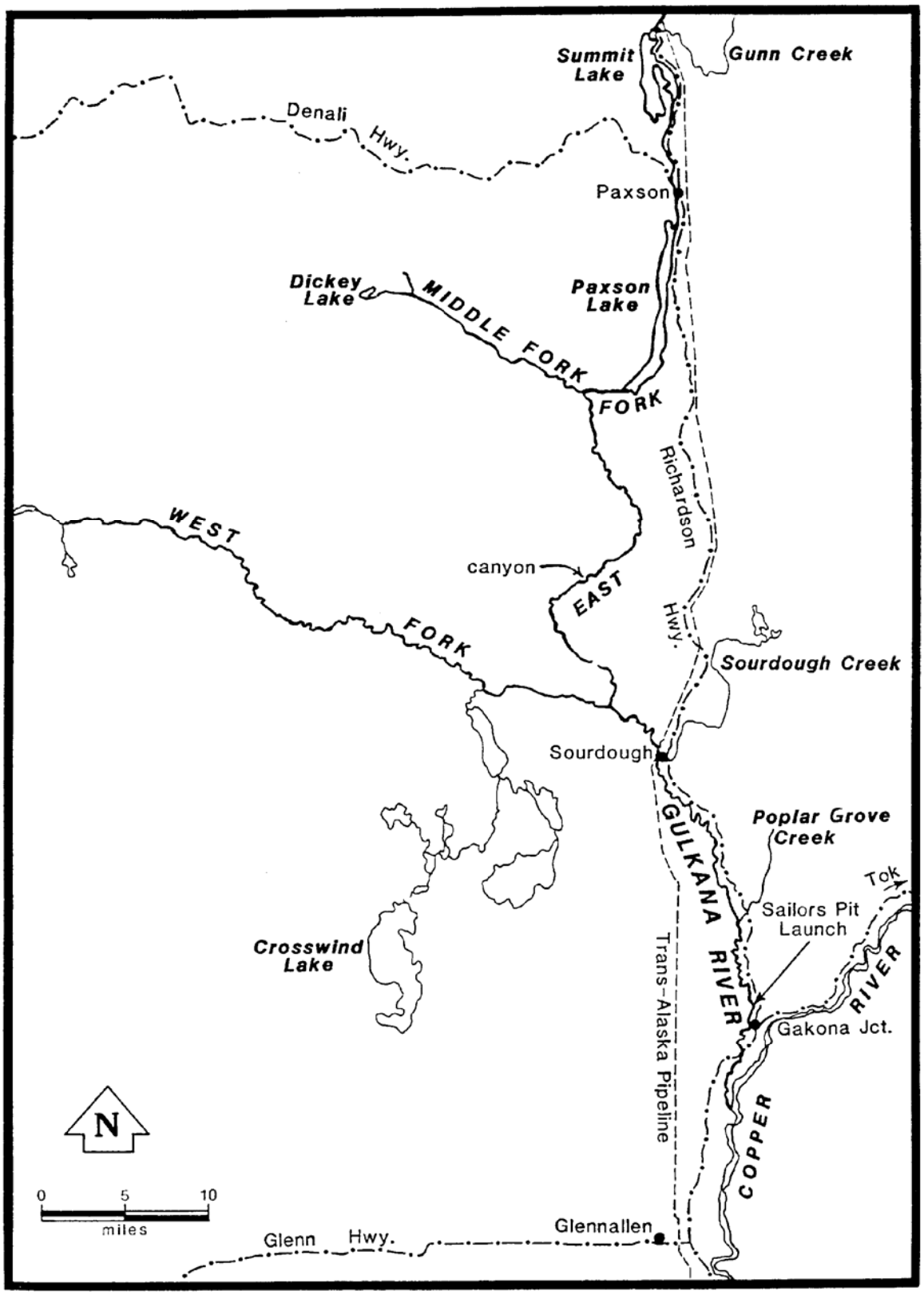

Figure 4.–Map depicting the Gulkana River drainage.

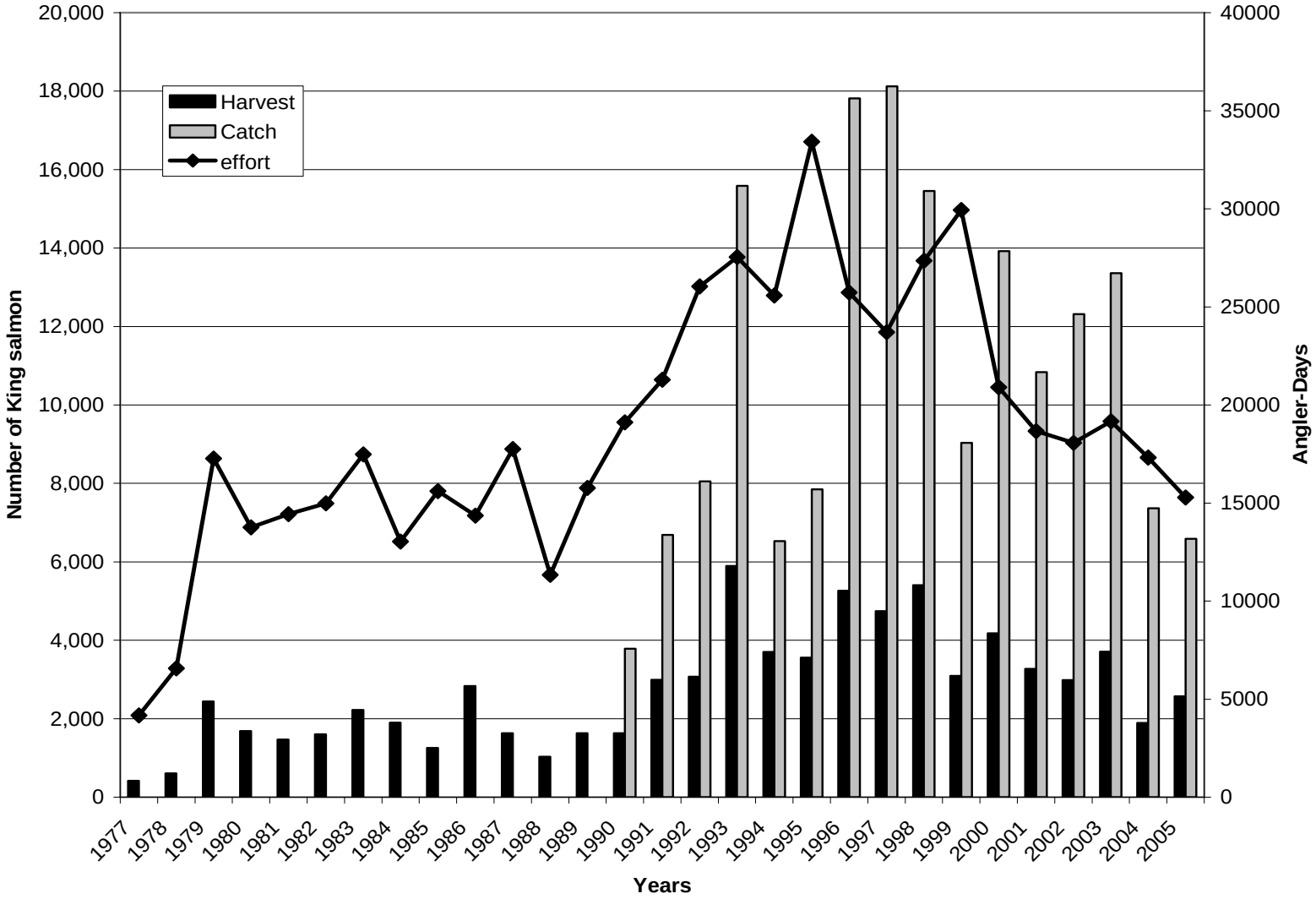

Figure 5.–Gulkana River king salmon catch, harvest and effort, 1977–2005.

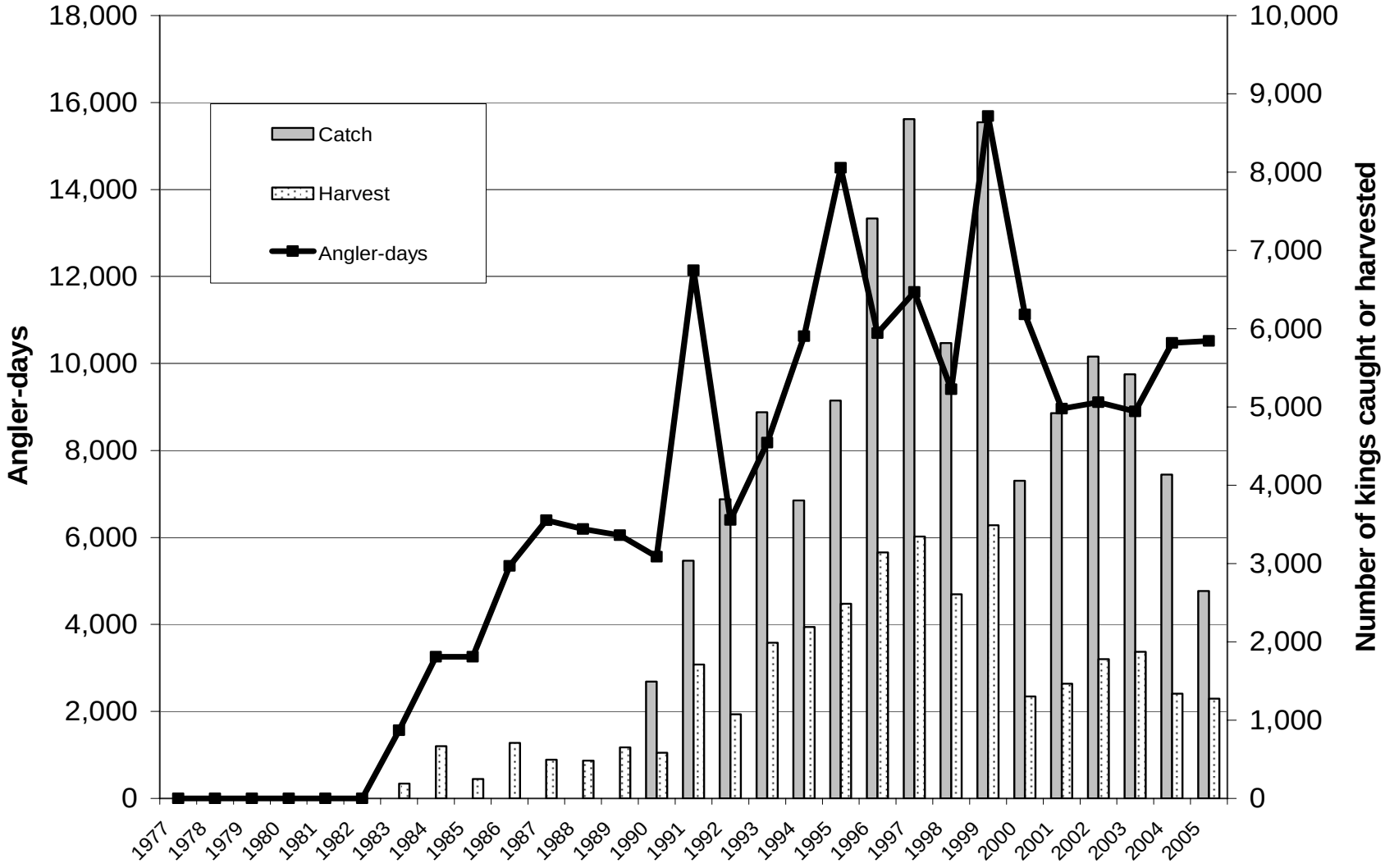

Figure 6.–Klutina River king salmon catch, harvest, and effort, 1977 – 2005.

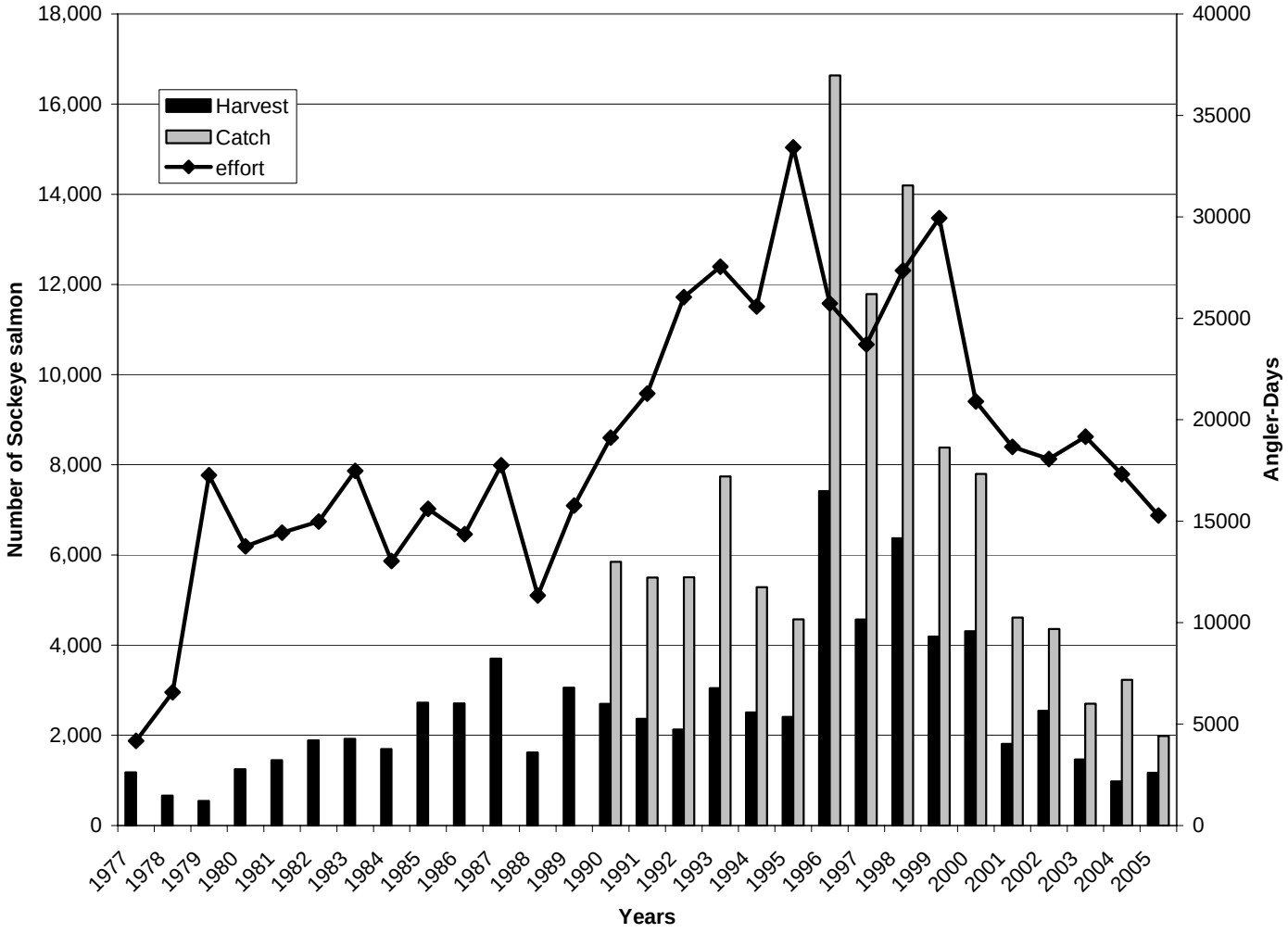

Figure 7.–Gulkana River sockeye salmon catch, harvest, and effort, 1997–2005.

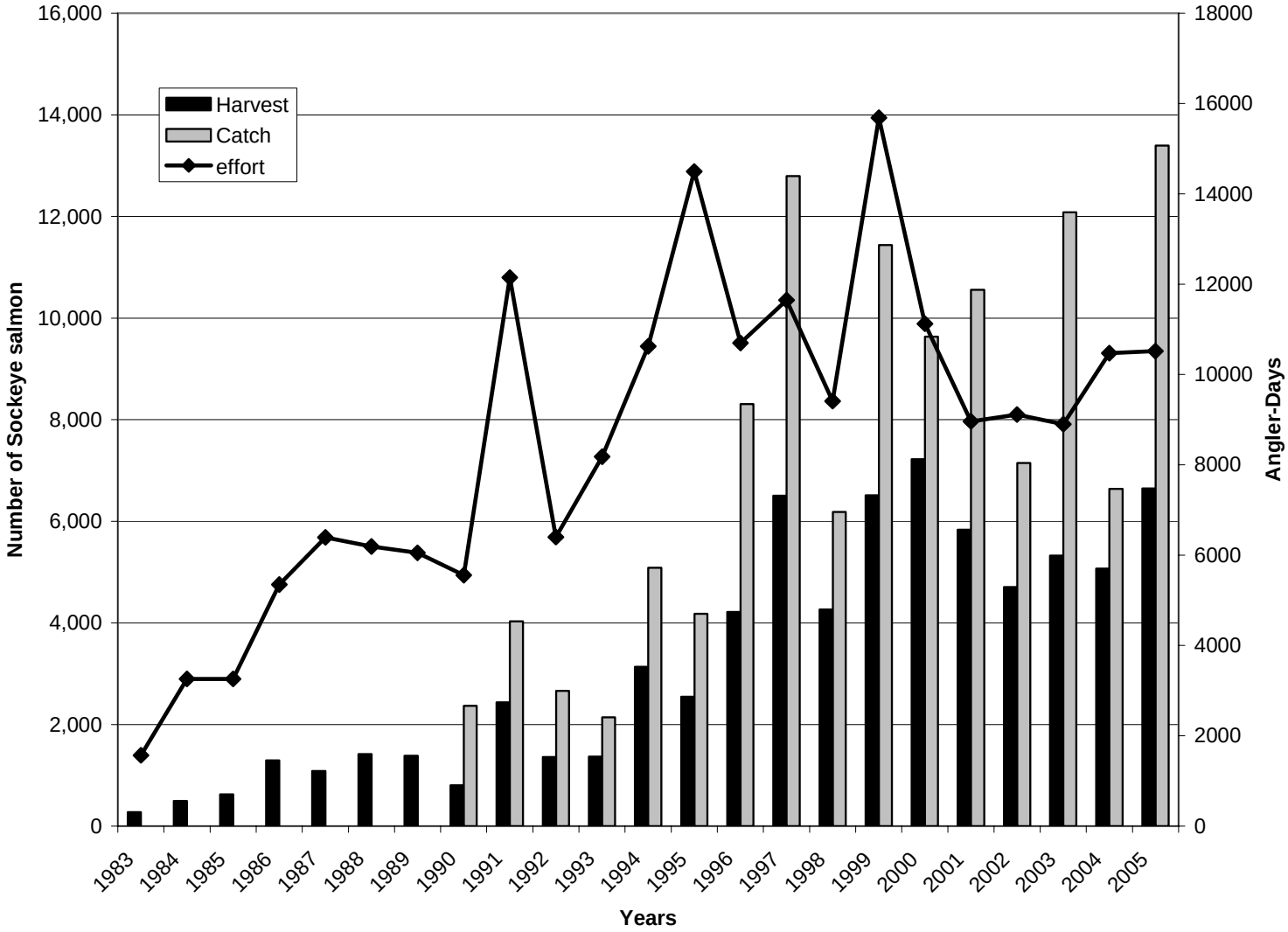

Figure 8.–Klutina River sockeye salmon catch, harvests and angler effort, 1977–2005.

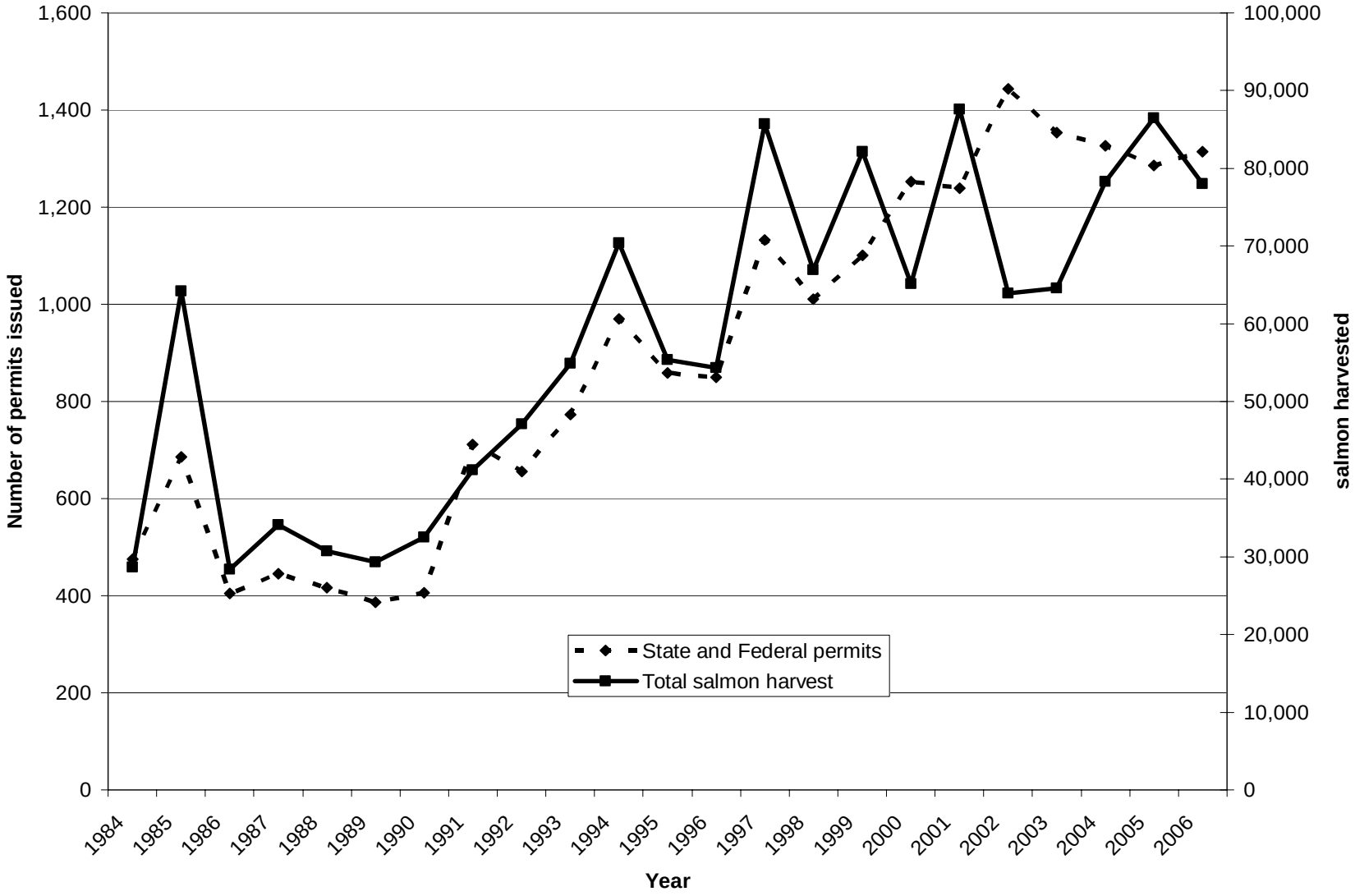

Figure 9.–**Total permits issued (state and federal) for subsistence fishing in the Copper River Glennallen, Batzulnetas, and Chitina Subdistricts 1984 – 2006.**

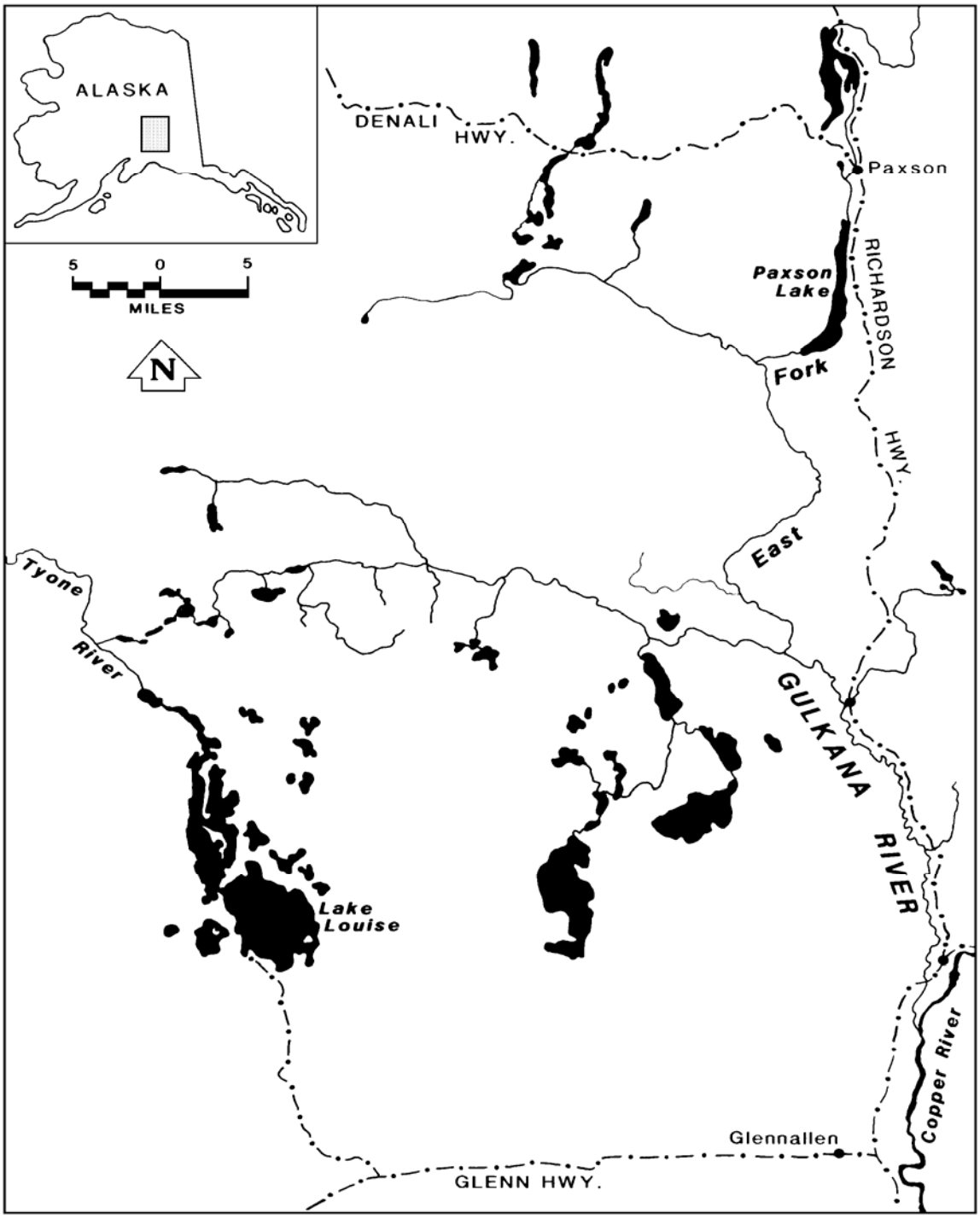

Figure 10.–Map of major lake trout fisheries in the UCUSMA.

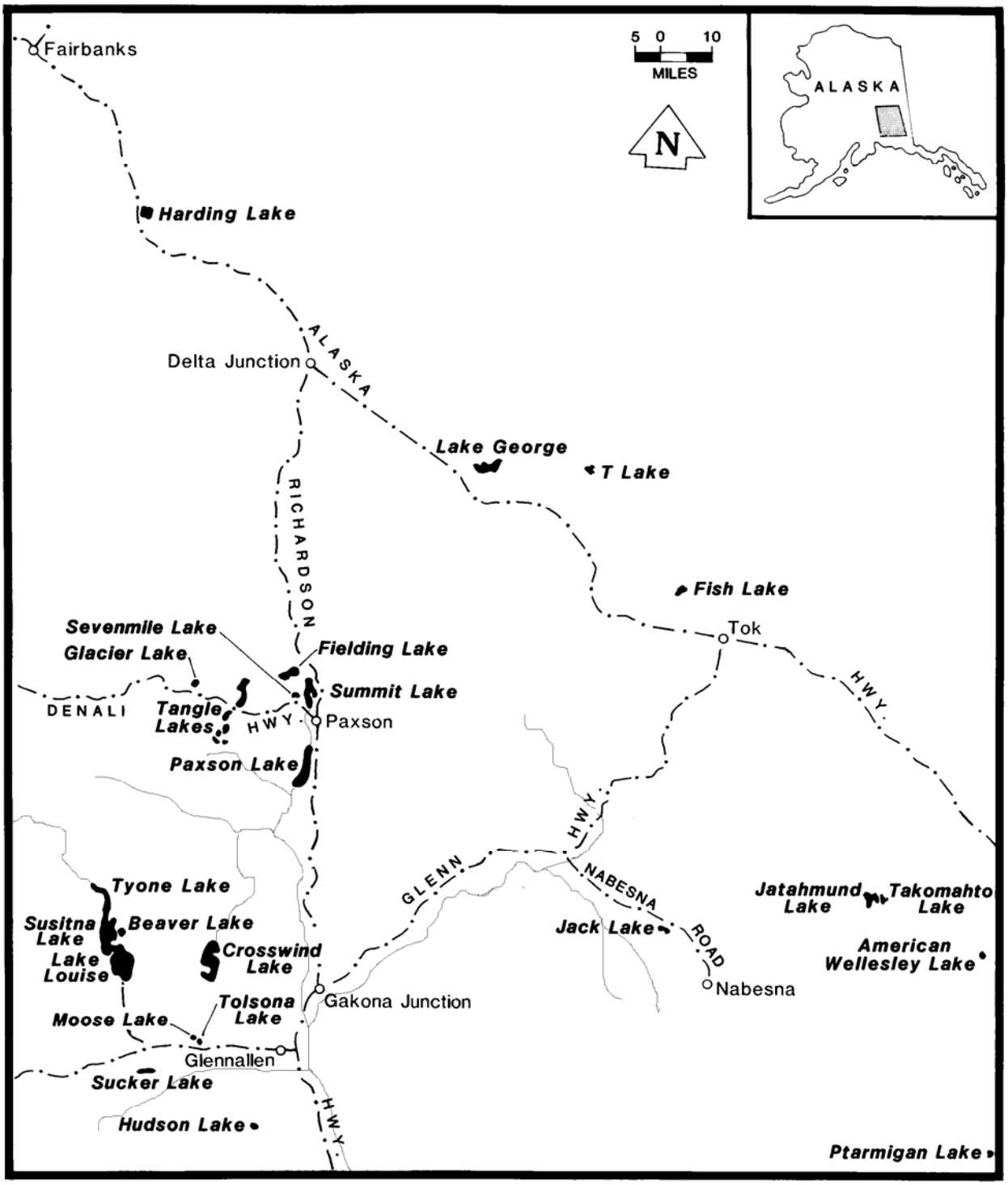

Figure 11.–Lakes supporting major burbot fisheries in the UCUSMA.

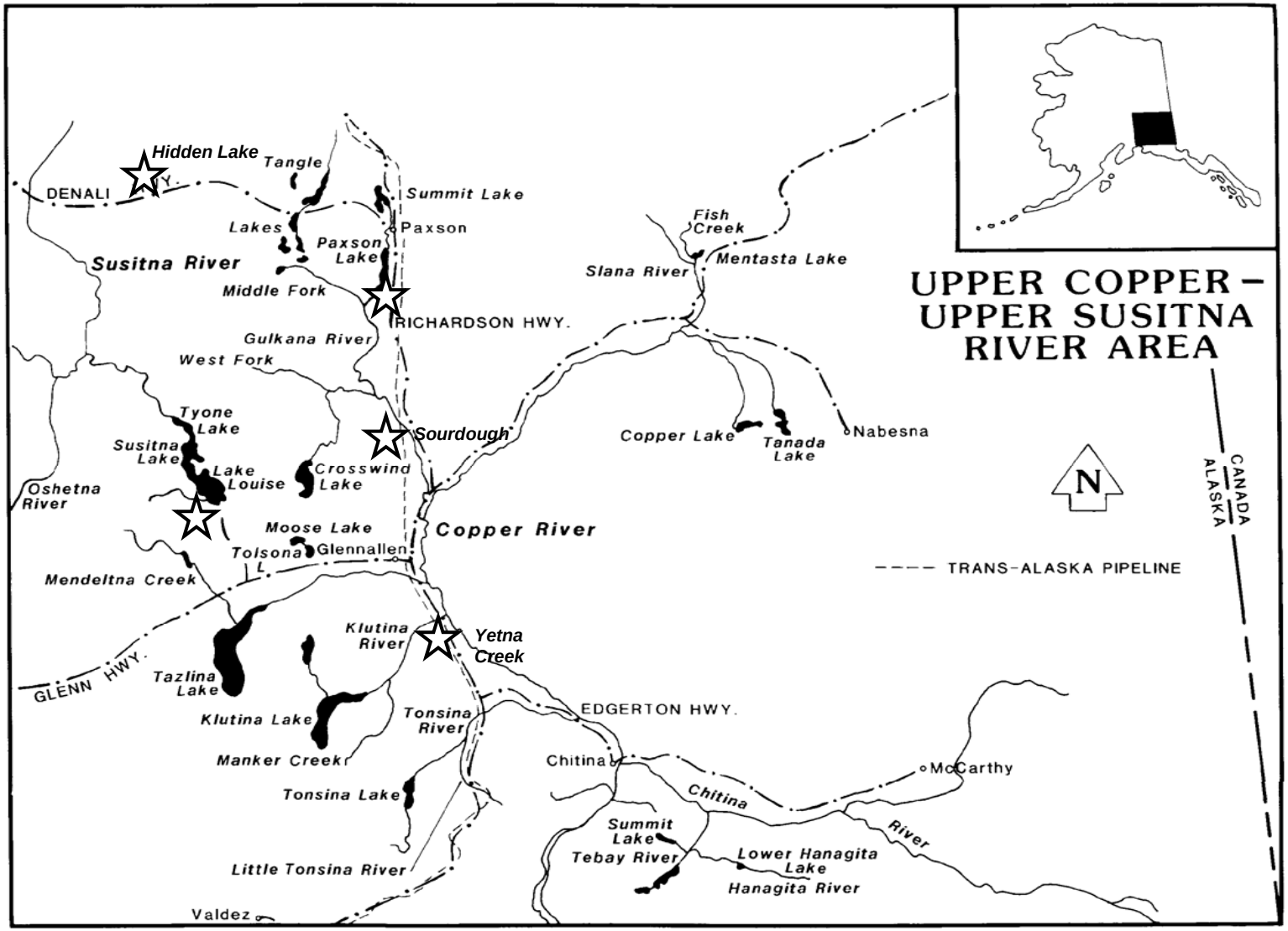

Figure 12.–Map of northern pike catch or observation reports in the UCUSMA.

APPENDICES

Appendix A–Listing of the addresses and contact numbers for information sources regarding UCUSMA information.

Organization	Address	Phone	Internet address
Alaska Department of Fish and Game, Glennallen Area office	**PO Box 47 Glennallen, AK 99588-0047**	**(907) 822-3309**	**www.adfg.state.ak.us**
Fairbanks Regional office	**1300 College Road Fairbanks, AK 99701-1599**	**(907) 459-7207**	
U.S. Bureau of Land Management	**PO Box 147 Glennallen, AK 99588-0147**	**(907) 822-3217**	**www.glennallen.ak.blm.gov**
WrangellSt. Elias National Park & Preserve	**PO Box 439 Copper Center, AK 99573**	**(907) 822-5234**	**www.nps.gov/wrst**
Ahtna, Inc	**PO Box 649 Glennallen, AK 99588-0649**	**(907) 822-3476**	**www.ahtna-inc.com**
Chitina Native Corporation	**PO Box 3 Chitina, AK 99566**	**(907) 823-2223**	
Greater Copper Valley Chamber of Commerce	**PO Box 469 Glennallen, AK 99588-0469**	**(907) 822-5555**	**www.traveltoalaska.com**

Appendix B. Emergency orders issued for UCUSMA sport, personal use, and subsistence fisheries during 2005 and 2006.

Year	E. O. Number	Explanation
2005	3-RS-01-05	Establishes the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River through August 31, 2005. The Chitina Subdistrict will be open from 12:01 P.M. Wednesday June 1 until 8:00 P.M. Sunday June 5.
2005	3-RS-02-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 6–June 12, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 6 until 11:59 P.M. Sunday June 12. In addition, this emergency order establishes the weekly period when a supplemental permit for 10 additional sockeye salmon will be valid for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River.
2005	3-RS-03-05	Establishes a weekly fishing period for the Batzulnetas area subsistence salmon fishery. The weekly fishing period will be 48-hours in duration from 12:00 noon Friday to 12:00 noon Sunday, beginning Friday June 3, 2005. Beginning on Friday July 1, the weekly fishing period will be increased to 84-hours in duration from 12:00 noon Friday to 11:59 P.M. Monday each week until September 1, or until closed by emergency order.
2005	3-RS-04-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 13–June 19, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 13 until 11:59 P.M. Sunday June 19.
2005	3-RS-05-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 20–June 26, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 20 until 11:59 P.M. Sunday June 26.
2005	3-RS-06-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 27–July 3, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 27 until 11:59 P.M. Sunday July 3.

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2005	3-RS-07-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period July 4–July 10, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 4 until 11:59 P.M. Sunday July 10. In addition, this emergency order establishes the weekly period when a supplemental permit for 10 additional sockeye salmon will be valid for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River.
2005	3-RS-08-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period July 11–July 17, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 11 until 11:59 P.M. Sunday July 17.
2005	3-RS-09-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period July 18–July 24, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 18 until 11:59 P.M. Sunday July 24.
2005	3-RS-10-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period July 25–July 31, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 25 until 11:59 P.M. Sunday July 31.
2005	3-RS-11-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period August 1–August 7, 2005. The Chitina Subdistrict will be open from 8:00 A.M. Tuesday August 2 until 11:59 P.M. Sunday August 7.
2005	3-RS-12-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period August 8–August 14, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday August 8 until 11:59 P.M. Sunday August 14.
2005	3-RS-13-05	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period August 15–August 31, 2005. The Chitina Subdistrict will be open from 12:01 A.M. Monday August 15 until 11:59 P.M. Wednesday August 31.

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2005	3-KS-01-05	Reduces the annual limit for king salmon 20 inches or more in length in the Gulkana River drainage of the Upper Copper River from 4 to 1 per year. The annual limit for the entire Upper Copper River will remain at 4 king salmon per year, but no more than 1 king salmon may be retained from the Gulkana River drainage after July 2, 2005.
2006	3-RS-01-06	Establishes the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River through August 31, 2006. The Chitina Subdistrict will remain closed through at least 12:01 A.M. Monday June 5.
2006	3-RS-02-06	Establishes a weekly fishing period for the Batzulnetas Area subsistence salmon fishery. The weekly fishing period will be 48-hours in duration from 12:00 noon Friday to 12:00 noon Sunday, beginning Friday June 2, 2006. Beginning on Saturday July 1, the weekly fishing period will be increased to 84-hours in duration from 12:00 noon Friday to 11:59 P.M. Monday each week through September 1, or until closed by emergency order.
2006	3-RS-03-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period June 5–June 11. The Chitina Subdistrict will be open from 12:01 P.M. Friday June 9 until 8:00 P.M. Sunday June 11.
2006	3-RS-04-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period June 12–June 18, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 12 until 11:59 P.M. Sunday June 18. In addition, this emergency order establishes the weekly period when a supplemental permit for 10 additional sockeye salmon will be valid for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River.
2006	3-RS-05-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period June 19–June 25, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 19 until 11:59 P.M. Sunday June 25.
2006	3-RS-06-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period June 26–July 2, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 26 until 11:59 P.M. Sunday July 2.

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2006	3-RS-07-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period July 3–July 9, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 3 until 11:59 P.M. Sunday July 9.
2006	3-RS-08-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period July 10–July 16, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 10 until 11:59 P.M. Sunday July 16.
2006	3-RS-09-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period July 17–July 23, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 17 until 11:59 P.M. Sunday July 23.
2006	3-RS-10-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period July 24–July 30, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 24 until 11:59 P.M. Sunday July 30.
2006	3-RS-11-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period July 31–August 6, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 31 until 11:59 P.M. Sunday August 6.
2006	3-RS-12-06	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River for the period August 7–August 31, 2006. The Chitina Subdistrict will be open from 12:01 A.M. Monday August 7 until 11:59 P.M. Thursday August 31.