Fishery Management Report No. 06-57

Area Management Report for the Recreational Fisheries of the Upper Copper/Upper Susitna River Management Area, 2004

by

Tom Taube

December 2006

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

FISHERY MANAGEMENT REPORT NO. 06-57

AREA MANAGEMENT REPORT FOR THE RECREATIONAL FISHERIES OF THE UPPER COPPER/UPPER SUSITNA RIVER MANAGEMENT AREA, 2004

by

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December 2006

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EXECUTIVE SUMMARY

This document provides a wide array of information specific to the recreational angling opportunities that exist within the Upper Copper/Upper Susitna Management Area. Information specific to the proposals that the Alaska Board of Fisheries will address at the December 1-6, 2005 meeting are contained within numerous sections of this report. As a means to assist Board members in acquiring information in a timely manner, Appendix B has been constructed (page 137). This table guides the reader to specific information contained within text, table, and graphic format that, hopefully will be useful in evaluating regulatory proposals.

PREFACE

The goals of the Division of Sport Fish of the Alaska Department of Fish and Game are to conserve wild stocks of sport fish, to provide a diversity of recreational fishing opportunities, and to optimize social and economic benefits from recreational fisheries. In order to implement these goals the division has in place a fisheries management process.

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 about important sport fisheries within Region III. The report is written to make information available to the Alaska 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 Division of Sport Fish management programs within the area.

An annual regional area review is conducted in mid-winter during which the current 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 during the course of these research projects is combined with effort information and input from user groups and is used to assess the need for and development of fisheries management plans, and to propose regulatory strategies.

Division of Sport Fish management and research activities are primarily funded by a combination of State of Alaska Fish and Game (F&G) and Federal Aid in Fisheries Restoration monies. The F&G funds are from the sale of fishing licenses. The Federal Aid (or D-J, named after Dingell and Johnson, the congressmen who wrote the Act) funds are from a Federal tax on fishing tackle and equipment. The D-J funds are provided to the states at a match of up to three-to-one with the F&G funds. Funding source for W-B (Wallop-Breaux, authors of the Act) money is a tax on boat gas and equipment. Other peripheral funding sources can 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 2004, with preliminary information from the 2005 season. Following the introduction, which includes an overview of the region, this report is organized into two primary sections: management area overview, and fisheries. The fisheries section describes the major fisheries within the UCUSMA. Each fishery contains a background and historical perspective, recent fishery performance, management objectives, fishery management, fishery outlook, recent Alaska Board of Fisheries actions, current issues, and ongoing and recommended research and management activities.

ABSTRACT

Sport fisheries management recommendations and background information for 2004 in the Upper Copper-Upper Susitna Management Area is presented. This information was provided to the Alaska Board of Fisheries, as well as the general public and interested parties. The Upper Copper-Upper Susitna Management Area 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. Sport, personal use, and subsistence salmon fisheries target king and sockeye salmon and sport fisheries target burbot, lake trout, rainbow/steelhead trout, Arctic grayling and Dolly Varden. In 2004, sport fish angler-days totaled 46,592, the majority in the Gulkana River drainage. Sockeye salmon were the predominant sport fish species harvested in 2004 with 6,464 fish taken, while Arctic grayling are the predominant species caught (including fish harvested and released) with 50,688 fish caught. Summaries of major sport, personal use and subsistence fisheries within the area are detailed, including descriptions of recent performances, Alaska Board of Fisheries regulatory actions, social and biological issues, and descriptions of ongoing research and management activities.

Key Words: Copper River, Susitna River, Gulkana River, Klutina River, Chitina Subdistrict, Glennallen Subdistrict, personal use, subsistence, king salmon, sockeye salmon, burbot, lake trout, Arctic grayling

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into ten regulatory areas for the purpose of organizing 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 (AAC 2004). Division of Sport Fish 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 is Southeast Alaska. Region II covers portions of Southcentral Alaska, Kodiak, Southwestern Alaska, and the Aleutian Islands. Region III includes two of the BOF regulatory areas. They are the upper Copper and upper Susitna regulatory area and the Arctic-Yukon-Kuskokwim regulatory area. Prior to 2000, a portion of the Arctic-Yukon-Kuskokwim regulatory area was excluded from Region III and included in Region II; this was the lower Kuskokwim drainage from the Aniak River downstream and Kuskokwim Bay.

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, and upper Copper and upper Susitna River drainage's), 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 Division of Sport Fish has divided Region III into six fisheries management areas (Figure 1). They are:

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

(2) The Arctic-Yukon-Kuskokwim (AYK) Management Area (the North Slope drainages, the Yukon River drainage except for the Tanana River drainage).

(3) 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).

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

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

(6) The Kuskokwim Management Area. This management area was created and added to Region III in 2000.

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

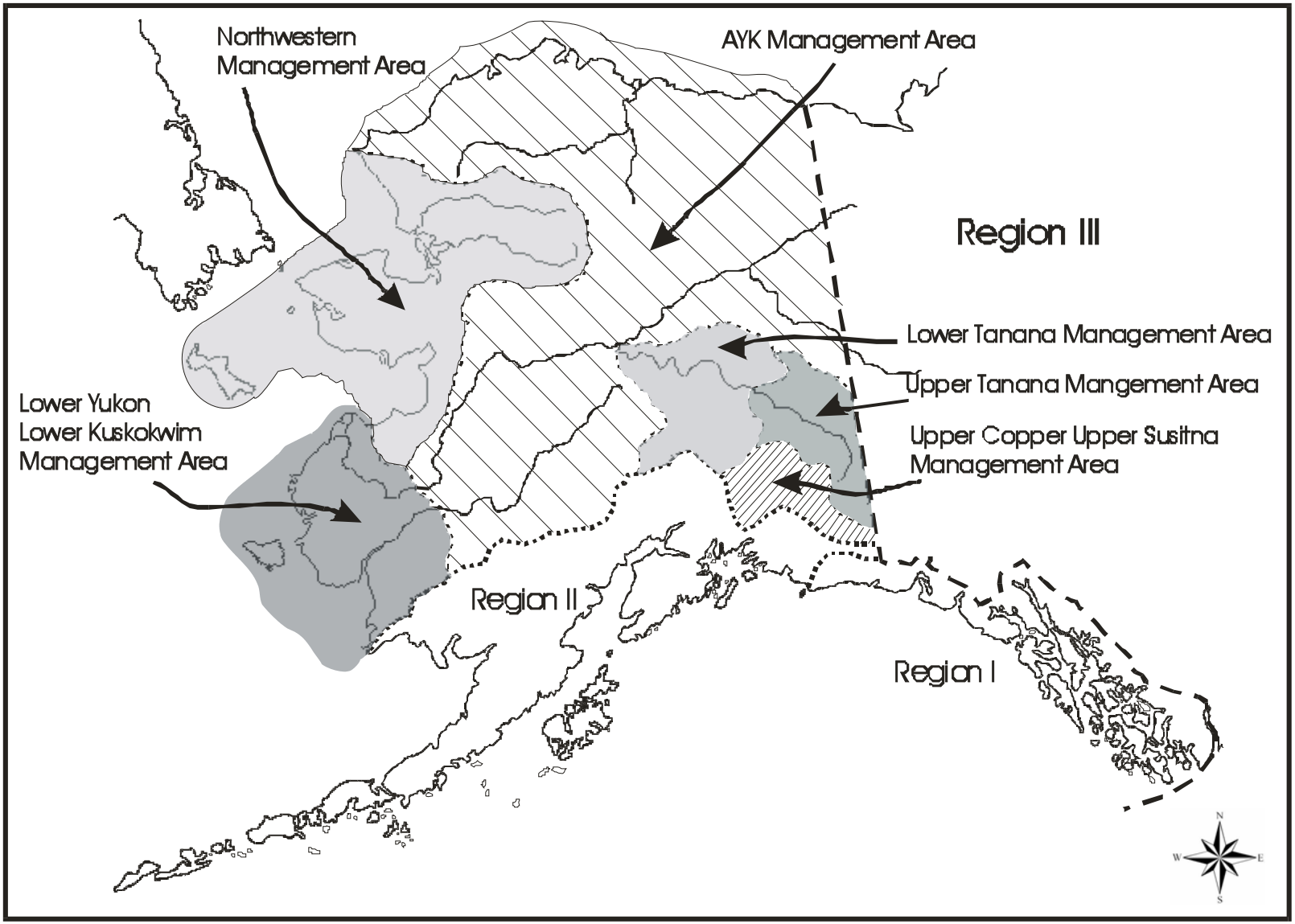

Figure 1.–Map of the sport fish regions in Alaska and the six Region III management areas.

ALASKA BOARD OF FISHERIES

The BOF is the 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 and must be confirmed by the legislature. Board members are appointed for 3 years.

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. The BOF meetings are usually in the wintertime, between early October and late March. Regulation proposals and management plans are received for evaluation by the BOF from ADF&G and the public (any Alaskan or individual can submit a proposal to the BOF), and during its deliberations the BOF receives input and testimony through oral and written reports from staff of the ADF&G, 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 individuals from the local public who are nominated 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 have generally 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 2004, 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 (AAC 2004a) to modify time, area, and bag/possession limit regulations. EOs are implemented to deal with conservation issues that arise that are not adequately controlled by existing regulations. In that scenario, they deal with the situation until it is resolved or the BOF can formally take up the issue. EOs are also the mechanism by which "in-season" management of fisheries is accomplished. In-season management is usually in accordance with a fisheries management plan approved by the BOF.

FEDERAL REGIONAL ADVISORY COUNCILS

Under ANILCA (Alaska National Interest Lands Conservation Act) the federal government requires the state of Alaska to establish use of fish and game by rural residents as the top 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 DIVISION OF SPORT FISH RESEARCH AND MANAGEMENT STAFFING

The Region III Division of Sport Fish 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. There is an access coordinator to administer the regional fishing and boating access program, who is also the regional management biologist assigned to the Region III headquarters office in Fairbanks. The access coordinator has an assistant who manages the construction and mapping components of the access program. An information officer located in Fairbanks and an education associate (added in 2003) are charged with the responsibility of organizing and upgrading the sport fishery outreach and information programs.

The research group consists of a research supervisor, a salmon research supervisor, a resident species supervisor, research biologists (seven in 2004), 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 overlap somewhat.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska has 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, 2006). In recent years, two types of questionnaires were mailed to a stratified random sample of households containing at least one individual who purchased a sport fishing license (resident or non-resident) or possess a valid permanent fishing license. Information gathered from the surveys 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 is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It was not designed to provide estimates of effort directed towards a single species and species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. The survey results for each year are not available until the following year; hence the results for 2004 were not available until fall 2005. 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 inseason management.

The following guidelines (Mills and Howe 1992) have been provided to evaluate the utility of statewide survey estimates, which is dependent on the number of responses for a given site:

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

In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation.

SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The Upper Copper River-Upper Susitna River sport fish 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). 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 good 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 not accessible by road. Snow machines are the popular mode of travel to remote fisheries in the 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 the sport fisheries in the UCUSMA are found in Chapter 52 of Title 5 of the Alaska Administrative Code (AAC 2004) and regulations regarding the personal use fisheries are found in Chapter 77; subsistence fisheries regulations are found in Chapter 01. 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) and Walker et al. (2003), Jennings et al. (2004, 2006) under the heading “Glennallen Area” (Area I). In 2004, the statewide harvest survey data areas were modified, and since that time data specific to the UCUSMA fisheries is divided under the headings of the “Upper Copper River Drainage” (Area I) and the “Susitna River Drainage” (Area M).

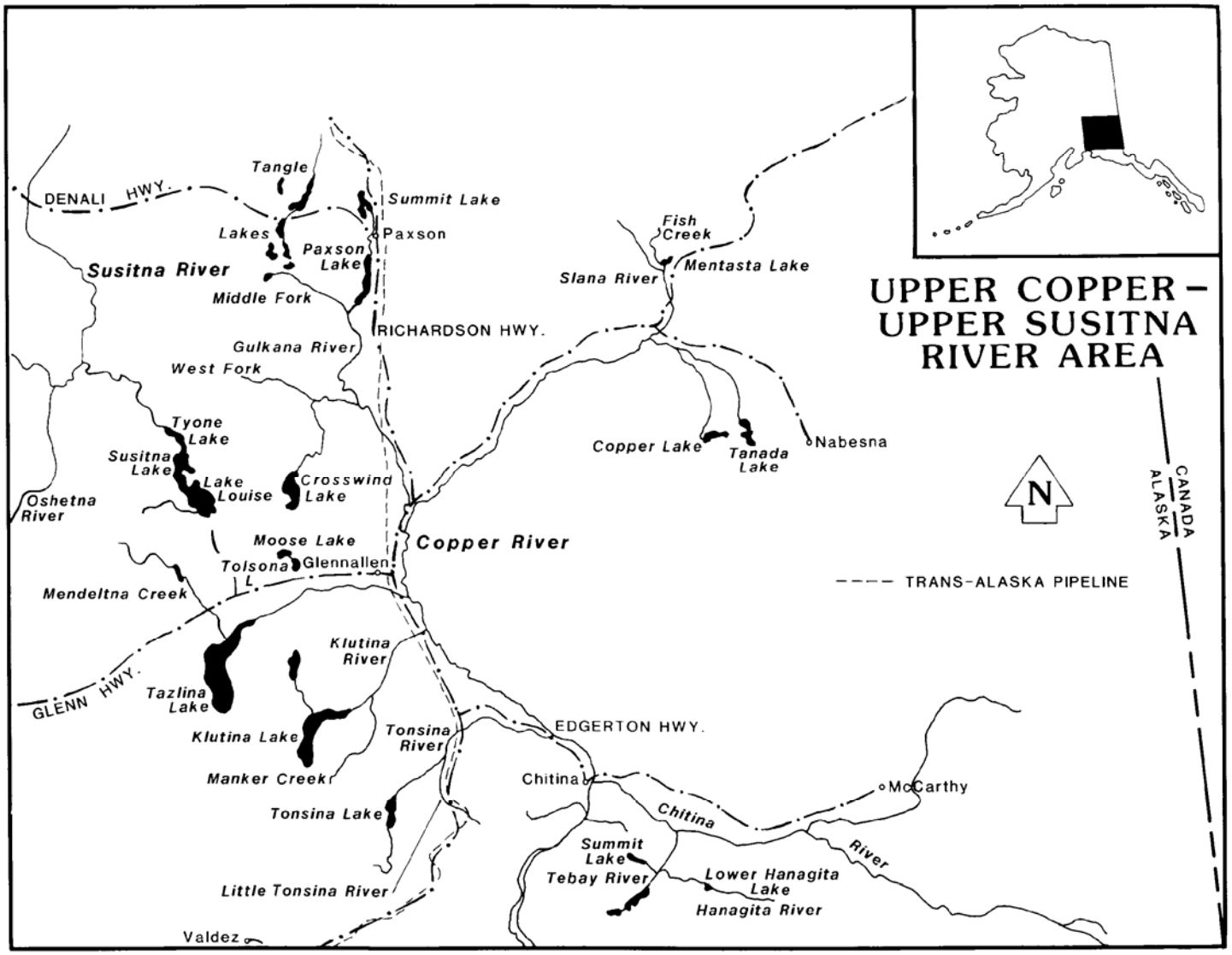

Figure 2.-The Upper Copper/Upper Susitna Management Area (UCUSMA).

Management and research of UCUSMA sport, personal use, and subsistence fisheries are directed from the Fairbanks and Glennallen area offices of the ADF&G. In 1997, management responsibility of the UCUSMA was transferred from Region II, headquartered in Anchorage, to Region III, headquartered in Fairbanks. The area management biologist and assistant area management biologist are stationed in Glennallen. A permanent full-time program technician is also stationed in Glennallen. This assistant is shared with the Division of Wildlife Conservation. 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 the 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 also 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* spp.

Currently, 28 lakes in the UCUSMA are stocked with Arctic grayling, rainbow trout, coho salmon, and Arctic char *S. alpinus*. 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 1999 through 2003, an average of 1,264,605 sockeye salmon and 43,915 king salmon were commercially harvested in the Copper River District (Gray et al. 2003; Table 1).

The BOF has established one personal use and two subsistence salmon fisheries in the upper Copper River. The Division of Sport Fish currently has the lead management responsibility for all of these fisheries (as opposed to Division of Commercial Fisheries which manages most of the State subsistence fisheries).

Table 1.-Commercial harvests of king and sockeye salmon in the Copper River District, 1977-2004.

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	35,461	1,048,004
1994-2003[a]	**50,806**	**1,540,056**
1999-2003[a]	**43,915**	**1,264,605**

[a] Average value for the years depicted.

From 1999 through 2003, an average of 176,180 salmon were harvested annually in these fisheries (Table 2). Sockeye salmon have comprised about 95% of the total catch. These fisheries are described in detail in a separate section of this report, and thus will not be described further here.

ALASKA BOARD OF FISHERIES ACTIVITIES

The development of regulations for fisheries in the UCUSMA occurs within the established Alaska BOF process. The public provides their input concerning regulation changes and allocation by various means including 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 have been established throughout Alaska to assist the BOF in assessing the effects of fisheries issues and proposed regulations on communities local to the resource under consideration. Most active committees meet at least once each year, usually in the fall prior to scheduled BOF meetings. Staff from the Division of Sport Fish and other divisions are often invited to attend the committee meetings. In this way, advisory committee meetings allow the public to interact with the staff involved with resource issues of local concern. Within the UCUSMA there are three advisory committees that serve resource users of the area; these are the Tok Cutoff/Nabesna Road, Copper Basin, and Paxson advisory 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

Under the current operating schedule, the BOF meets on a 3-year cycle. Proposals regarding UCUSMA fisheries were heard during the 1999 BOF meeting in Valdez. 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 this meeting (Taube 2002).

In January 2003 at its meeting in Cordova, the BOF addressed 50 proposals regarding UCUSMA sport, personal use, and subsistence fisheries. Changes as a result of BOF rulings are summarized below. Under personal use/subsistence regulations the BOF ruled against a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the Upper Copper River. This subdistrict encompassed the existing Copper River subsistence salmon dipnet fishery. As a result of this decision, the Copper River subsistence salmon dipnet fishery was repealed and the Chitina Subdistrict Personal Use Dip Net Salmon Fishery was re-established (as had been in effect from 1984-1999). The BOF viewed this as a name and allocation priority change only, and management of the fishery continued as it had previously, based upon the number of fish passing the Miles Lake sonar to provide an abundance based schedule that will distribute the harvest throughout the season. In addition, the BOF adopted a department proposal which required rainbow/steelhead trout caught in fish wheels and retained to have the tips of the tail fin removed. This aligned the state and federal regulations subsistence fisheries marking requirements for the Glennallen Subdistrict. A proposal was also adopted that gave the owner of a fishwheel the option to identify their fishwheel with either their name and address or their permanent ID number, which must be a valid Alaska Drivers License number or

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]	5,693	131,103	2,313	139,109
2003[a]	4,568	129,014	2,800	136,382
2004[a]	5,880	162,953	2,969	171,802
2005[c]	2,750	123,341	979	127,070
1994-2003[c]	**6,583**	**167,205**	**3,007**	**176,795**
1999-2003[c]	**6,613**	**166,405**	**3,162**	**176,180**

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

[b] Preliminary data based on less than 60% of permits returned.

[c] Average value for the years depicted.

Alaska State Identification number, on a wood, metal, or plastic plate at least 12 inches high by 12 inches wide with the letters or numerals at least one inch high. The BOF clarified the marking and reporting requirements for both the Glennallen and Chitina Subdistricts, participants must record all harvested fish and remove both tips of the tail immediately upon harvesting the fish. "Immediately" was defined as before concealing the salmon from plain view or transporting the salmon from the fishing site. "Fishing site" was defined as the location where the fish was removed from the water and became part of the permit holder's bag limit.

The BOF adopted a department proposal which modified the Copper River King Salmon Management Plan (AAC 2004b). The spawning escapement range of 28,000 – 55,000 king salmon was changed to a sustainable escapement goal of 24,000 or more king salmon. This adjustment was done based upon additional data collected by research projects since the previous escapement range was set. In addition, the conservation measures, outlined in the plan that may be taken by the sport fish manager to meet escapement goals were prioritized. Specific to the Gulkana River king salmon sport fishery all waters of the Middle Fork were closed to king salmon fishing to protect spawning salmon. This change rectified an error in the regulations that had been in place prior to 1997 and were inadvertently removed following the 1996 Board meeting. The BOF also passed a proposal allowing the use of bait and multiple hooks in the Tonsina River; previously bait was only permitted on single hooks with a gap of less than 3/8 of an inch. New data gathered by the department since the bait restriction was put into effect, indicated a king salmon run larger than previously thought and of sufficient size to withstand additional sport fish harvest. Bait and multiple hooks was also permitted in the Copper River mainstem upstream of Haley Creek, to provide for the king salmon and burbot fisheries that had occurred there prior to 2000 when the drainage-wide unbaited, single-hook artificial lure regulation was instituted.

There was one proposal passed regarding rainbow trout and steelhead regulations in the area. Twelvemile Creek, in the Gulkana River drainage, was closed to all sport fishing from April 15 to July 14 to protect spawning rainbow trout and steelhead. This proposal had been submitted by the department as a result of radio-telemetry work done on the Gulkana River which identified Twelvemile Creek as a spawning area.

Regarding burbot, there were three changes in the regulations for the Upper Copper River drainage. Burbot may 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 each hook must be a single hook with a gap between point and shank larger than ¾ inch, and must be set to rest on the river bottom. Each line must be identified with the angler's name and address and must be physically inspected at least once every 24 hours. The second change was the closure of Tolsona Lake to burbot fishing. Tolsona Lake had been closed to burbot fishing by EO since 1998 due to a decline in the burbot population. This action will afford the burbot population protection until it reaches a level that can sustain harvests and reduce public confusion regarding the EO. The third change was the opening of Lake Louise to burbot fishing with a bag and possession of one burbot. Lake Louise had been closed to burbot fishing since 1991, and the population has stabilized at a level that can sustain a modest harvest.

Two changes occurred in the Arctic grayling regulations for the Upper Copper River/Upper Susitna River drainage. In flowing waters and lakes, the background bag and possession limit for Arctic grayling is five to provide consistency in the regulations for wild Arctic grayling populations. Arctic grayling bag and possession limit for stocked lakes was increased from five to ten.

Regarding lake trout, only unbaited, single-hook, artificial lures may be used in Paxson and Summit lakes (Gulkana River drainage). This regulation reduces hooking mortality associated with bait for lake trout released under the current 24" minimum size regulation and provides for additional protection to rainbow trout and Arctic grayling populations that are under catch-and-release regulations in the Upper Gulkana River.

A proposal was passed that permits the harvest of whitefish and suckers with bow and arrow. Whitefish may be taken by spear or bow and arrow from October 1 through March 31 and suckers may be taken by spear or bow and arrow during the entire year.

Finally, ice fishing houses that remain on the ice at the end of a day must be registered and a permit received each year from the department. Permit numbers must be displayed on one side and roof of the ice house, in numbers at least 12 inches in height.

During the January 2004 meeting, the BOF adopted a Regional Arctic Grayling Management Plan (the UCUSMA was included through submission of an agenda change request). The plan created three management categories with associated regulatory options; Background Regulations, Conservative Harvest Regulations, and Special Management Regulations.

The plan categorized Mendeltna Creek in the UCUSMA under Conservative Harvest management with a bag and possession limit of two fish, and a minimum size limit of 12 inches. There were no wild Arctic grayling waters classified as Special Management in the UCUSMA.

The regulations adopted under the plan as Background Regulations did not change the general Arctic grayling regulations in the UCUSMA as these had been modified at the 2003 BOF meeting. Regulations for waters already under special regulations did not change, such as those in the Gulkana River drainage.

The BOF also adopted a Regional Stocked Waters Management Plan (again the UCUSMA was included through submission of an agenda change request). The Plan created three Management Categories; High Yield Lakes, Conservative Yield Lakes, and Special Management Lakes. Almost all stocked lakes in the UCUSMA are categorized under the Plan as High Yield - Rural. Four of the UCUSMA lakes were categorized as High Yield - Remote. No stocked lakes in the UCUSMA were classified as Conservative Yield or Special Management lakes.

The regulations for High Yield Lakes were applied region-wide, and changed the general regulations for stocked waters in the UCUSMA. Previously, the bag and possession limits for UCUSMA stocked lakes were 10 rainbow trout, of which one could be greater than 20 inches and 10 Arctic grayling, with no size limit. Under the High Yield category, the bag and possession limits for rainbow trout, Arctic grayling, landlocked salmon, and Arctic char/Dolly Varden are 10 fish in combination, of which only one fish may be greater than 18 inches in length.

Emergency Order Authority

To address conservation concerns and to implement BOF adopted management plans, the department has EO authority (AAC 2004a) to modify time, area, and bag/possession limit regulations. EOs issued under this authority during 2004-2005 are summarized in Table 3.

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 primarily 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 (10) 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, usually in the fall and late winter, the most recent meeting was held October 25-27, 2005 in Kenai. At this meeting, nine 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. Staff from the Division of Sport Fish and other divisions are invited to attend the council meetings and present data to the council regarding wildlife and fisheries issues within the councils responsibility.

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), and Jennings et al. (2004, 2006) under the heading “Glennallen Area” (Area I). In 2004, the statewide harvest survey data areas were modified, and since that time, data specific to the UCUSMA fisheries is divided under the headings of the “Upper Copper River Drainage” (Area I) and the “Susitna River Drainage” (Area M). 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.

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; 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.

Table 3.-Emergency orders issued for UCUSMA sport, personal use, and subsistence fisheries during 2004-2005.

Year	E. O. Number	Explanation
2004	3-RS-01-04	Establishes the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the Upper Copper River through August 31, 2004. The Chitina Subdistrict will be open from 6:00 A.M. Thursday June 3 until 11:59 P.M. Sunday June 6.
2004	3-RS-02-04	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 7 – June 13, 2004. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 7 until 11:59 P.M. Sunday June 13. In addition, this EO 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.
2004	3-RS-03-04	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 4, 2004. Beginning on Friday July 2, 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 EO.
2004	3-RS-04-04	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 14 – June 20, 2004. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 14 until 11:59 P.M. Sunday June 20.
2004	3-RS-05-04	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 21 – June 27, 2004. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 21 until 11:59 P.M. Sunday June 27.
2004	3-RS-06-04	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period June 28 – July 4, 2004. The Chitina Subdistrict will be open from 12:01 A.M. Monday June 28 until 11:59 P.M. Sunday July 4.
2004	3-RS-07-04	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period July 5 – July 11, 2004. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 5 until 11:59 P.M. Sunday July 11.
2004	3-RS-08-04	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period July 12 – July 18, 2004. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 12 until 11:59 P.M. Sunday July 18.
2004	3-RS-09-04	Amends the schedule for the personal use dip net salmon fishery in the Chitina Subdistrict of the upper Copper River for the period July 19 – August 31, 2004. The Chitina Subdistrict will be open from 12:01 A.M. Monday July 19 until 11:59 P.M. Tuesday August 31.
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 EO 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.

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Table 3.–Page 2 of 2.

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 EO.
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.
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 EO 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.
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.

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

Due to a computational problem (discovered in 1999), the estimates of effort, catch, and harvest for 1995 – 1998 produced by RTS were incorrect. RTS has recomputed the estimates for 1996, 1997, and 1998, and all of the tables within this report have been corrected to reflect the recalculated values of effort, catch and harvest. The electronic file containing data for 1995 was lost and the data will never be corrected.

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, and Jennings et al. 2004, 2006). From 1994 through 2003 sport anglers` expended an average of 64,920 angler-days fishing UCUSMA waters, an average of 2.8% of the annual statewide sport angling effort and about 25% of the annual AYK (Region III) sport angling effort over this period (Table 4). Recreational angler effort was relatively stable until 1991 when it began to increase and peaked in 1995 when 102,951 angler-days were expended in the UCUSMA (Figure 3). The upper Copper River drainage has supported approximately 84% of the sport effort expended in the UCUSMA from 1994 through 2003 (Table 5). In this drainage, the Gulkana River drainage has supported the majority of the sport angling effort. The Klutina River is the other upper Copper River drainage that supports a popular sport fishery. The major sport fishery in the upper Susitna River drainage is in the Tyone River drainage and includes Lake Louise, Susitna and Tyone lakes.

During 2004, sport anglers fishing UCUSMA waters expended approximately 46,592 angler-days (Tables 4 and 5). Participation in 2004 was the lowest since 1988 and approximately 28% less than the recent 10-year average. The low number of angler-days expended during 2004 in the UCUSMA reflects a reduced level of effort that has occurred in the area and regional sport fisheries since 1999.

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 area's fisheries. 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 area's fish stocks. The following management plans and policies have been adopted by the BOF for UCUSMA fish stocks and reflect actions taken by the BOF during the January 2003 and 2004 meetings:

> *Copper River District Salmon Management Plan* (AAC 2004c). This management plan contains spawning escapement goals for sockeye and other salmon, harvest guidelines 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.

Table 4.-Number of angler-days of sport fishing effort expended by recreational anglers fishing UCUSMA waters, 1977-2004.

Year	UCUSMA Effort	Alaska Effort	% by UCUSMA	Region III Effort[a]	% by UCUSMA
1977	51,485	1,198,486	4.3	174,646	29.5
1978	44,566	1,285,063	3.5	190,058	23.4
1979	57,266	1,364,739	4.2	183,362	31.2
1980	50,518	1,488,962	3.4	210,784	24.0
1981	53,499	1,447,886	3.7	202,385	26.4
1982	54,953	1,640,644	3.3	253,744	21.7
1983	51,512	1,755,408	2.9	250,637	20.6
1984	51,964	1,874,064	2.8	251,005	20.7
1985	48,707	1,953,716	2.5	235,590	20.7
1986	51,563	2,087,268	2.5	246,276	20.9
1987	52,324	2,185,359	2.4	269,433	19.4
1988	45,867	2,348,595	2.0	279,426	16.4
1989	52,262	2,297,133	2.3	291,888	17.9
1990	50,791	2,455,468	2.1	296,420	17.1
1991	64,207	2,476,588	2.6	284,129	22.6
1992	72,052	2,564,754	2.8	253,904	28.4
1993	77,870	2,559,408	3.0	298,842	26.1
1994	85,520	2,719,911	3.1	295,507	28.9
1995	102,951	2,787,670	3.7	373,092	27.6
1996	64,407	2,006,528	3.2	265,573	24.3
1997	56,257	2,079,514	2.7	295,113	19.1
1998	56,706	1,856,976	3.1	227,841	24.9
1999	77,619	2,499,152	3.1	304,522	25.5
2000	58,194	2,627,805	2.2	241,574	24.1
2001	48,879	2,261,941	2.2	194,138	25.2
2002	46,613	2,259,091	2.1	220,276	21.1
2003	52,051	2,219,398	2.3	206,705	25.2
2004	46,592	2,473,961	1.9	217,041	21.5
1994-2003[b]	**64,920**	**2,331,799**	**2.8**	**262,434**	**24.6**
1999-2003[b]	**56,671**	**2,373,477**	**2.4**	**233,443**	**24.2**

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

[b] Average value for the years depicted.

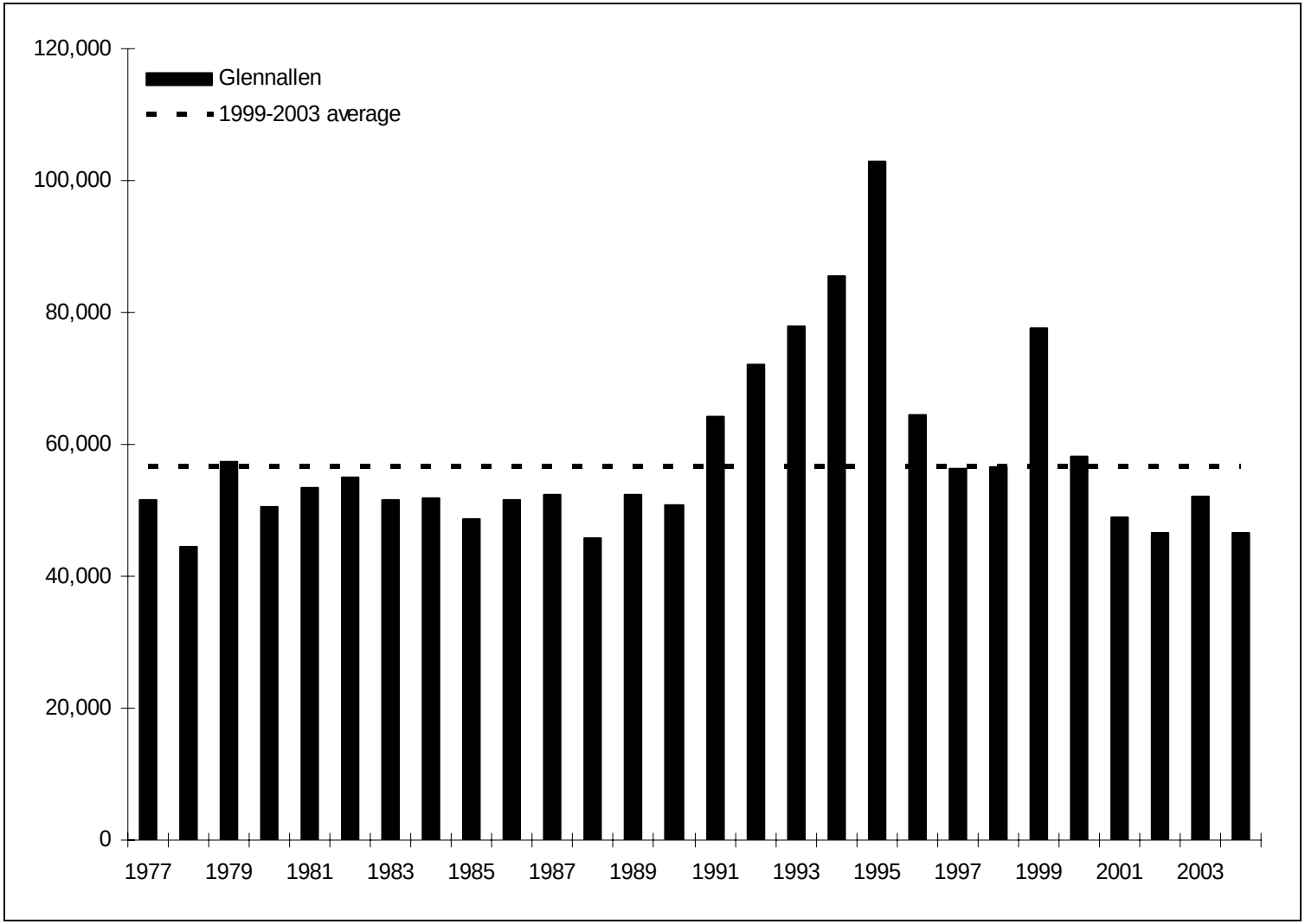

Figure 3.-Sport fish effort in the UCUSMA, 1977-2004.

Table 5.-Sport fishing effort (angler-days) in the UCUSMA by drainage, 1977 - 2004.

	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[c]	Stocked Lakes	Lakes	Streams	Total	Total
1977	8,281	4,165	12,446	14,899	0[a]	14,899	0[a]	234	0[a]	0[a]	0[a]	1,776	0[a]	0[a]	22,130	51,485
1978	8,917	6,570	15,487	13,161	0[a]	13,161	0[a]	0	0[a]	0[a]	0[a]	2,584	0[a]	0[a]	13,334	44,566
1979	7,750	17,323	25,073	12,199	0[a]	12,199	0[a]	63	0[a]	0[a]	0[a]	1,036	0[a]	0[a]	18,895	57,266
1980	7,725	13,752	21,477	10,539	0[a]	10,539	0[a]	129	0[a]	0[a]	0[a]	1,737	0[a]	0[a]	16,636	50,518
1981	7,902	14,430	22,332	14,397	0[a]	14,397	0[a]	0	0[a]	0[a]	0[a]	1,473	0[a]	0[a]	15,297	53,499
1982	8,855	14,979	23,834	14,024	0[a]	14,024	0[a]	34	0[a]	0[a]	0[a]	1,810	0[a]	0[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 5.-Page 2 of 2.

Year	Gulkana River Drainage			Upper Susitna Drainage			Klutina	Tazlina	Tonsina	Copper River		Stocked Lakes	Other Sites			Area Total
	Lakes	Streams	Total	Lakes	Streams	Total				Upstream of Gulkana	Downstream of Klutina[b]		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
1994-2003[c]	**6,752**	**24,250**	**31,002**	**9,052**	**1,236**	**10,288**	**11,065**	**1,830**	**1,564**	**1,019**	**778**	**3,794**	**1,782**	**1,796**	**3,578**	**64,920**
1999-2003[c]	**6,308**	**21,344**	**27,651**	**7,564**	**850**	**8,414**	**10,756**	**1,115**	**1,162**	**898**	**437**	**3,535**	**1,387**	**1,315**	**2,702**	**56,671**

[a] Prior to 1983, harvest included in "other sites".
[b] Not including the Tonsina drainage.
[c] Average value for the years depicted.

Copper River King Salmon Fishery Management Plan (AAC 2004b). This management plan provides for a sustainable escapement goal for king salmon in the Copper River drainage of 24,000 or greater. To achieve this goal the department will manage the commercial fishery through EO closures of the statistical areas of the Copper River District during statistical weeks 20, 21, and 22 based upon considerations of tides, water levels, fishery performance, other environmental factors, and other indicators of run strength. 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 through the use of 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 (AAC 2004d). 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 Tanada Creek and its confluence with the Copper River.

Copper River Personal Use Dip Net Salmon Fishery Management Plan (AAC 2004e). This management plan establishes fishing season, 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 EO. The permit limit may be increased during weeks of harvestable surplus determined from actual sonar counts.

Lake Burbot Management Plan (AAC 2004h). 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 EOs to reduce the time or areas open to fishing and/or prohibit set lines to accomplish this management objective.

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.

Wild Arctic Grayling Management Plan (AAC 2004g). 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 BOF to change or address the management approach for a water body or fish stock or outlined in the plan.

Upper Copper River and Upper Susitna River Area Stocked Waters Management Plan (AAC 2004j). 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 BOF during the Board's meeting cycle.

MAJOR ISSUES

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

Copper River King Salmon: From 1999-2002, estimates of upper Copper River king salmon escapement have been obtained from a department radio-telemetry research study. This information, in addition to harvest and age data, resulted in modifying the spawning escapement range of 28,000 – 55,000 king salmon to a sustainable escapement goal of 24,000 or more king salmon in the *Copper River King Salmon Management Plan* (AAC 2004b), which was adopted by the BOF at the 2003 meeting. Since 2003, estimates of escapement have been obtained from a fish wheel mark-recapture study conducted by the Native Village of Eyak and LGL, Inc. Unfortunately, there is still a lack of spawner-recruit data to assess the long-term productivity of the Copper River king salmon return or the validity of establishing a king salmon biological escapement goal. From 1995-99 commercial harvests, the largest component of the annual harvest, had increased in conjunction with the area's subsistence and sport fisheries raising concerns regarding sustainability of these harvest levels. As a result of the actions taken through the plan, 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: Since 1990, harvest and participation in the Glennallen and Chitina Subdistrict subsistence salmon fisheries have doubled. Both fisheries are managed under BOF-adopted management plans. Under these management plans, an escapement goal of 60,000–75,000 salmon for the Glennallen Subdistrict subsistence fishery and an escapement goal of 100,000 – 150,000 salmon for the Chitina Subdistrict personal use fishery have been set. The Chitina Subdistrict allocation increase following the 1999 BOF meeting has addressed the increasing harvests numbers since 1996. But the Glennallen Subdistrict fishery (60 – 75,000 salmon) harvest has exceeded the harvest guidelines in 1997, 1999, and 2001. Strong returns of sockeye salmon to the Copper River in recent years have likely contributed somewhat to the higher harvests, but participation continues to increase in the Glennallen Subdistrict fishery. In addition, the repeal of the Chitina Subdistrict as a subsistence fishery frustrated some of the more vocal dipnetters. The commercial users

were supportive of the repeal, as the Chitina Subdistrict harvest no longer has 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 rivers stakeholders.

Land Access: In 1998, Ahtna Native Corporation initiated an access fee program for native-owned uplands adjacent to the Klutina River upstream of the Richardson Highway Bridge. This encompassed nearly the entire river with the exception of the lower two river miles. There is a public easement (managed by the Bureau of Land Management (BLM)) that runs parallel to the river and provides access to Klutina Lake, but it provides limited direct river access. Non-shareholders were required to pay a day use fee to access the river from the easement and also pay camping fees to camp at sites off the easement. This angered many of the sport fishing public that used the easement and Native lands to access the river and resulted in some users avoiding this access point. Ahtna Native Corporation initiated a similar access fee program at Gulkana River access points in 1999 (since 2003 this program has been coordinated by Gulkana Village). On the Gulkana, Ahtna Native Corporation owns the majority of land downstream of Sourdough and the Gulkana River Scenic River corridor. 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 to the Chitina Subdistrict fishery has long been an issue between dipnetters and Ahtna and Chitina Native Corporations. An access fee has been associated with the permit since the early 1990s. 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. During the 2002-2003 session the Alaska Legislature removed the permit from statutes due to the DOT survey results. This action was opposed by Ahtna and Chitina Native Corporations who remain 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, the Native corporations placed a fee station at the site and allowed access to the river to those individuals who paid the access fee.

Burbot: The lakes of the UCUSMA have historically supported some of the largest sport fisheries for burbot in Alaska. Stock assessment work indicated that many of the larger burbot stocks in lakes were depressed due to overfishing in the early 1980s. Based on these findings, the BOF adopted a management plan for burbot stocks in UCUSMA lakes. Under this management plan, the BOF has adopted a more conservative management regime for UCUSMA burbot fisheries which allows previously overfished stocks to recover enough to permit sustainable fisheries, and which protects healthy

stocks from overharvest. Part of the current regulatory regime is the elimination of unattended setlines from the fishery. Many local anglers are not supportive of this action and have submitted proposals to the BOF to have unattended setlines reintroduced to the fishery. Currently, ADF&G staff does not support reintroduction of unattended setline use in lakes. This gear question will likely continue to remain an issue into the future. Lake Louise was closed to burbot fishing from 1990 – 2002 as a result of depressed burbot stocks caused by overexploitation by setline use in the 1980s. The population stabilized and the BOF reopened the lake to burbot fishing to a conservative bag limit of 1 fish. Local advisory committees were supportive of this action. The department has allowed use of unattended setlines through a personal use burbot fishery (1997-1999) and currently under conservative sport fishing regulations for the mainstem Copper River. Stock assessment in Tolsona Lake during 1996 and 1997 indicated a decline in abundance to levels below any previous estimate, and resulted in an EO closure of this lake to burbot fishing in 1998 and a regulatory closure in 2003. This population will be discussed in detail in a later section.

Lake Trout: Lakes in the UCUSMA have historically supported some of the largest sport fisheries for lake trout in Alaska, with lakes of the Tyone River drainage (Lake Louise and Susitna and Tyone lakes) and Gulkana River drainage (Paxson, Summit, and Crosswind lakes) having supported the largest fisheries. Concern was raised in the late 1980s that sport harvests in some of these lakes might have been exceeding sustainable levels. As a result, an 18 inch minimum size limit was enacted for the above lakes to assure that fish could spawn at least once prior to being subject to harvest. Subsequent stock assessment work suggested that an 18 inch size limit did not protect first-time spawners from harvest in these lakes. A 24 inch minimum size limit for these lakes was implemented 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. At the 2003 BOF meeting, a proposal was adopted to eliminate bait in Paxson and Summit lakes to reduce potential hooking mortality resulting from 80% of all lake trout caught being released. This action has not been well received by anglers fishing Paxson Lake, particularly those targeting burbot, as they feel their fishing efficiency has been reduced through the prohibition of bait.

CURRENT MANAGEMENT AND RESEARCH ACTIVITIES

During 2004 several research and management projects were initiated or continued.

Research Projects

King Salmon - An ongoing study was conducted in 2004 to determine inriver abundance, spawning distribution and migratory timing of king salmon in the upper Copper River (Savereide 2005a). This was accomplished through the capture of king salmon with fish wheels located in Baird Canyon (upstream of the Miles Lake sonar) which were then implanted with radio transmitters. Twelve radio-telemetry 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*. Partial funding for this project was obtained through the Office of Subsistence Management. This was the sixth and final year of this study, summaries of the previous 5 years are found in Evenson and Wuttig 2000, Wuttig and Evenson 2001, Savereide and Evenson 2002, and Savereide 2003, 2004.

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 prep a-b*). This project, in conjunction with the Copper River king salmon radio-telemetry project has estimated the proportion of king salmon spawning in the Gulkana River that spawn above the tower and the escapement for the entire Gulkana River. The radio-telemetry component estimates the proportion of radio-tagged king salmon that spawn above and below the counting tower. This proportion is then used to expand the number of king salmon counted passing the counting tower to estimate the total escapement to the Gulkana River. Following 2004, only king salmon escapement passing the counting tower will be estimated. This is a continuing study (in cooperation with the U.S. Bureau of Land Management) with the long-term goal of this project to establish an escapement goal for Gulkana River king salmon upstream of the counting tower.

Rainbow/Steelhead Trout – Three rainbow trout/steelhead trout projects were conducted in 2004. The first occurred at Summit Lake in the Tebay River drainage. Work initiated in 1999 indicated a stunted population of rainbow trout in Summit Lake, which had documented catches of rainbow trout greater than 32 inches in the 1980s. A 20-year study plan has been developed to try 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 5-year period. Approximately 2,500 rainbow trout were removed from Summit Lake in 2003 and outstocked to Silver Lake along the McCarthy Road. Another 7,000 rainbow trout each year were removed and outstocked in 2004 and 2005. Abundance estimates through mark-recapture experiments were conducted during sampling in 2003 and 2005. 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.

Two feasibility studies were conducted in 2004. One on the Gulkana River tested sampling methods and design for a mark-recapture study that was conducted in 2005 to estimate abundance of rainbow trout in the mainstem Gulkana River from Sourdough to Paxson Lake. Rainbow trout were captured with baited hoop traps or rod and reel and marked with numbered tags (Schwanke and Taras *In prep*). The second was conducted on the Copper River mainstem and tested sampling methods and design for a radio-telemetry study conducted in 2005 to determine distribution of steelhead in the upper Copper River drainage. Steelhead were captured by fishwheel 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 2005b).

Burbot - The burbot research program conducted stock assessment in 2004 on Tolsona Lake (Schwanke and Perry-Plake *In prep*). Tolsona Lake has been sampled annually since 1986 and was closed to sport fishing in spring 1998 due to a population decline. Estimates of abundance,

CPUE and length composition were collected at Tolsona Lake. Sampling occurred in late May, shortly after ice-out.

Lake trout - In spring 2004 the final event of a mark-recapture stock assessment was conducted on the lake trout population in Paxson Lake. Work in June 2004 entailed capturing lake trout with a variety of gear types for the final recapture event to estimate abundance of lake trout in Paxson Lake (Scanlon *In prep*).

Management Projects

King/Sockeye salmon - Two management projects were continued in 2004: 1) biological catch sampling of the Chitina Subdistrict Personal Use Salmon Fishery and 2) aerial surveys of the nine king salmon spawning escapement index streams. Sampling of the Chitina Subdistrict subsistence fishery occurred from the opening of the fishery in June through the majority of the sockeye run ending in mid to late 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.

In 2004, aerial surveys on the seven of the nine index streams including the Gulkana River were flown in late July and early August for comparison to historic survey indices as a measure of king salmon run strength. Due to poor survey conditions in 2004, the aerial surveys of the index streams, with the exception of the Gulkana River, were flown outside of the preferred survey "window".

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 were completed in 2004 in the UCUSMA, which entailed validating easements, improving existing trails, replacing or installing signs for local roadside lakes. Work continued on a four-mile trail to Tolsona Mountain Lake, a remote stocked lake, which had been initiated in 1999. Trail clearing was completed in 2004, with the final one-half mile of trail to the lake being cleared.

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and EOs 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, by species, the major sport fisheries in the UCUSMA. Discussion of recent performance of the fishery will center on harvest and catch during the 2004 season, as the major source of data for most sport fisheries in the area is the SWHS (Jennings et al. 2006). Survey results for 2005 will not be available until the summer of 2006. However, observations or research data regarding the fisheries in 2005 will also be presented when available. A summary of the historical harvest and catch of fish in the UCUSMA by species is presented in Tables 6 and 7, respectively.

KING SALMON SPORT FISHERIES

In the UCUSMA, only the Copper River drainage supports anadromous runs of king salmon. No anadromous runs of king salmon return to the upper Susitna River drainage. Devil's Canyon is a velocity barrier, which limits upstream salmon migration in this drainage. At least one king salmon stock has been documented above Devils Canyon, but none upstream of the Oshetna River. King salmon returning to the Copper River drainage pass through the Copper River Delta and enter the Copper River during early May. Inriver returns of king salmon are estimated by a mark-recapture study using fish wheels located at Baird Canyon (above Miles Lake) and near Haley Creek. This study is conducted by the Native Village of Eyak (NVE) and LGL, Inc. (a consulting firm), and provides a post-season estimate of total escapement (Smith et al. 2003, Smith 2004). The peak migration into the river is generally 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 primarily through June and July, with spawning beginning in mid-July and continuing through August.

King salmon are broadly distributed throughout the Copper River basin, having been observed in approximately 40 tributaries. Aerial escapement surveys have been conducted in 35 of these systems, but only nine of these systems have been surveyed consistently since 1966 (Roberson and Whitmore 1991). In general, king salmon runs to these nine Copper River tributaries have been above historical averages since 1982 (Table 8). In 1992, 1995, 2001, 2003, and 2004 escapement surveys in these years were flown outside the peak dates and are considered tenuous at best (Figure 4). During 1995, heavy rains throughout the summer caused high siltation, which obscured visibility in the lower Gulkana River. Aerial surveys of the index streams east of the Gulkana were later than normal and may have missed the bulk of the king return. In 2001, 2003, and 2004 poor weather and pilot availability resulted in surveys being conducted outside the historic peak dates, and in 2001 the Gulkana, East Fork Chistochina, and Indian rivers had high water levels that obscured visibility. Many of the nine streams were not surveyed in 1993, so comparison to historical means during 1992, 1993, 1995, 2001, 2003 and 2004 is not advisable. During 1996 and 1997, king salmon counts of many index streams were at or near record levels.

Table 6.-Number of fish harvested, by species, by recreational anglers fishing UCUSMA waters, 1977 - 2004.

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
1994-2003[b]	**6,684**	**9,443**	**205**	**3**	**3,974**	**1,651**	**2,219**	**8,885**	**1,703**	**776**	**302**	**60**
1999-2003[b]	**5,598**	**9,300**	**220**	**2**	**3,238**	**1,592**	**1,784**	**6,621**	**1,868**	**923**	**257**	**77**

[a] Includes rainbow trout, Arctic grayling, Arctic char, King and coho salmon harvested from stocked waters.
[b] Average value for the years depicted.

Table 7.-Number of fish caught, by species, by recreational anglers fishing UCUSMA waters, 1990-2004.

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
1994-2003[b]	**19,419**	**17,930**	**547**	**191**	**19,211**	**4,518**	**10,791**	**71,333**	**2,996**	**2,299**	**742**	**170**
1999-2003[b]	**18,292**	**16,774**	**492**	**217**	**17,372**	**4,782**	**11,021**	**69,512**	**3,278**	**2,418**	**544**	**161**

[a] Includes rainbow trout, Arctic grayling, Arctic char, king and coho salmon caught in stocked waters.
[b] Average value for the years depicted.

Table 8.-Upper Copper River king salmon aerial escapement index counts, 1977-2005.

		Copper River Upstream of Gulkana		Tazlina Drainage		Klutina Drainage		Tonsina Drainage		
Year	Gulkana River [a]	E. Fork Chistochina River	Indian River	Mendeltna Creek	Kiana Creek	St. Anne Creek	Manker Creek	Little Tonsina River	Grayling Creek	Total
1977	729	132	[b]	73	91	10	15	[b]	[b]	1,050
1978	618[c]	137	9	52[d]	125[d]	24[d]	20[d]	285[d]	92[d]	1,362
1979	764	810	29	5[d]	279[d]	16[d]	16[d]	285[d]	153[d]	2,357
1980	712	575	24	3[d]	247	8[d]	35[d]	70[d]	66[d]	1,740
1981	77	120	[b]	51	191	19	33	191	107	789
1982	879[d]	1,260	179	70[d]	200[d]	35[d]	49[d]	440 [d]	124[d]	3,236
1983	589	575	41	12[d]	166	87	141	330	287	2,228
1984	1,331	577	17	26[d,c]	382[c]	89[c]	264[c]	568	279	3,533
1985	224	360	14	26[d]	91[d]	15[d]	22[d]	203[d]	58[d]	1,013
1986	1,484	618	[b]	76	328	182	251	424	224	3,587
1987	1,098	764	33	10	80	192	141	247	112	2,677
1988	831	709	[b]	25[d]	249	64	119	78	167	2,242
1989	2,009	750	7	187	345	90	165	68[d]	78	3,699
1990	1,171[d]	645	15	323[d]	414[d]	43[b]	43	57	52[d]	2,763
1991	1,223[d]	925	18	310[c]	522[c]	130	107	59	159	3,453
1992	540	88	1	83[d]	79[d]	12[d]	14[d]	107	17[d]	941
1993	693	[c]	[b]	[b]	[b]	[b]	[b]	[b]	[b]	693
1994	786	508	47	120	430	250	75	4[d]	2[d]	2,222
1995	285[c]	37 [d]	2[d]	32[d]	111[d]	26[d]	8[d]	25[d]	26[d]	552
1996[c]	1,364[c]	450[c]	11[c]	360[c]	723[c]	117[c]	164[c]	25[c]	143[c]	3,357
1997	2,270	2,245[c]	270[c]	311[c]	693[c]	900[c]	466[c]	55[c]	330[c]	7,540
1998	1,407	740[c]	48	280[c]	700[c]	515[c]	843[c]	60	527[c]	5,120
1999	934[d]	82[d]	2[d]	38[d]	216[d]	486[d]	69 [d]	93[d]	88[d]	2,008

-continued-

Table 8.-Page 2 of 2.

		Copper River Upstream of Gulkana		Tazlina Drainage		Klutina Drainage		Tonsina Drainage		
Year	Gulkana River	E. Fork Chistochina River	Indian River	Mendeltna Creek	Kiana Creek	St. Anne Creek	Manker Creek	Little Tonsina River	Grayling Creek	Total
2000	1,174	580	62	125	155[d]	70	54[d]	26[d]	104[d]	2,350
2001	556[d]	0[e]	0[e]	80[d]	154[d]	75[d]	24[d]	7 [d]	73[d]	969
2002	2,087	956	27	220	240	130	130	139	164	4,093
2003[c]	982	160[d]	4[d]	[c]	200[d]	85[d]	[c]	[c]	[b]	1,431
2004	2,014	38[d]	[b]	73[d]	180[d]	13[d]	9[d]	37[d]	[b]	2,364
2005	824	195	[b]	[b]	[b]	[b]	[b]	[b]	[b]	1,019
1977-1986[f]	**725**	**516**	**45**	**67**	**234**	**77**	**141**	**378**	**224**	**2,090**
1987-1996[f]	**951**	**605**	**19**	**197**	**392**	**141**	**116**	**96**	**132**	**2,260**
1997-2003[f]	**1,584**	**1,130**	**102**	**234**	**544**	**404**	**480**	**85**	**340**	**3,359**
Escapement Objective	1,200	500	**-**	350		250		350		2,650

Source: Some data published in Brady et al. 1991, remainder is unpublished. Escapement objectives are for the drainage.

[a] Gulkana River index counts are those upstream and including the West Fork.

[b] No aerial survey conducted.

[c] Counts determined by two surveyors. In years where more than one surveyor was used, counts from the most experienced surveyor are listed·

[d] Survey flown outside of July 17 - 31.

[e] Visibility poor due to high water.

[f] Averages exclude years when surveys were flown outside July 17-31.

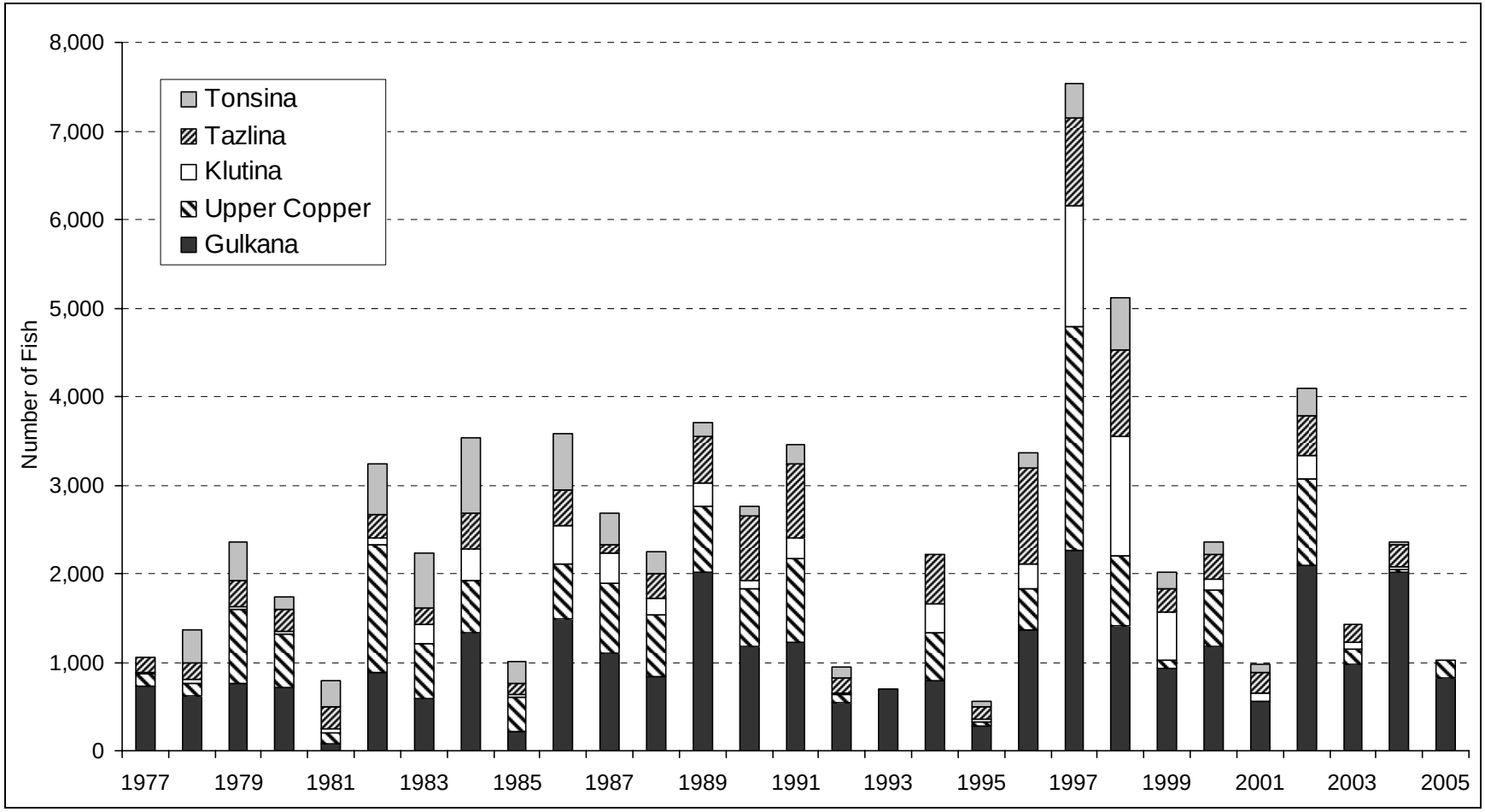

Figure 4.-Upper Copper River king salmon aerial survey index escapement counts by drainage, 1977-2005.

The count for index streams between 1996 and 1998 constituted the three highest index counts since 1977. In 2003 and 2004, only the Gulkana River survey was conducted during the July 17 – 31 peak survey period, the other streams were conducted outside of the peak survey period due to cloud cover, rainy conditions, and pilot availability. Surveys were not flown on the majority of the index streams in Tazlina, Klutina, and Tonsina drainages in 2003 due to the late survey timing and the realization that any index would not provide relative information. Unfortunately, assessment of king salmon spawning escapements through aerial survey evaluation of key index areas does ***not*** provide an estimate of the total spawning return. This is because not all spawning areas are surveyed and not all spawners are counted in surveyed areas.

Based on the results of the radio-telemetry study conducted by the department from 2002-2004 it has been determined that approximately 45% of the returns to the Klutina River and 16% to the Tonsina River spawn in the index streams, the remainder spawn in the glacial mainstem of those rivers (Savereide 2005a). As a result, in 2005 the department discontinued aerial surveys on five of the nine index streams. Only the Gulkana River and East Fork Chistochina were flown in 2005. The Klutina River index streams were not flown due to weather conditions and pilot availability, but remain in the aerial survey schedule as the surveys can still give some indication of run strength in the Klutina River for inseason management purposes. The radio-telemetry study indicated that the nine index streams represented approximately 26 - 46% of the total escapement. Due to the variability of the proportion of total escapement between years and that the majority of the index streams were early run stocks, the aerial surveys were deemed not to be a reliable index of escapement. The current aerial survey streams provide an inseason index of run strength in the major sport fishery systems, prior to the availability of the total escapement estimates post-season.

Copper River king salmon stocks are harvested in a variety of fisheries including: (1) a commercial gillnet fishery on the Copper River delta; (2) a personal use dip net fishery (a subsistence fishery from 2000 – 2003) in the Copper River near Chitina; (3) a subsistence dip net and fish wheel fishery in the Copper River between the Chitina and Slana rivers; and, (4) sport fisheries that occur in 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 1982, the total harvest of king salmon in these fisheries has ranged from 27,000 to over 85,000 (Table 9). The total king harvest in 2004 was below the recent 10 year average (1994 – 2003). Unfortunately, the contribution to the catch 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 Copper River District commercial fishery management strategy provides for two, 24-hour periods per week commencing during the second or third week of May, with adjustments in the fishing schedule being made through EO. Early season management, when king salmon are of consequence in the fishery, is based on actual catches compared to anticipated catches. Since 1997, under the *Copper River King Salmon Fishery Management Plan*, the department has the authority, by EO, to open and close the season within the inside statistical areas of the Copper River District, during the first two weeks of the fishing season. Following the 1999 and 2003 BOF meetings, modifications to the *Copper River King Salmon Fishery Management Plan* have provided the Department additional means to conserve king salmon for spawning escapement. These included a reduction of the annual sport limit from 5 to 4 king salmon and allowing

Table 9.-Copper River king salmon harvests and escapement indices, 1977-2005.

Year	Commercial Harvest[a]	Commercial Personal Harvest	Sport Harvest	Subsistence Harvest[b]	Personal Use Harvest[b]	Total Harvest	Aerial Escapement Index
1977	21,722		532	2,555	[c]	24,809	1,050
1978	29,062		641	2,239	[c]	31,942	1,362
1979	17,678		2,948	3,416	[c]	24,042	2,357
1980	8,454		2,101	3,035	[c]	13,590	1,740
1981	20,178		1,717	2,410	[c]	24,305	789
1982	47,362		1,802	2,764	[c]	51,928	3,236
1983	52,500		2,579	5,950	[c]	61,029	2,228
1984	38,957		2,787	509	1,760	44,013	3,533
1985	42,214		1,939	629	1,329	46,111	1,013
1986	40,670		3,663	686	2,367	47,386	3,587
1987	41,001		2,301	813	2,968	47,083	2,677
1988	30,741		1,562	992	2,994	36,289	2,242
1989	30,863		2,356	787	2,251	36,257	3,699
1990	21,702		2,302	647	2,708	27,359	2,763
1991	34,787		4,884	1,328	4,056	45,055	3,453
1992	39,810		4,412	1,449	3,405	49,076	941
1993	29,727		8,217	1,434	2,846	42,224	693
1994	47,061		6,431	1,989	3,743	59,224	2,222
1995	65,675		6,709	1,892	4,707	78,983	552
1996	55,646		9,116	1,482	3,584	69,828	3,357
1997	51,273		8,346	2,583	5,447	67,649	7,540
1998	68,827	1,411	8,245	1,842	6,723	87,048	5,120
1999	62,337	1,115	6,742	3,141	5,913	79,248	2,008
2000	31,259	740	5,531	4,856	3,168	45,554	2,350
2001	39,524	935	4,904	3,553	3,113	52,029	969
2002	38,734	773	5,098	4,165 [f]	2,036 [f]	50,806	4,093
2003	47,721	1,068	5,717	3,057 [f]	1,912 [f]	59,475	1,431
2004	35,461	540	3,435	3,999 [f]	2,497 [f]	45,883	2,364
2005	32,576 [d]	800 [e]	4,000 [e]	3,000 [e]	2,500 [e]	40,376 [d]	[g]
1977-1986[h]	**31,880**		**2,071**	**2,419**	**1,819**	**36,916**	**2,090**
1987-1996[h]	**39,701**		**4,829**	**1,281**	**3,326**	**49,138**	**2,260**
1997-2003[h]	**48,525**	**1,791**	**6,369**	**3,167**	**4,131**	**62,178**	**3,359**

[a] Gray et al. 2003.

[b] These figures are expanded to reflect unreported permits. See Table 2 for reported harvests.

[c] The Copper River Chitina Subdistrict was a Personal Use Fishery from 1984 – 1999, a subsistence fishery from 2000 – 2002, and was reclassified a personal use fishery in 2003.

[d] Preliminary.

[e] Estimated.

[f] Includes reported federal subsistence harvest.

[g] Aerial surveys in 5 of the 9 index streams were discontinued, thus the 2005 escapement index is not comparable to previous years.

[h] Average value for the years depicted.

commercial closures within the inside statistical areas during the third week of the fishing season. From 1997-2003, king salmon harvest in the Copper River District Delta commercial fishery has averaged over 48,000 fish (Table 9; Figure 5), with a record harvest occurring in 1998. Prior to 1994, king salmon harvest had remained relatively stable. Since 2000, harvests have declined; primarily through management plan actions (inside statistical area closures) and fishery closures occurring to manage for sockeye salmon escapement.

Subsistence and personal use (combined) harvests of Copper River king salmon have averaged over 7,000 fish from 1997-2003, with record harvest occurring in 1999 (Table 9). The Glennallen Subdistrict subsistence fishery occurs from June 1 through September 30 in the mainstem Copper River from the upstream edge of the Chitina-McCarthy Highway Bridge upstream to Slana. 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. 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 is restricted to mainstem waters of the Copper River from the downstream edge of the Chitina-McCarthy Highway Bridge, downstream to a department marker located approximately 200 yards upstream of Haley Creek. The season is from June 1 through September 30. Fishing periods are established by EO. 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, based on the weekly forecasted return. Adjustments to the schedule are made inseason based on actual sonar counts compared to projected counts; fishing times are increased or decreased if actual counts are greater or less than projected counts. Participants in both subsistence fisheries must be residents of Alaska. Permits are a requirement of this fishery, daily harvest by species must be recorded and permits for both fisheries must be returned to the Department at the end of the fishing season.

In the Chitina Subdistrict personal use fishery, permits limit households of one individual to 15 salmon of which no more than one can be king salmon and households of more than one person to 30 salmon of which no more than one can be king salmon. King salmon are present in the subdistrict when the fishery is opened. On average, 80% of the king salmon harvest is taken by July 1 and 95% by July 17 (Roberson and Whitmore 1991).

The average sport harvest of king salmon from Copper River tributaries more than tripled between 1977 - 1986 and 1997 - 2003, with the 1996 harvest of 9,116 being the highest on record (Tables 10 and 11; Figure 6). Since 1994, the average harvest of king salmon by sport anglers fishing UCUSMA waters has been nearly 6,700 fish. Sport harvest of king salmon in the UCUSMA during 2004 accounted for approximately 2% of the statewide, and 51% of the AYK region king salmon sport harvests (Table 10). The fishery occurs in various tributaries to the Copper River with the largest fisheries occurring in the Gulkana and Klutina rivers (Table 11). Approximately 95% of the estimated sport harvest of king salmon taken from the Copper River drainage during 1994-2003 was taken from these two drainages. From 1994-2003, catch has averaged over 19,000 king salmon by sport anglers fishing the UCUSMA waters (Table 12). Approximately, 34% of the catch has been harvested over this same period. The Klutina River

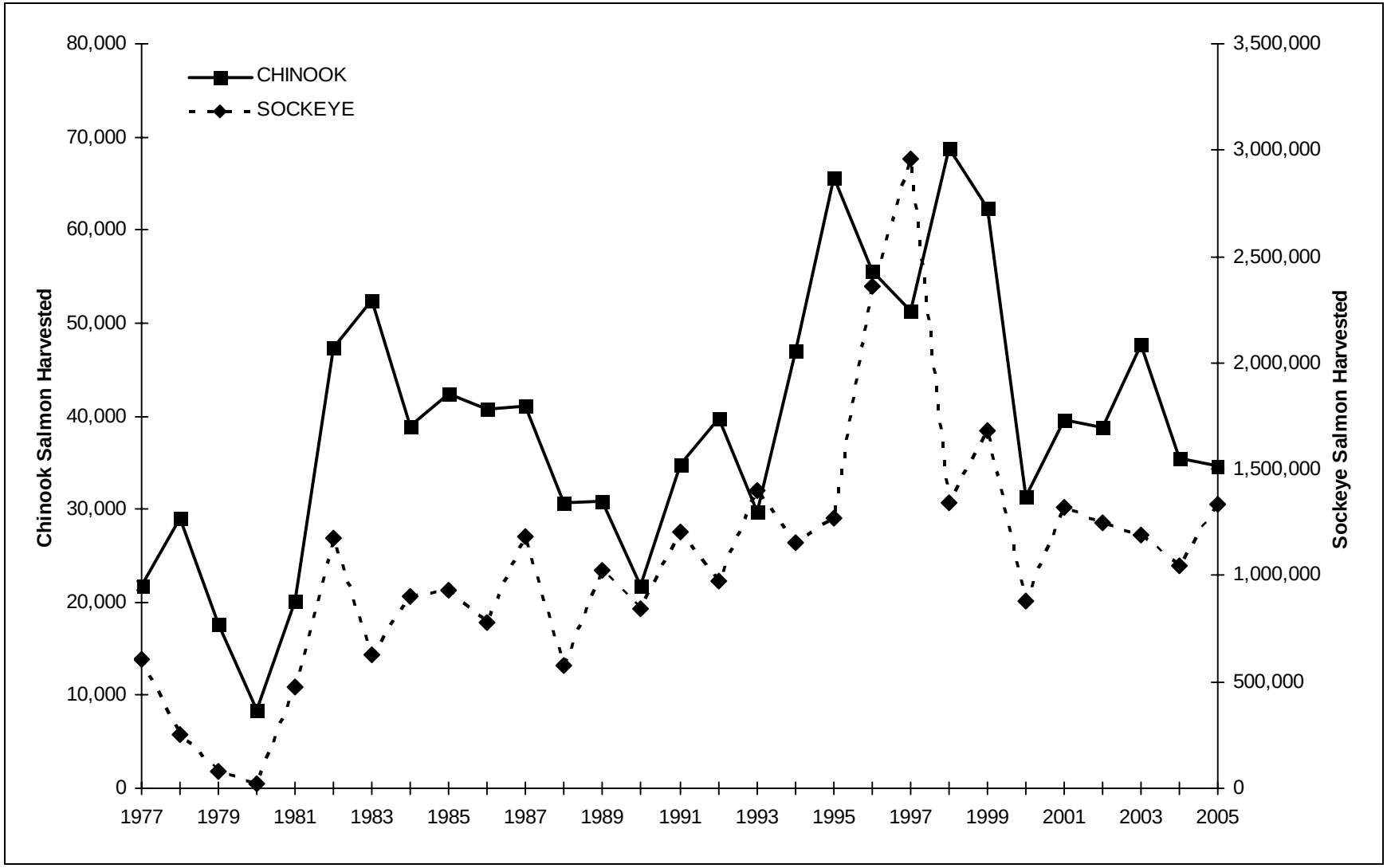

Figure 5.-Copper River District commercial harvest of king and sockeye salmon, 1977-2005.

Table 10.-Harvest of king salmon by recreational anglers fishing UCUSMA waters, 1977-2004.

Year	Copper River Drainage Harvest	Alaska Harvest	Percent[a]	Region III Harvest	Percent[b]
1977	532	43,060	1.2	1,031	52
1978	641	44,149	1.5	1,736	37
1979	2,948	51,749	5.7	4,107	72
1980	2,101	46,248	4.5	3,981	53
1981	1,717	58,997	2.9	3,592	48
1982	1,802	74,536	2.4	4,316	42
1983	2,579	83,112	3.1	6,276	41
1984	2,787	85,010	3.3	4,606	61
1985	1,939	90,718	2.1	4,626	42
1986	3,663	105,482	3.5	6,523	56
1987	2,301	116,402	2.0	4,494	51
1988	1,562	134,452	1.2	5,380	29
1989	2,356	122,737	1.9	5,632	42
1990	2,302	123,908	1.9	4,037	57
1991	4,884	150,420	3.2	6,390	76
1992	4,412	153,919	2.9	5,686	78
1993	8,217	210,833	3.9	11,584	71
1994	6,431	176,870	3.6	11,460	56
1995	6,709	156,507	4.3	11,000	61
1996	9,116	163,569	5.6	16,193	56
1997	8,346	185,175	4.5	14,971	56
1998	8,245	144,098	5.7	12,890	64
1999	6,742	184,296	3.7	9,855	68
2000	5,531	177,928	3.1	7,872	70
2001	4,904	177,473	2.8	7,301	67
2002	5,098	153,941	3.3	7,795	65
2003	5,717	177,093	3.2	9,435	61
2004	3,435	193,041	1.8	6,680	51
1977-1986[c]	**2,071**	**68,306**	**3.0**	**4,079**	**50**
1987-1996[c]	**4,829**	**150,962**	**3.1**	**8,186**	**58**
1997-2003[c]	**6,369**	**171,429**	**3.8**	**10,017**	**64**

[a] Percent of all king salmon harvested in state which were harvested in UCUS.
[b] Percent of all king salmon harvested in Region III which were harvested in UCUS.
[c] Average value for the years depicted.

Table 11.-Harvest of king salmon by recreational anglers fishing in the UCUSMA by drainage, 1977-2004.

Year	Gulkana River Drainage				Klutina River Drainage	Tonsina River Drainage	Tazlina River Drainage	Copper River		Other Waters	Area Total
	Upper River	Lower River	Other[a]	Total				Upstream of Gulkana	Downstream of Klutina		
1977	0		421	421			0		0	111	532
1978	0		606	606					0	35	641
1979	0		2,440	2,440			0		0	508	2,948
1980	0		1,688	1,688			0		0	413	2,101
1981	0		1,469	1,469			0		0	248	1,717
1982	283		1,320	1,603			0		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
1994-2003[b]	**1,153**	**2,413**	**423**	**3,990**	**2,368**	**166**	**26**	**5**	**19**	**111**	**6,684**
1999-2003[b]	**1,054**	**2,030**	**362**	**3,447**	**1,982**	**53**	**0**	**8**	**13**	**96**	**5,598**

[a] Includes harvests not specified as taken in lower or upper river.
[b] Average of total annual harvest for the years depicted.

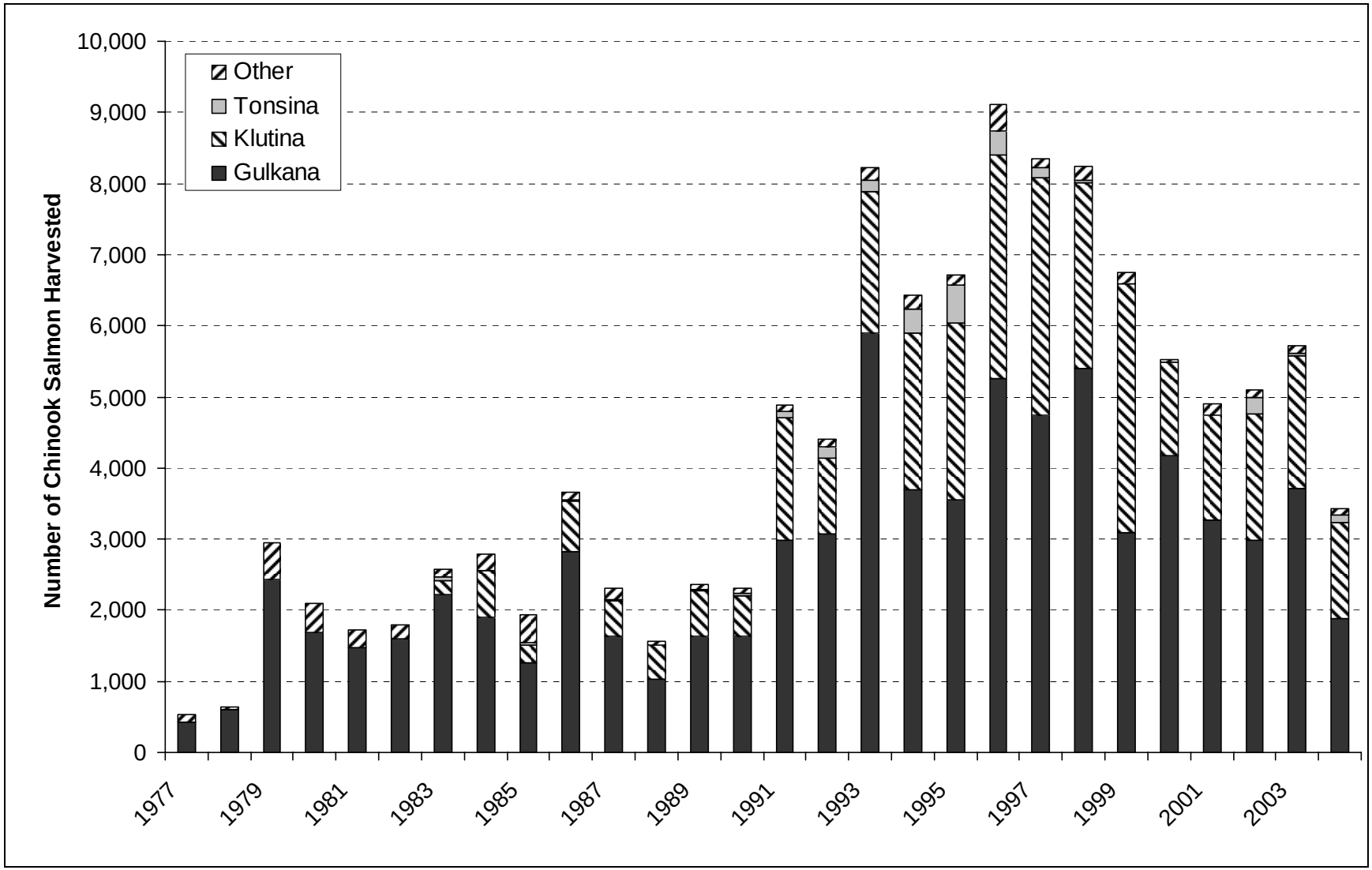

Figure 6.-Upper Copper River king salmon sport harvest by drainage, 1977-2004.

Table 12.-Catch of king salmon by recreational anglers fishing in the UCUSMA by drainage, 1990-2004.

Year	Gulkana River Drainage				Klutina River Drainage	Tonsina River Drainage	Tazlina River Drainage	Copper River		Other Waters	Area Total
	Upper River	Lower River	Other[a]	Total				Upstream of Gulkana	Downstream of Klutina		
1990	2,728	1,055		3,783	1,493	35	146	17	0	583	6,057
1991	3,956	2,731		6,687	3,036	146	134	0	25	63	10,079
1992	4,635	3,419		8,054	3,822	222	8	18	160	56	12,340
1993	10,592	4,994		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
1994-2003[b]	**4,004**	**7,504**	**1,016**	**12,523**	**5,947**	468	52	93	45	292	**19,419**
1999-2003[b]	**3,714**	**7,291**	**887**	**11,892**	**5,736**	293	21	99	16	235	**18,292**

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

[b] Average of total annual harvest for the years depicted.

has a slightly higher retention rate (40%) of king salmon than the Gulkana River (32%) during this time period.

Since 1970, the sport harvest of king salmon over 20 inches within the Copper River Basin sport fishery has been limited by a bag and possession limit of one per day and one in possession. Further protection was afforded area king salmon stocks through spawning season closures beginning in 1989. Beginning in 1989, to reduce catch-and-release mortality, any king salmon removed from UCUSMA waters becomes part of the daily bag and possession limit of the person who hooked the fish. During 1991, sport king salmon fishing was closed in Fish, Indian, Bernard, Ahtel and Natat creeks and the Little Tonsina River. This action was taken in an effort to bolster escapements to these small clear water tributaries, which had showed a decline in king salmon returns in preceding years. Also during 1991, the portion of the Gulkana River 7.5 miles upstream of the confluence of the West Fork was designated as an area where only unbaited, single-hook artificial lures may be used. This action was taken as a conservation measure for rainbow trout and has had little or no effect on the king salmon fishery. In 1994, a seasonal bag limit of five king salmon was instituted for the Copper River drainage. In 1997, following the 1996 BOF meeting, sport king salmon fishing was closed in Manker Creek, Klutina Lake and all flowing waters entering Klutina Lake, all tributaries to the Tonsina River, Tonsina Lake and all flowing waters entering Tonsina Lake, the Chokosna and Gilahina rivers and all clearwater tributaries of the Gakona River, Tazlina Lake and all flowing waters entering Tazlina Lake except ¼ mile radius around the mouth of Kiana Creek. In addition, the season closure date for king salmon was moved from August 10 to August 1 for the flowing waters downstream of the department markers located at mile 19.2 on the Klutina Lake Road. These measures were taken to protect spawning king salmon. To reduce harvests in the Tonsina River the use of bait was restricted and only unbaited, single-hook, artificial lures were permitted. In addition, creation of the *Copper River King Salmon Fishery Management Plan* (AAC 1998) during the BOF meeting resulted in a planned 5% reduction in the harvest potential of the commercial, personal use, and sport fisheries to provide for escapement levels at or above historic levels. This was to be achieved in the sport fishery through the prohibition of guiding in the flowing waters of the Copper River drainage on Tuesdays from May 15 to July 31. At the 1999 BOF meeting, this provision was deemed ineffective and as a result the king salmon seasonal bag limit was reduced from 5 to 4 in the Copper River drainage. This reduction was implemented to achieve the 5% reduction the guide restriction was unable to accomplish. At this meeting, the reference to the personal use fishery was removed from the plan with the establishment of the Chitina Subdistrict subsistence fishery.

Under the *Copper River District Salmon Management Plan* (AAC 2004c), 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. This sport harvest allocation was exceeded from 1996 – 2000, primarily due to the doubling of the sockeye sport harvest during those 5 years due to strong sockeye runs and an increased development of the sockeye fishery. Given the increase in the popularity of the sport king and sockeye salmon fisheries in the Copper River basin, it is likely that the allocation will continue to be exceeded into the future unless actions are taken to reduce harvest or the inriver escapement goal is raised to accommodate the growth in the fishery. Under the revised *Copper River King Salmon Fishery Management Plan* the department is directed to manage the commercial and sport fisheries to achieve a sustainable escapement goal of 24,000 king salmon or more (AAC 2004b). Through management actions resulting from this plan, king salmon harvest has declined since 2000.

Conflicts among users and concerns over king salmon resources have been a contentious issue in previous BOF 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). Increasing harvests over the past decade have been supported by above average returns (Table 9). Strong returns of king salmon are unlikely to continue indefinitely, while participation in upriver fisheries is likely to increase. 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. Following initial feasibility studies in 1995 and 1996, capture and coded wire tagging of juvenile king salmon began in 1997 in the Gulkana, Klutina, and Tonsina rivers; continued in 1998 with tagging on the Gulkana, Tonsina and Chistochina rivers; and finished in 1999 with tagging on the Gulkana, Klutina and Chistochina rivers (Sarafin 2000). Recovery of tagged king salmon occurred in the commercial fishery in 2001 and 2002, though tag recovery was insufficient and this project was discontinued after sampling in 2002 (Brase and Sarafin 2004). A weir was operated successfully in the Gulkana River from June 11 to July 31 in 1996, a total of 11,684 king salmon and 183,461 sockeye salmon were enumerated (LaFlamme 1997). From 1999 – 2004, a radio-telemetry study was conducted on the Copper River that deployed radio-transmitters in king salmon captured downstream of Haley Creek (Evenson and Wuttig 2000; Wuttig and Evenson 2001; Savereide and Evenson 2002; Savereide 2003, 2004, 2005a). The radio-tagged king salmon were tracked via remote tracking stations located at the lower and upper ends of the personal use fishery, the mouths of the Chitina, Tonsina, Klutina, Tazlina, and Gulkana rivers, and upstream of the Gulkana River on the mainstem Copper River. These stations recorded the signal of tagged king salmon that passed stations equipped with two antennas, to determine if the salmon were moving into the tributary or continuing up the Copper River. From this data, 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. As part of the radio-telemetry study 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 mark-recapture study using fish wheels conducted by the Native Village of Eyak and LGL, Inc. beginning in 2002, has provided estimates of king salmon escapement to the Copper River since 2003. The estimated total inriver escapement in 2004 at 40,564 king salmon (30,682 spawning escapement; Smith *In prep*). In addition, the department in concert with BLM initiated a counting tower on Gulkana River in 2002, the goal of this project is to develop a BEG for king salmon in the Gulkana River (Taras and Sarafin 2005, Perry-Plake and Taras *In prep a-b*).

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 7). 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

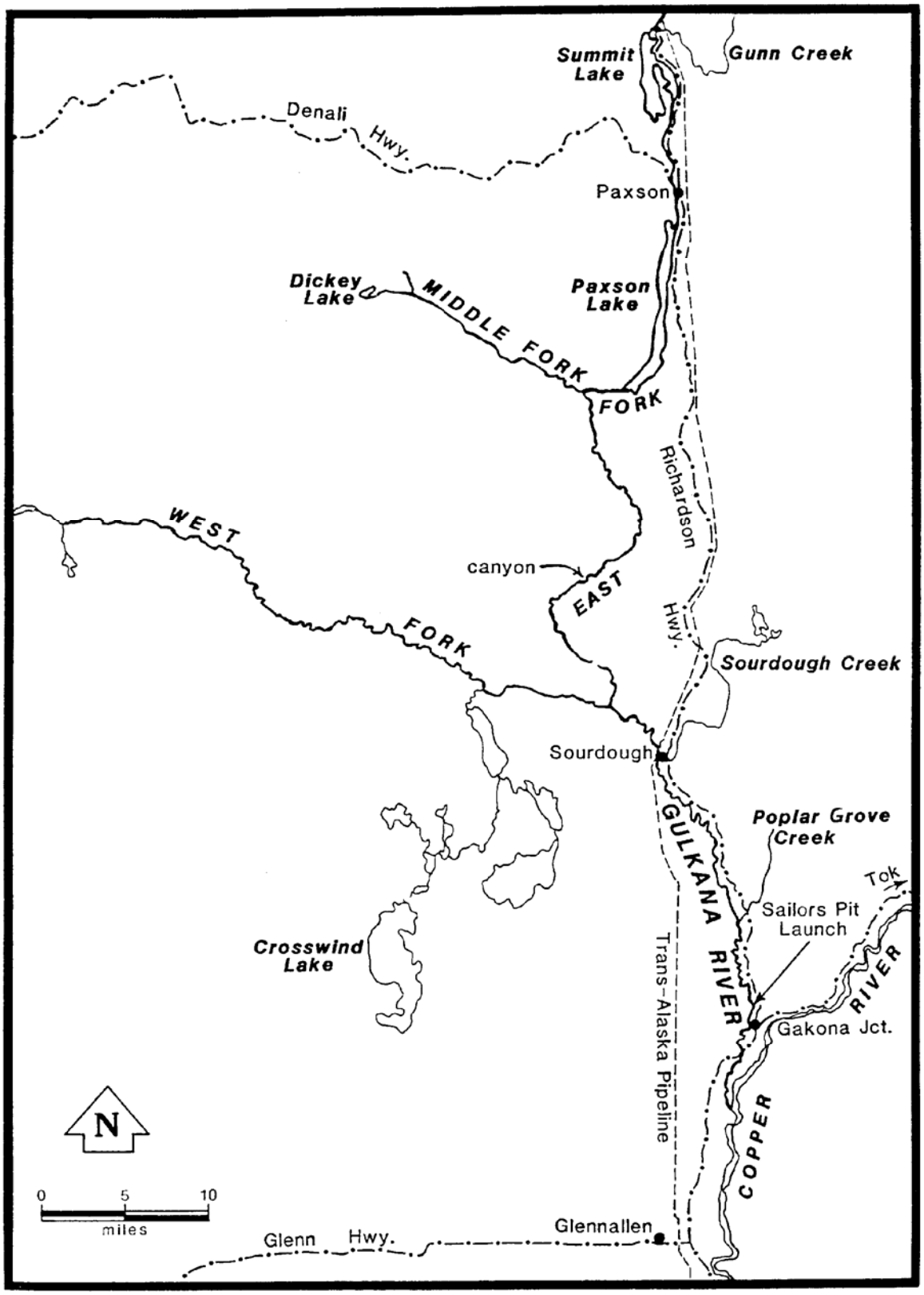

Figure 7.-Map depicting the Gulkana River drainage.

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 access the mouth of the Gulkana River using powerboats launched from Gakona and the Richardson Highway Bridge.

King salmon typically begin entering the Gulkana River in early to mid-June. The sport fishery typically 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. Under current regulations, anglers fishing the Gulkana River are allowed one king salmon over 20 inches daily and in possession and an Upper Copper River drainage-wide total of four per year. 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 primary source of information regarding the sport fishery is the statewide mail survey (Mills 1979-1980, 1981a-b, 1982–1994, Howe et al. 1995-1996, 2001a-d, Walker et al. 2003, and Jennings et al. 2004, 2006). Based on this survey, the sport harvest of king salmon in the Gulkana River averaged 3,990 fish annually from 1994-2003, and 3,447 fish annually from 1999-2003 (Table 13). The 2004 harvest of 1,890 king salmon was the lowest harvest since 1990, yet still accounted for 55% of the sport harvest of king salmon in the UCUSMA. Sport fishing effort on the Gulkana River averaged 24,250 angler-days annually from 1994-2003, and 21,344 angler-days from 1999-2003 (Table 5). 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 in 2004 was the lowest since 1989. Lower participation during 2004 was also reflected at the regional level, which was below the recent 5 and 10 year averages (Table 4). The majority of effort and harvest of king salmon occurs from the Richardson Highway Bridge upstream to the confluence of the West Fork.

A roving creel survey was conducted in 1989 to estimate the catch and harvest of and effort directed toward king salmon. Results of this survey (Potterville and Webster 1990) indicated 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 of harvest is close to that estimated from the mail survey (1,630 fish), indicating that the mail survey appears to accurately estimate the harvest of king salmon in this fishery. Approximately 50% of the harvest was estimated to have occurred on weekends. The majority of the 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 fished the single-hook, artificial fly-fishing-only area and, although many anglers floated the upper river, the harvest of king salmon was minimal in this reach due to the July 19 spawning season closure.

Table 13.-Sport harvest and spawning escapement indices of king salmon in the Gulkana River drainage, 1977-2004.

Year	Sport Harvest	Observed Spawning Escapement[a]
1977	421	729
1978	606	618
1979	2,440	764
1980	1,688	712
1981	1,469	77
1982	1,603	879
1983	2,224	589
1984	1,898	1,331
1985	1,256	224
1986	2,833	1,484
1987	1,631	1,098
1988	1,033	831
1989	1,630	2,009
1990	1,627	1,171
1991	2,991	1,223
1992	3,071	540
1993	5,892	693
1994	3,702	786
1995	3,556	285
1996	5,260	1,364
1997	4,741	2,270
1998	5,403	1,407
1999	3,093	934
2000	4,177	1,174
2001	3,274	556
2002	2,983	2,087
2003	3,707	982
2004	1,890	2,014
1994-2003[b]	**3,990**	**1,185**
1999-2003[b]	**3,447**	**1,147**

[a] Gulkana River index counts are those upstream and including the West Fork.
[b] Average value for the years during the period.

A second access-point creel survey was conducted in 1996. Results of this survey (LaFlamme 1997) indicated that 35,080 angler-hours were expended to catch 4,920 king salmon, 50% (2,441 king salmon) of the catch was harvested. The estimated catch and harvest reported in the 1996 mail survey was 17,815 and 5,260, respectively. The large discrepancy in estimates between creel and mail survey, 44% and 72% less for harvest and catch, was attributed to access sites used by anglers that were not surveyed in the onsite creel survey, resulting in biased harvest and catch estimates. As in 1989, the majority of harvest occurred at the Richardson Highway Bridge and Sourdough access points. 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.

The 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). Since 1977, escapement counts have generally increased (Table 13). Average escapement from 1977 to 1989 was 916; while from 1994 - 2003 escapement averaged 1,185. The average escapement for 1999 - 2003 is 1,147. High and low escapements during this 25-year period range from 2,270 fish in 1997 to 77 fish in 1981 (Table 8). With the exceptions of a low escapement during 1981, 1985 and 1992, escapements have remained relatively stable since 1977 (Figure 8).

As part of a drainage-wide king salmon research project, a weir was operated on the Gulkana River in 1996 to provide a count of king escapement. The access-point creel survey was conducted concurrently to estimate the harvest of king salmon. Based on the final weir counts and creel survey harvest estimates, 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 - 2004 were 6,355, 4,890, and 4,788 respectively (Taras and Sarafin 2005, Perry-Plake and Taras *In prep a*). The observed escapement passing the counting tower in 2005 was 2,688 Chinook salmon, the lowest observed passage in the four years of operation (Perry-Plake and Taras *In prep b*). A radio-telemetry tracking station was installed at the tower site to provide data in conjunction with the Copper River king salmon radio-telemetry project that enabled the estimation of the proportion of radio-tagged king salmon migrating past the tower to the total entering the Gulkana River.

Based upon the radio tag data in 2004, 50% of the Gulkana River king salmon run passed the counting tower. This resulted in a total estimate of abundance for king salmon in the Gulkana River at 9,576 (SE = 1,686; 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 river.

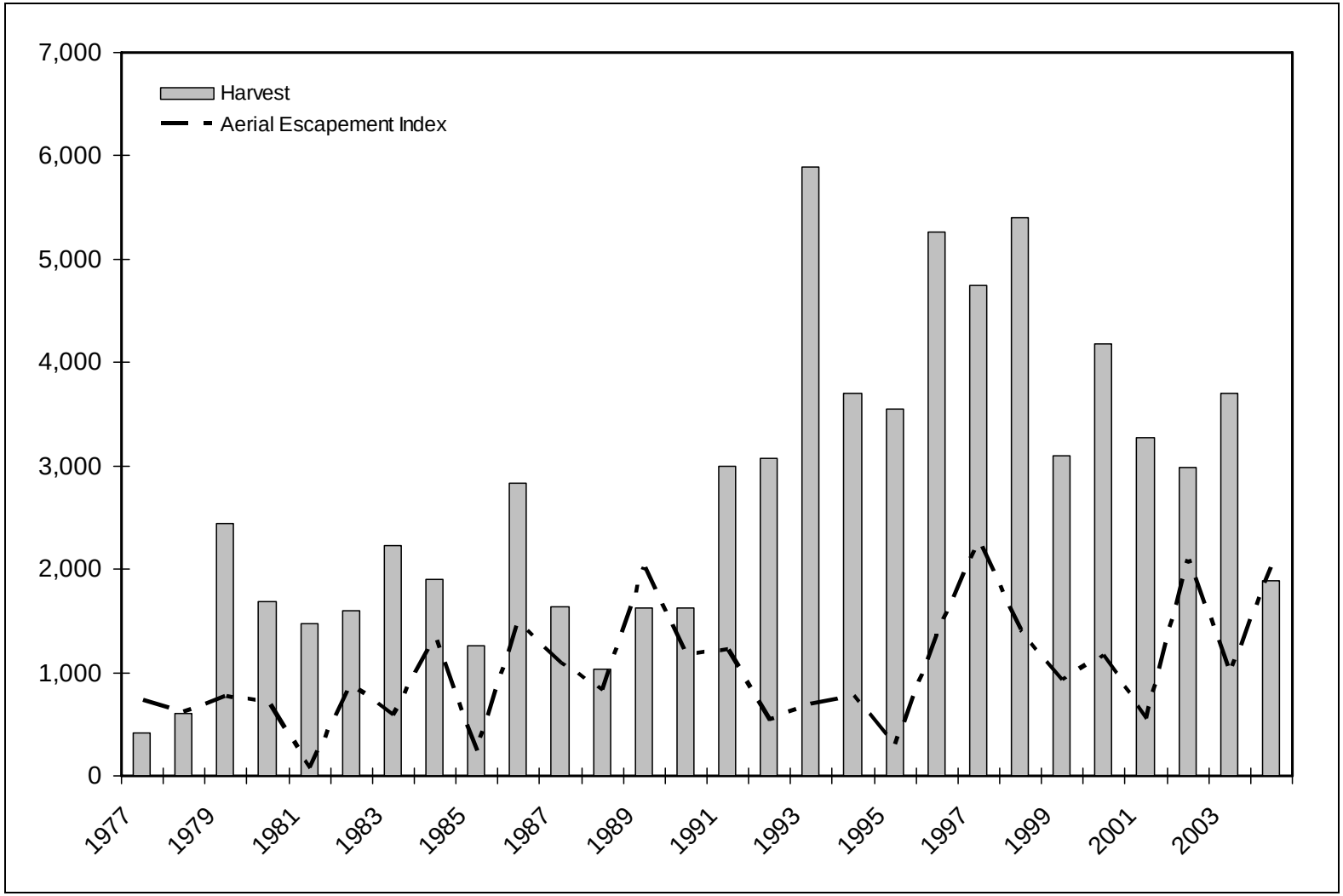

Figure 8.-Gulkana River king salmon sport harvest and aerial survey index escapement counts, 1977-2004.

Recent Fishery Performance

During 2004, sport anglers fishing the Gulkana River drainage harvested 1,890 king salmon (Table 13). This was 53% below the 1994 – 2003 average and 45% less than the 1999 – 2003 average. Whereas, the fishing effort of 17,318 angler-days in 2004 was 29% and 19% less for the respective averages (Table 5). Observed king salmon spawning escapement during 2004 (2,014) was the second largest since 1997 (Table 13). Spawning escapement was 41% above the 1994-2003 average and 43% above the 1999 – 2003 average. Savereide (2005a) reported 20% of radio-tagged king salmon in 2004 were located in the Gulkana River.

Since 1991 there has been a significant increase in the use of powerboats from the Richardson Highway Bridge upstream for about 5 miles. Also, a notable increase in the number of guides specializing in targeting king salmon has occurred on the lower river (below the West Fork confluence) over the past several years. Prior to the 1986 season, only one individual specialized in guiding anglers for king salmon on this section of the river. During the 1987 and 1988 seasons, a minimum of eight guides operated on the lower portions of the river, while the number increased to at least ten guides during 1989 and 1990. Twelve guides registered with the Bureau of Land Management to operate on upper Gulkana River (Wild River Corridor) in 2004 and 14 guides in 2005 (Denton Hamby, BLM, personal communication). This does not include guides that only operate downstream of the Gulkana Wild River corridor, though a majority of the guides that operate out of Sourdough, do fish below the Wild River Corridor during a portion of the season. From 1999-2001, BLM had a moratorium on the number of guides that could register to operate in the Gulkana Wild River corridor, which limited the number of guides operating in this portion of the river during this period. Available data indicate that guided anglers are more successful than unguided anglers.

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 recent BOF meetings and a sustainable escapement goal of 24,000 king salmon has been in place since 2003. In five of the past eight years (1997 – 2004) since the plan was implemented, escapement counts have been above the 1987-1996 average of 951 king salmon and exceeded the aerial survey escapement objective of 1,200 for the Gulkana River.

Fishery Management

In 2004, the king salmon run timing into the Gulkana River, as in 2003, appeared to be early, with angler reports of catches in mid-May. This was supported by the first king salmon passing the counting tower on June 6, the earliest date in the counting towers' 3 years of operation. Water levels at the beginning of June were average for that time of year, but began to drop with little rain occurring throughout the drainage and the river remained low throughout the season. Angler success was good in June, but as the river dropped salmon congregated in the larger pools, and unless anglers could access these holding areas, fishing success dropped. Tower counts declined after the end of June, raising concerns that the latter part of the Gulkana River

run were weak, but aerial surveys flown under ideal conditions five days after the season closed indicated approximately 50% of the fish were downstream of the counting tower. This was supported by the radio-tagged king salmon and the estimated Gulkana River escapement from the counting tower counts and radio telemetry data was the highest of the 3 years the tower has been in operation.

In 2005, king salmon were counted passing the Gulkana River counting tower beginning June 3 which was earlier than the previous 3 years. Counts remained above previous 3 year's counts through June 20th. However, by June 30th tower counts were below the previous 3 year's counts and at the end of the tower operations were 41% below the lowest counts in previous years. An aerial survey of the Gulkana River was conducted in that portion of the Gulkana River downstream of the counting tower on June 29. This survey was conducted to verify low numbers of king salmon in the lower river and provide justification for management actions restricting the sport fishery. Survey conditions were marginal, as the West Fork Gulkana was muddy and occluded the deeper holes and channels of the mainstem Gulkana River. The survey count was 9 live kings and 9 dead kings from the confluence of the Gulkana and Copper rivers upstream to the counting tower (approximately 1.5 miles upstream of the West Fork confluence). 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 counts from two of the previous 3 years resulted in an EO going into effect July 2 that reduced the seasonal bag limit from 4 to 1 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 survey index was 824, 30% below the recent 10 year average escapement level of 1,185.

In 1999, Ahtna Native Corporation began an access fee program for access to the Gulkana River across corporation lands ($5 per day per person, or a $20 individual seasonal or $50 seasonal family pass). Access to the Gulkana River downstream of Sourdough was limited to the Richardson Highway Bridge and the easement trail at mile 141 Richardson Highway if no access fee was paid. If a day or seasonal use fee was paid, access to the river included the uplands adjacent to the river and access points at Sailors Pit and Poplar Grove. A private campground that provided river access upstream of Sailors Pit for less than the Ahtna fee shifted effort from Sailors Pit to the campground. This campground was only open to the public during the 1999 and 2000 fishing seasons. From 2001 - 2003, it became a membership only (primarily guides) river access point, with limited use by the general public. The fee program also shifted effort from Sailors Pit to the Richardson Highway Bridge ROW and overall fishing effort has not been reduced as a result of the access fee. Access to the lower Gulkana River will continue to be an issue, if fishing pressure begins to increase.

Fishery Outlook

It is anticipated that effort and harvests of king in the Gulkana River will remain at current levels in the near future. The increased effort and harvests 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 have been lifted effort on the Gulkana River has declined in recent years. The recent data indicates a potential for overharvest of the Gulkana River king 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 recent years, but based upon returns since 1999, it is realistic to assume runs will decrease over the next several years.

Recent Board of Fisheries Actions

In 1994, a seasonal bag limit of five king salmon was imposed on the UCUSMA fisheries and guides were restricted from fishing while accompanying clients. Both restrictions were implemented to reduce the harvest potential on king salmon stocks in the area that are considered fully utilized. In 1996, as part of the *Copper River King Salmon Fishery Management Plan*, guides were restricted from operating in the flowing waters of the Copper River drainage on Tuesdays. No other proposals were passed during the 1996 BOF meeting regarding king salmon sport fishing in the Gulkana River.

During the 1999 BOF meeting, the Board passed two proposals specific to the Gulkana River, one specific to king salmon, the other impacting king salmon anglers on the upper Gulkana River. The regulation concerning king salmon clarified the single-hook, artificial fly regulation, for the area downstream of the Richardson Highway Bridge. The regulation now has a specific hook size (3/4-in or less) and distance that weight can be used in front of the hook (18”). The second regulation, designed to protect rainbow and steelhead trout, permits only unbaited, single-hook artificial lures in the Gulkana River, with the exception of the single-hook, artificial fly area from June 1 to July 31 and the mainstem Gulkana River upstream of the Richardson Highway Bridge to an ADF&G marker 7 ½ miles upstream of the confluence with the West Fork from June 1 to July 19. This regulation permits bait in the main king salmon fishing area of the Gulkana River during the open season. Copper River drainage-wide revisions to the *Copper River King Salmon Fishery Management Plan* included lifting guiding restrictions and reducing the seasonal bag limit from five to four.

Only one regulation change specific to the Gulkana River Chinook salmon sport fishery was adopted by the BOF at the 2003 meeting. All waters of the Middle Fork Gulkana River were closed to king salmon fishing, to protect spawning salmon. This change rectified an error in the regulations that had been in place prior to 1997 and were inadvertently removed following the 1996 Board meeting.

Current Issues

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 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.

The majority of the land adjacent to the Gulkana River downstream of Sourdough is owned by the Ahtna Native Corporation. Beginning during the 1991 season, this corporation prohibited trespass across its lands for the purpose of hunting or fishing because it felt its customary and

traditional lifestyle has been jeopardized by elimination of the rural preference in the subsistence law. 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 fishing and camping site where land ownership is in dispute. As previously mentioned, an access fee was initiated in 1999 for access to the Gulkana River across Corporation lands. Many anglers voiced dissatisfaction with the fee and shifted their efforts to the non-fee areas (Richardson Highway Bridge and upstream of Sourdough). Overall, effort has not been reduced due to the access fee program.

The allocation of Copper River drainage king salmon between subsistence, sport, and commercial uses remains a controversial issue. The *Copper River King Salmon Management Plan* was developed during the BOF meeting in 1996. The plan had an "insurance plan" that reduces harvest by commercial, personal use, and sport fisheries to allow more king on the spawning grounds. The original plan was written with a sunset clause of December 31, 2002 to allow the department to further research the Copper River king populations. There were several proposals submitted for the 1999 BOF meeting that addressed the modification or repeal of the current management plan. As a result, the management plan was modified, but still contains the sunset clause and direction to the department to develop a management plan that provides for high sustained yield. The BOF adopted a Department proposal at the 2003 BOF meeting which removed the sunset clause in the management plan and maintained the existing plan, with minor modifications in the escapement goal and actions taken in the commercial and sport fisheries. The plan, along with environmental and other factors, has effectively reduced king harvests and increased king salmon spawning escapement since 2000.

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. These are, at best, post-season indicators of relative spawning abundance due to their dependence on survey conditions, surveyor, and the residence of fish in the survey area. In 1996, a weir was operated in the Gulkana to count returning adult king salmon and verify aerial counts. The weir project was discontinued after 1 year and does not provide a reliable expansion factor with a single data point. 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.

Coded wire tagging of king smolt was begun in 1997 with the purpose of determining the contribution of various stocks to the total king run in the Copper River. Coded wire tag returns in the commercial fishery were believed to indicate the run timing of different Copper River king stocks and whether one stock (the Gulkana River stock) can serve as a gauge of the abundance of other king stocks. Unfortunately, after 2 years of tag recovery, returns have been insufficient to meet the project objectives and the project was discontinued (Brase and Sarafin 2004). In 2004, Division of Commercial Fisheries - Genetics initiated sampling of king salmon spawning stocks

in the spawning tributaries and at the commercial fishery to collect genetic markers and potentially estimate stock composition within the commercial fishery.

Aerial surveys will be continued to index numbers of spawning salmon, and the results compared to counting tower counts. From 1999 through 2004, a radio-telemetry study on the Copper River has 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 in spawning tributaries (Evenson and Wuttig 2000, Wuttig and Evenson 2001, Savereide and Evenson 2002, Savereide 2003, 2004, 2005a). In 2001, an Office of Subsistence Management funded project conducted by the Native Village of Eyak (NVE) and a consulting firm, LGL, Inc., was initiated to estimate Chinook salmon abundance in the Copper River through a mark-recapture study using fish wheels. Since 2003, this project has provided the estimate of total upriver escapement for Copper River Chinook salmon (Smith et al 2003, Smith 2004, *In prep*).

Recommended research projects are the continuation of the Gulkana River counting tower project and support of the NVE/LGL Chinook 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 Chinook salmon in the Gulkana River. The Chinook 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. Much of the land between the road and the river belongs to the Ahtna Native Corporation and beginning in 1998, an access permit is required to be purchased prior to crossing Corporation lands. Current limited use permit fees from Ahtna, Inc. are $5 per day per person for a day use access permit and $20 per night for camping. 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 typically begin entering the Klutina River in late June, with the run continuing into August. The sport fishery typically 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 bag and possession limits governing the sport fishery for king salmon over 20 inches is one fish. The Upper Copper River drainage-wide seasonal bag limit of four king salmon per year includes the Klutina River.

Sport harvest of king salmon from the Klutina River drainage has been estimated using the mail survey since 1983 (Mills 1979-1980, 1981a-b, 1982–1994, Howe et al. 1995-1996, 2001a-d, Walker et al. 2003, and Jennings et al. 2004, 2006). Based on this survey, the sport harvest of king salmon from the Klutina River drainage averaged 2,368 fish from 1994 through 2003, ranging from a low of 1,303 fish in 2000 to a high of 3,489 fish in 1999 (Table 14, Figure 9). Harvests remained relatively stable from 1983 to 1990. From 1994 to 2003, sport effort on the Klutina River averaged approximately 11,065 angler-days, ranging from 8,897 in 2003 to 15,687 in 1999 (Table 5). Due to the nature of the mail survey, we do not know how much of this effort was directed toward king salmon versus other species. Observations in recent years, however, suggest that a majority of the recent effort is directed toward king salmon.

During 1988 and 1989, creel surveys of the sport fishery targeting king salmon in the Klutina River drainage were conducted. High water reduced effort and catch during a significant portion of the 1988 season, whereas river conditions remained favorable throughout the 1989 season. Results of the 1988 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 fairly accurately estimates sport harvest in this fishery. In 1989 the creel survey estimate was 1,587 king salmon caught of which 65% were retained (Potterville and Webster 1990). The estimated harvest (1,031 fish) was again reasonably close to that reported in the mail survey for 1989 (652 fish). The 1988 creel survey showed that guided boat anglers accounted for nearly 90% of the catch and 80% of the harvest of king salmon. During the 1989 survey, 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.

Table 14.-Sport harvest and spawning escapement indices of king salmon in the Klutina River drainage from 1983-2004.

Year	Sport Harvest	Observed Spawning Indices
1983	189	228
1984	667	353
1985	249	37
1986	710	433
1987	495	333
1988	483	183
1989	652	255
1990	583	86
1991	1,709	237
1992	1,075	26
1993	1,989	[a]
1994	2,189	325
1995	2,485	34
1996	3,142	281
1997	3,344	1,366
1998	2,608	1,358
1999	3,489	555
2000	1,303	124
2001	1,465	99
2002	1,778	260
2003	1,873	85
2004	1,338	22
1994-2003[b]	**2,368**	**449**
1999-2003[b]	**1,982**	**225**

[a] No aerial survey conducted in 1993.
[b] Average value for the years depicted.

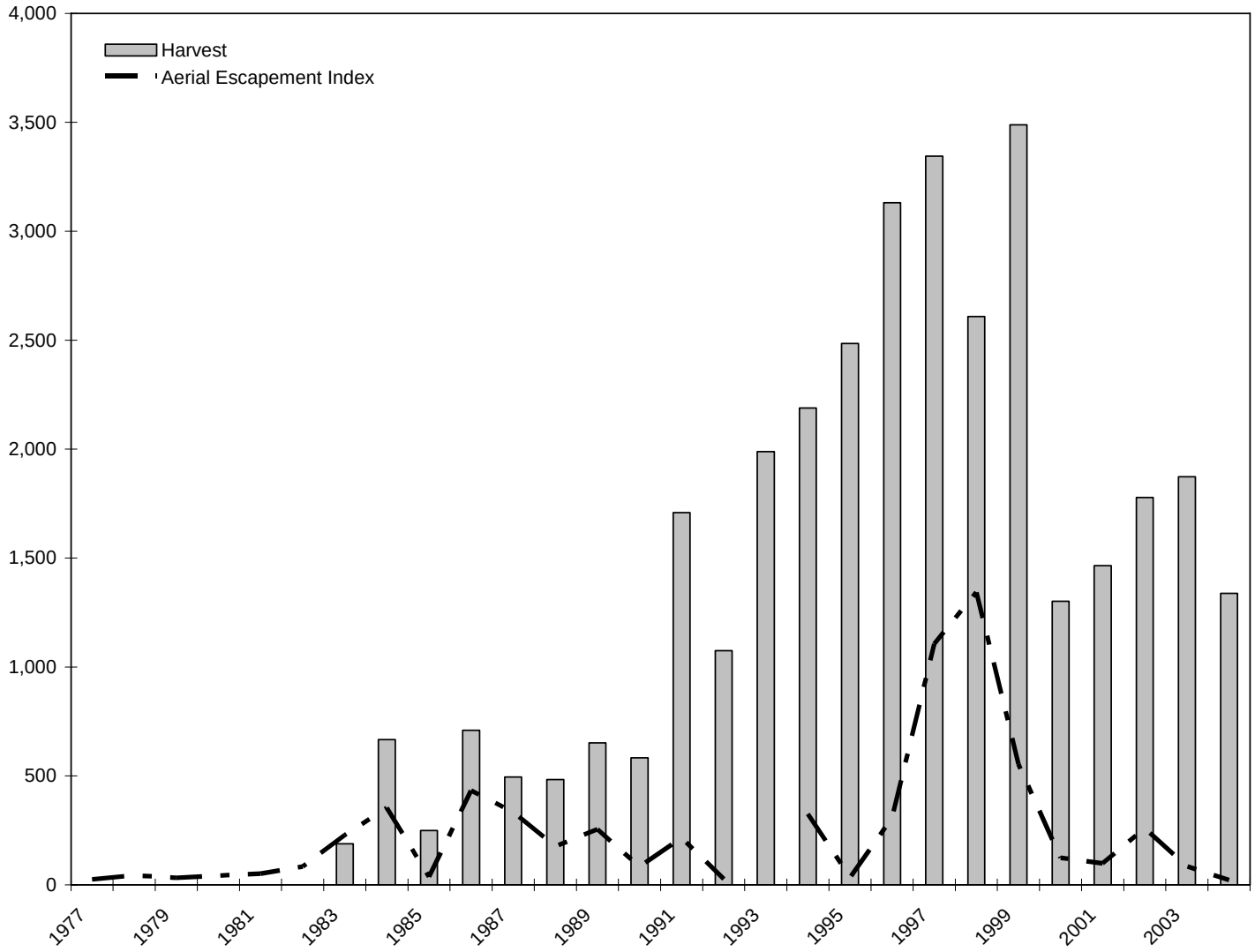

Figure 9.-Klutina River king salmon sport harvest and aerial survey index escapement counts, 1977-2004.

The spawning escapement of king salmon to the Klutina River has been documented by aerial surveys of St. Anne and Manker creeks since 1966 (Table 8). Spawning escapement has averaged 218 fish during 1977-1986, ranging from a high of 433 in 1986 to a low of 25 in 1977. Since 1987, observed escapements to this drainage have remained stable, the average escapement for 1987-1996 being 257 (Table 14). Since 1997, the observed escapements in 1997 and 1998 were the highest on record with an average in those 2 years of 1,362. No escapement surveys were flown on the Klutina River index areas in 1993. Since 1999, poor survey conditions and pilot availability have caused surveys to be flown outside the optimum survey period, and these indices likely do not represent the Klutina River king salmon escapement accurately. The 2-mile stretch of the river just below the lake is known to support king salmon spawning, but due to the turbid water conditions in this area, it is not possible to assess abundance of spawning fish. In addition, the radio-telemetry project determined that in the semi-glacial tributaries of the Copper River such as the Klutina and Tonsina rivers, the majority of king salmon spawn in the mainstem of the tributary (Evenson and Wuttig 2000, Wuttig and Evenson 2001, Savereide and Evenson 2002, Savereide 2003, 2004, 2005a). The king salmon that spawned in the clearwater tributaries of these two systems were the early component of the king salmon run to those systems. From 2002 – 2004, the aerial survey tributaries of Manker and St. Anne creeks represented an average of 45% of the total Klutina River run, determined by radio-tagged king salmon. As a result, the utility of the aerial surveys of these streams as an index of the king salmon spawning escapement to the Klutina River is limited. 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, fishwheel 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

The 2004 sport harvest of 1,338 king salmon was the lowest harvest since 2000 and accounted for 39% of the estimated total sport harvest of king salmon in the UCUSMA (Table 11). The harvest in 2004 was 44% less than the 1994–2003 average. Effort in 2004 was estimated at 10,472 angler-days, which was 5% below the 1994-2003 average. The aerial escapement count for index streams in the Klutina River drainage in 2004 was 22. The surveys were flown outside the peak escapement dates and likely do not represent actual escapement to the index streams. As a result, the 2004 escapement of king salmon to index sites in the Klutina River drainage was the lowest on record (Table 8). Savereide (2005a) reported 12% of radio-tagged king salmon in 2004 were located in the Klutina River.

Management Objectives

No specific fishery objectives have been established for this stock. An underlying goal of past and current management, however, has been to ensure sustained yield. Aerial survey index evaluation does not appear to represent the majority of spawning fish in this system and has been used as a post-season escapement index, with the realization that the majority of spawning occurs in the glacially occluded mainstem Klutina River. From 2002-2004, data gathered from the radio-telemetry study indicated 39-72% of radio-tagged king salmon entering the Klutina River remained in the mainstem (Savereide 2005a). In addition, run timing of king salmon spawning in the index streams is earlier than mainstem Klutina River spawners. Based upon this information, it appears the two escapement index streams are likely not representative of the entire Klutina River escapement.

Fishery Management

In 2004, no inseason management assessment was conducted on the Klutina River. Harvest and catch data for the Klutina River king salmon stocks are obtained from the SWHS. In 2004, aerial surveys were flown on both index streams, but were flown after the peak period, due to poor weather conditions.

During 2004 water conditions were favorable for sport fishing throughout the season. King salmon harvests were reported beginning in mid-June and aside from a short period in mid-July catches were reported steady throughout the fishing season. This entry and run timing was supported by the radio-tagged Chinook salmon data collected in 2004. Shore based anglers continued to fish the confluence of the Klutina and Copper rivers and while Fish and Wildlife enforcement officers made concerted efforts of patrolling that area of the river, reports of abuse of bag limits of both king and red salmon were reported.

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, generally 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. Unfortunately, aerial surveys were unable to be flown, and based upon the past radio-telemetry study, king salmon in the two Klutina River index streams have earlier run timing than the mainstem spawning salmon and only represent approximately 45% of the Klutina River spawning escapement. As a result, due to the lack of justification, no inseason action was taken on the Klutina River.

Many guides continue to report abuse of the daily and seasonal 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.

Fishery Outlook

The increasing trend in effort and harvest of king in the Klutina River appears to have stabilized. The higher levels of effort and harvest that resulted in the 1990s may have been a result of restrictions on the Cook Inlet fisheries (such as catch-and-release restrictions and closures for the Kenai and Susitna rivers). As these restrictions have been lifted, effort has declined slightly in recent years for the Klutina River. The recent data indicates the potential for overharvest 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 (with the exception of the 2000 and 2001 fishing season). The Copper River drainage harvest trends and aerial survey indices indicate strong king salmon

returns in recent years, 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.

Recent Board of Fisheries Actions

During the 1996 BOF meeting, as part of the *Copper River King Salmon Fishery Management Plan*, guides were restricted from operating in the flowing waters of the Copper River drainage on Tuesdays. Other actions during the 1996 BOF meeting included closure of sport king salmon fishing in Manker Creek, Klutina Lake and all flowing waters entering Klutina Lake. In addition, the season date closure for king salmon was moved from August 10 to August 1 for the flowing waters downstream of the department markers located at mile 19.2 on the Klutina Lake Road. These measures were taken to protect spawning king salmon. At the 1999 BOF meeting, no action was taken specific to the Klutina River king fishery. Copper River drainage-wide revisions to the *Copper River King Salmon Fishery Management Plan* included lifting guiding restrictions and reducing the seasonal bag limit from five to four.

There were several proposals directed at extending the king salmon fishing season on the Klutina River submitted to the BOF for the 2003 meeting, none of these were adopted. A proposal was adopted to allow bait in the Copper River mainstem upstream of Haley Creek, to provide for the king salmon and burbot fisheries that had occurred there prior to 2000 when the drainage-wide unbaited, single-hook artificial lure regulation was instituted. This allowed for the sport fishery that occurs at the confluence of the Klutina and Copper rivers to again utilize bait, which had been a source of confusion since the regulation for unbaited, single-hook artificial lure was instituted following the 1999 BOF meeting. The intent of that proposal was to protect rainbow trout/steelhead populations, not restrict Chinook salmon fishing in the Copper River.

Current Issues

The sport fishery for king salmon in the Klutina River has, in recent years, taken a higher proportion of king salmon returning to the upper Copper River (Table 11). This has resulted from an increase in the number of guides operating in the fishery, increased angler access to salmon holding areas, and a general increase in angler proficiency. Greater exploitation rates increase the risk of overharvest during years of low production and high angler effort. Further harvest increases may make further restrictions to the fishery necessary. The radiotelemetry study reported that the Klutina River represented from 10-12% of the total Copper River return from 2002-2004, this is substantially less than the Gulkana River which represented 17-27% of the total return during the same period (Savereide 2005a). As a result, it cannot be expected that the Klutina River can sustained harvests or effort at the same level as the Gulkana River.

The majority of the land adjacent to the Klutina River upstream of the Richardson Highway is owned by Ahtna Native Corporation. Beginning during the 1991 season, this corporation prohibited trespass across its lands for the purpose of hunting or fishing. The corporation is not allowing free access for hunting or fishing purposes because it's members feel their customary and traditional lifestyle has been jeopardized by elimination of the rural preference in the state subsistence law. It has conducted an access fee program since 1998 to allow access to the upper Klutina River. 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.

A large component of the guides, charter operators, and businesses on the Klutina River have formed a Klutina River Association. Until 2002, Ahtna Native Corporation was involved with the association and would not issue a land access permit to a guide or operator unless the individual/business was a member of the Klutina River Association. This has caused conflict among the various guides and operators on the Klutina River.

Princess Lodge purchased University of Alaska property on the Klutina River in 1999, and began construction of a lodge in 2000. The lodge opened in May of 2002. Undoubtedly the lodge and its clientele have the potential to dramatically increase fishing pressure not only on the Klutina River, but possibly the Gulkana River and other Copper River tributaries as well. The development of Wrangell-St. Elias National Park and the completion of the new park visitor center (located in Copper Center) in summer 2002 also has the potential for attracting tourists with sport fishing interests. 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. Under the current State guide registration program (prior to the 2005 guide licensing program), the department is unable to determine the actual number of guides operating on a water body in a given season, though there was anecdotal information of several new guides operating in the Copper River tributaries in 2002. If sport fishing effort does increase as a result, though it appears it has not in the first 3 years of operation, BOF action will need to be taken to maintain current harvest levels.

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. This is not an issue unique to the Klutina River, similar conflicts occur on the Gulkana River. 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. At a public meeting held in August 2002, members of the Klutina River Association voiced their opposition to the improvements, citing safety issues and increase dangers of inexperienced boaters operating on the river. Other members of the public supported the project, as did the department for improved public access to the river. While funding is available to finish the road and parking area, DOT requires additional funding to make any further improvements on the launch itself and as a result future boat launch improvements are on hold.

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. However, the nature of the king fishery has changed since the last creel survey was conducted (1989), effort has doubled and harvests have averaged three times higher. The fishery should be examined through a creel survey to determine if angler efficiency has increased, and if distribution of effort has shifted.

Managers depend on aerial surveys to index the escapement of king salmon. These are, at best, indicators of relative spawning abundance rather than absolute abundance due to their dependence on survey conditions, surveyor, and the residence of fish in the survey area. The radio-telemetry study has provided information regarding mainstem spawning, the aerial survey index streams accounted for only 36% of the total king salmon return to the Klutina River during the 6 years of the study (Evenson and Wuttig 2000, Wuttig and Evenson 2001, Savereide and Evenson 2002, Savereide 2003, 2004, 2005a). As a result, the aerial surveys of the Klutina River tributaries provide only an index of the early component of the Chinook salmon return, which in conjunction with additional information (fishwheel project CPUE, angler reports, subsistence/personal use harvests) can provide the manager with a marginal measure of inseason Chinook salmon run strength.

Recommended research and management projects are a creel survey, a hooking mortality study, the continuation of aerial surveys and support of the NVE/LGL Chinook salmon estimation project. The Chinook 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.

A portion of the king salmon hooked in the Klutina River are 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 most recent creel survey on the Klutina River was conducted in 1989 (Potterville and Webster 1990). Since that time, effort and harvest has increased by 50% and 200%, respectively.

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 Tonsina River king salmon sport fishery harvest increased annually from 1988 to 1995 (Table 11). Harvests averaged 52 fish from 1983 – 1993 and 166 fish from 1994 – 2003. The recent 5-year average (1999-2003) is 53, though no king salmon harvests were reported in 1999 and 2000. 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. Fish and Wildlife Protection and 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 (Table 8). The spawning

escapement to these index sites averaged 602 fish from 1977 to 1986, but the average index count for 1987 – 1996 declined to 228. Aerial surveys on the Tonsina River tributaries were discontinued after 2004, due to minimal sport fishing effort and harvest and based upon the radio-telemetry 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. Current daily bag and possession limits for king salmon over 20 inches in this drainage are one and one, respectively, with a seasonal bag limit of four for the Copper River drainage.

A limited fishery for king salmon also occurs on Kiana Creek in the Tazlina River drainage. The average escapement for Kiana Creek from 1977 to 1986 was 234 salmon and for 1987 through 1996 was 392 (Table 8). The returns to Kiana Creek from 2002 – 2004 were below the 1987 – 1996 average, though the survey was conducted outside the optimum survey time due to poor survey conditions in two of those years. Aerial surveys on Kaina Creek were discontinued after 2004, due to minimal sport fishing effort and harvest and based upon the radio-telemetry study that indicated the Tazlina River represented less than 5% of the total Copper River return. Harvests in this fishery have averaged less than 50 fish since 1990.

Management and Fishery Objectives

No specific fishery objectives have been established for these stocks. An underlying goal of past and current management, however, has been to ensure sustained yield. The aerial survey index has been used as a post-season escapement index with the realization that the majority of spawning may occur in the glacially-occluded mainstem of the Tonsina River. The Tazlina River index streams represent the spawning escapement in that drainage but the radio telemetry study revealed that less than 5% of the total Copper River escapement returns to the Tazlina River drainage. As a result, the aerial surveys of the spawning tributaries in both the Tonsina and Tazlina rivers were discontinued after 2004.

Recent Board of Fisheries Actions

During the 1996 BOF meeting, sport fishing for king salmon was closed in all tributaries to the Tonsina River, Tonsina Lake and all flowing waters entering the lake. Additionally, the Chokosna and Gilahina rivers and all clearwater tributaries of the Gakona River, Tazlina Lake and all flowing waters entering Tazlina Lake except ¼ mile radius around the mouth of Kiana Creek.

The primary biological concern regarding the Tonsina River king salmon stock in recent years is the extremely low king salmon escapements in the Little Tonsina River. The trend in harvest does not match the trend in escapement within this drainage (Figure 10). The problem, therefore, is reduced production, overharvest within one of several other mixed-stock fisheries, or the result of illegal fishing activities within the Tonsina River drainage. In response to this concern, the use of bait was restricted and only unbaited, single-hook, artificial lures were permitted following the 1996 BOF meeting. In addition, all tributaries to the Tonsina River, Tonsina Lake and all flowing waters entering Tonsina Lake were closed to sport fishing to protect spawning king salmon. As a result of these restrictions, harvest and effort in 1997 and 1998 were both below

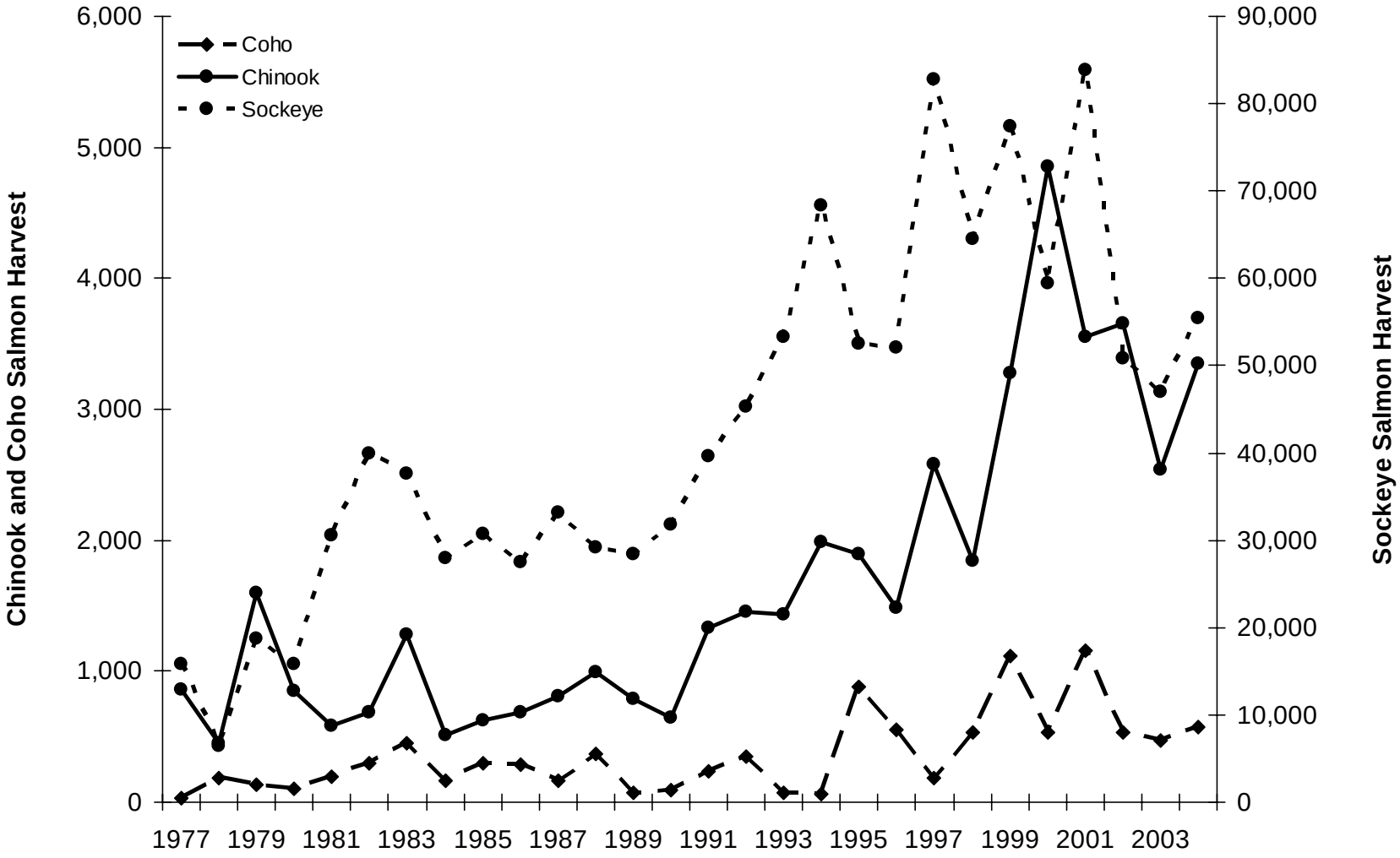

Figure 10.-Copper River Glennallen Subdistrict subsistence harvest by species, 1977-2004.

the 10-year average. 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. During the December 1999 BOF meeting, Copper River drainage-wide revisions to the Copper River King Salmon Fishery Management Plan included lifting guiding restrictions and reducing the seasonal bag limit from five to four. At the January 2003 BOF meeting, the Board passed a proposal allowing the use of bait in the mainstem Tonsina River; previously bait was only permitted on single hooks with a gap of less than 3/8 of an inch. New data gathered by the department since the bait restriction was put into effect following the 1996 Board meeting, indicated a king salmon run larger than previously thought and of sufficient size to withstand additional sport fish harvest.

Current Issues

Recent increases in harvests in the Copper River drainage may be attributed to poor king salmon returns on the Kenai and Susitna rivers. Media coverage of strong returns in the late 1990s to the Copper River may also be responsible. In the near future, it is anticipated that effort will continue to remain at current levels or increase further, depending on the previously mentioned factors. The recent strong king salmon returns to the Copper River have prevented the overexploitation of king salmon stocks. If the Copper River experiences below normal king salmon returns, managers will need to take inseason action to prevent potential overexploitation. Currently, limited effort has occurred on king salmon streams other than the Gulkana and Klutina rivers. The majority of the 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.

Ongoing and Recommended Research and Management Activities

The level of responses to the SWHS for these systems (less than 20 in 1998) does not provide useable estimates of harvest, but do provide indications of harvest trends. If effort and harvest on these systems did increase significantly, it would be reflected in the SWHS. In these smaller king salmon fisheries (Tonsina River and Kiana Creek), harvests at current levels appear sustainable. Any increase in current harvests may not be sustainable.

From 1999 – 2004, a radio-telemetry 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 in spawning tributaries (Evenson and Wuttig 2000; Wuttig and Evenson 2001; Savereide and Evenson 2002; Savereide 2003, 2004, 2005a). 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.

Recommended research and management projects include support of the NVE/LGL Chinook salmon estimation project. The Chinook salmon estimation project provides data necessary to evaluate whether Copper River fishery management has complied with the Copper River king salmon management plan.

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 Division of Commercial Fisheries 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 15). The area harvest of 6,464 sockeye salmon during 2004 was the lowest harvest since 1995. 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 1999-2003 occurred in these two rivers. The sockeye salmon sport fisheries on these two rivers have experienced increases within recent years, which 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* (AAC 2004c), the department is directed to manage the commercial fishery to achieve an inriver goal of 15,000 salmon (all species) for sport fishery harvest, 60,000 to 75,000 sockeye salmon (including hatchery stocks) for subsistence harvest, 100,000-150,000 (including hatchery stocks) for personal use harvest, 300,000 sockeye salmon for spawning escapement, and a 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 15). The Gulkana River originates in the Alaska Range and flows approximately 126 km south from its headwaters above Summit Lake to its confluence with the Copper River near the community of Gulkana (Figure 7). It is one of few clearwater, non-glacial rivers in the Copper Basin. In addition to the mainstem, this river system also consists of the Middle Fork and the West Fork, both of which join the mainstem from the west. The section of the Gulkana River from Paxson Lake downstream to Sourdough is designated by the U.S. Congress as “wild” under the Wild and Scenic Rivers Act of 1968. This section of the river flows through federal lands of the Bureau of Land Management. Much of the land encompassing the remainder of the lower river belongs to the Ahtna Native Corporation. In addition, areas of state and other private ownership are present. Access to the river is available from various secondary roads and trails from the Richardson Highway, which parallels much of

Table 15.-Harvest of sockeye salmon by recreational anglers fishing UCUSMA drainages, 1977 – 2004.

Year	Gulkana River Drainage				Klutina River Drainage	Tonsina River Drainage	Tazlina River Drainage	Copper River		Other Waters	Area Total
	Upper River	Lower River	Other[a]	Total				Upstream of Gulkana	Downstream of Klutina		
1977	0		1,180	1,180			0		0	2,482	3,662
1978	0		662	662					0	944	1,606
1979	0		545	545			0		0	1,054	1,599
1980	0		1,248	1,248			0		0	861	2,109
1981	0		1,447	1,447			0		0	76	1,523
1982	660		1,226	1,886			0		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
1994-2003[b]	**1,146**	**1,912**	**701**	**3,758**	**5,026**	**44**	**24**	**36**	**140**	**415**	**9,443**
1999-2003[b]	**884**	**1,342**	**638**	**2,863**	**5,918**	**23**	**13**	**37**	**158**	**287**	**9,300**

[a] Includes harvests not specified as taken in lower or upper river.
[b] Average of total annual harvest for the years depicted.

the river. Shore angling occurs at each area of access. Anglers also use rafts, canoes, and powerboats to gain access to the more remote sections of the river. Powerboats launch at developed ramps located at Paxson Lake and Sourdough and at an undeveloped site at the Richardson Highway Bridge. Raft and canoe anglers frequent the river sections from Paxson Lake downstream to the Richardson Highway Bridge. Sockeye salmon are one of various species within the drainage that are targeted by sport fishers. 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). Sockeye salmon that are surplus to the broodstock requirements of the hatchery are believed to be a substantial component of those harvested in the sport fishery.

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. Beginning in 1966, the escapement of sockeye salmon to the Gulkana River has been documented by aerial surveys of index sites to monitor spawner distribution in the drainage (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, and Jennings et al. 2004, 2006), which is performed each year with mail out questionnaires. 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*). While the primary objective of this project is to estimate Chinook salmon escapement, sockeye salmon passage was also recorded. In 2004, an estimated 15,884 sockeye salmon passed the tower from May 27 to August 14. 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 2004 sport harvest of sockeye salmon from the Gulkana River was 976 fish, the lowest since 1979. The 2004 harvest was 74% less than the 1994-2003 average and 66% less than the 1999-2003 average. From 1994 to 2003, harvests averaged 3,758 sockeye salmon, annual harvest estimates ranged from 1,465 fish in 2003 to 7,418 fish in 1996 (Table 15). Annual sockeye salmon harvest increased substantially from 1996 to 2000, a result

of strong wild and hatchery sockeye salmon returns to the Gulkana River. Sport effort in 2004 on the Gulkana River drainage was estimated at 20,608 angler days. Effort in 2004 was below the 10-year average, 1994 – 2003, of 31,002 (Table 5). However, due to the nature of the mail survey, it is unknown how much of this effort is directed towards sockeye salmon versus other species. Observations in recent years suggest that most of this effort is directed towards king salmon. The harvest declines that have occurred since 2001 were likely a result of the high water conditions and poor Gulkana hatchery returns that occurred in the Gulkana River during that time.

Management Objectives

Sockeye salmon fisheries in the Gulkana 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. Escapement objectives for this drainage have not yet been established.

Fishery Management

A management plan is in the process of being completed for the Gulkana River sockeye salmon recreational fishery. 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

During the December 1999 BOF meeting, only one change regarding sockeye salmon was passed. From August 1 to December 31, the bag and possession limit was increased from 3 to 6 fish 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 BOF.

Current Issues

Increased use by float and powerboat operators on the Gulkana River is intensifying conflicts between users. The Bureau of Land Management is in the process of updating the management plan for the Wild portion of the Gulkana River upstream of Sourdough.

The majority of lands adjacent to the Gulkana River downstream of Sourdough are owned by the Ahtna Native Corporation. Beginning in the 1991 season, this corporation prohibited trespass across its lands for the purpose of hunting or fishing. In 1999, an access fee was initiated for use

of their lands. Many anglers voiced dissatisfaction with the fee and shifted their efforts to the non-fee areas (Richardson Highway Bridge and upstream of Sourdough). Ahtna Corporation, in conjunction with the Department of Transportation, is in the planning phase of the development of a public use area on its lands near the Richardson Highway Bridge, a popular fishing and camping site where land ownership is in dispute.

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 Chinook 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 supports one of two major sockeye salmon sport fisheries in the UCUSMA (Figure 2). This semi-glacial river drops rapidly out of Klutina Lake to enter the Copper River near the community of Copper Center. Access to the river is available along the Richardson Highway and from the Klutina Lake Road, which parallels the river. 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.

Access to much of the Klutina River is complicated by private land ownership, which encompasses a large portion of the drainage. Much of the land between the road and the river belongs to the Ahtna Native Corporation. The Klutina Lake Road is situated on a public access easement, which provides access to state land at the lake, but does not provide direct public access to the river itself. Presently, the Ahtna Native Corporation requires land use permits for river access and camping use of their lands.

The Klutina River provides opportunity for both shore and boat anglers. Shore anglers are primarily limited to fishing the lower 1-mile of the river near Copper Center downstream of the Richardson Highway. Jet riverboats are used by experienced operators to access the upstream portions of the river. Launches are available on private land adjacent to the highway and from a site along the new Richardson Highway Bridge. The river has considerable stretches of whitewater and is considered to be very challenging to boat operators. The four-wheel drive Klutina Lake Road also provides a launch at the lake for whitewater rafters to access the river.

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, 2006), which is performed each year with mail out questionnaires. Creel surveys, which emphasized king salmon, were conducted in 1988 and 1989 (Roth and Delaney 1989 and Potterville and Webster 1990). 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 harvest is not directly comparable to the SWHS estimate.

Recent Fishery Performance

Based on the SWHS, the estimated 2004 sport harvest of sockeye salmon from the Klutina River was 5,069 fish (Table 15). The 2004 harvest is 9% greater than the 1994 – 2003 average and 14% less than the 1999 – 2003 average. From 1994 to 2003, harvests averaged 5,069, annual harvest estimates during this period, have ranged from 2,549 fish in 1995 to 7,219 fish in 2000. The SWHS estimates indicate a trend of increasing harvest from 1996 - 2000, with a slight decline in annual harvests beginning in 2001. Sport effort in 2004 on the Klutina River drainage was estimated at 10,472 angler days. The 2004 effort was 5% less than the 10-year average, 1994 – 2003, of 11,065 angler-days (Table 5). However, due to the nature of the mail survey, it is unknown how much of this effort is directed towards sockeye salmon versus other species. Observations in recent years suggest that most of this effort is directed towards king salmon. The decline in sockeye salmon harvest since 2001 generally tracks with the decline in effort during the same period.

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

A management plan is in the process of being completed for the Klutina River sockeye salmon recreational fishery. 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 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 BOF meetings.

Current Issues

The majority of the land adjacent to the Klutina River, upstream of the Richardson Highway, is owned by the Ahtna Native Corporation. Beginning during the 1991 season, this corporation prohibited trespass across its lands for the purpose of hunting or fishing. It has conducted an access fee program since 1998 to allow access to the upper Klutina River. 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. Increasing use of the swift Klutina River by powerboats and rafts creates a greater hazard to users. Many sections of the river are not wide enough to allow boats to pass and results in conflicts between the two user groups.

Reports by guides and sport anglers of snagging and over limits of sockeye salmon have increased in recent years. Enforcement of both king and sockeye salmon regulations has increased in recent years 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. 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.

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. A creel survey would be an initial step in providing desired information.

COPPER RIVER PERSONAL USE AND SUBSISTENCE SALMON FISHERIES

Background and Historical Perspective

There is a long history of salmon harvest for consumption as food 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. Also, 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 BOF adopted the *Copper River Subsistence Salmon Fisheries Management Plan* (AAC 2004d). 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 BOF 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 BOF to establish a new category of fisheries, personal use fisheries in 1982 (AAC 2004f). 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* (AAC 1999).

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. Also, whereas 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 managed the personal use fishery, while the Division of Commercial Fisheries managed the subsistence fishery.

Both 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 EO. Only Alaska residents can participate in this subsistence fishery. A special permit, which is free, is required to participate in the fishery. The permit can only be obtained at Fish and Game offices in Anchorage, Delta Junction, Fairbanks, Glennallen, Palmer, or Tok, and at the National Park Service office in Slana and Chitina. 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 5 of the salmon may be king salmon. There is also a requirement that all anglers, upon landing a salmon while subsistence fishing, must immediately remove both tips of the tail from the 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.

During the 1999 BOF meeting, the Board ruled in favor of a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the upper Copper River. This resulted in the Chitina Subdistrict Personal Use Salmon fishery changing to the Chitina Subdistrict Subsistence Salmon fishery. During the February 2003 meeting in Cordova, the BOF ruled against a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the Upper Copper River. As a result, the Chitina Subdistrict subsistence fishery was **repealed** and the Copper River Personal Use Dip Net Salmon Fishery was re-established. 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. The fishery is opened by EO. Both a valid Alaska sport fishing license and a special permit are required to participate in the personal use fishery. 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 can currently be obtained at the Fish and Game offices in Anchorage, Delta Junction, Fairbanks, Glennallen, and Palmer and from over 40 licensed vendors located in the Southcentral and Interior regions. Anglers must record their harvest on their permit and return the permit upon completing fishing. 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.

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 (in AAC 2004c):

Spawning escapement (sockeye salmon)	300,000
Spawning escapement (other salmon)	17,500
Glennallen Subdistrict Subsistence harvest (salmon)	60,000 – 75,000
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. When an escapement greater or less than the inriver goal actually pass the sonar counter, the BOF has remanded the department increase or decrease the fishing times by the corresponding percentage. From 2000 – 2002, as a subsistence fishery, the Chitina Subdistrict has 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. Since 1997, the harvest range for the Glennallen Subdistrict has been 60,000-75,000 salmon. Prior to 1997, this amount was 35,000 salmon.

Harvests by the 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 16). Under the subsistence fishery management plan, harvests decreased substantially in 1984 to about 29,000 salmon. Since 1984, subsistence harvests have gradually increased, with the 2000 permits and 2001 harvest of 1,253 and 88,578, respectively, the highest since 1983 (Figure 10). The percentage of non-Copper River basin participants has increased from less than 20% prior to 1991 to an average of 54% from 1991-2001. This increase can be attributed to those participants from Anchorage (26%), Fairbanks (9%) and Mat-Su Borough (11%) communities that entered the fishery following the McDowell decision. Concern has been expressed regarding significant under-reporting of salmon harvest in this fishery, especially over the past decade. Trends in the number of permits issued to participate in this fishery closely resemble harvest trends (Table 16).

Harvests in the Chitina Subdistrict fishery have been estimated since establishment in 1984 (Table 17). 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 (Figure 11). Trends in the number of permits issued to participate in this fishery closely resemble harvest trends (Table 17).

Table 16.-Number of permits issued and salmon harvests during the Glennallen Subdistrict subsistence salmon fishery in the Copper River, 1977-2004.

		Estimated Salmon Harvest			
Year	Number Permits Issued	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	-[b]	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
1994 - 2003	**1,055**	**2,767**	**63,863**	**602**	**67,340**
1999 - 2003	**1,145**	**3,576**	**63,702**	**761**	**68,139**

[a] Total harvest includes steelhead and other species.

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

[c] Data not available.

Table 17.-Number of permits issued and salmon harvested during the Chitina Subdistrict personal use salmon fishery in the Copper River, 1984-2004.[a]

Year	Number Permits Issued	Estimated Salmon Harvest			
		King	Sockeye	Coho	Total[c]
1984	5,415	1,760	48,236	717	50,734
1985	---[b]	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
1994-2003	**8,105**	**4,032**	**110,231**	**2,556**	**116,979**
1999-2003	**8,188**	**3,224**	**109,677**	**2,604**	**115,764**

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

[b] Data not available.

[c] Total estimate includes unidentified salmon.

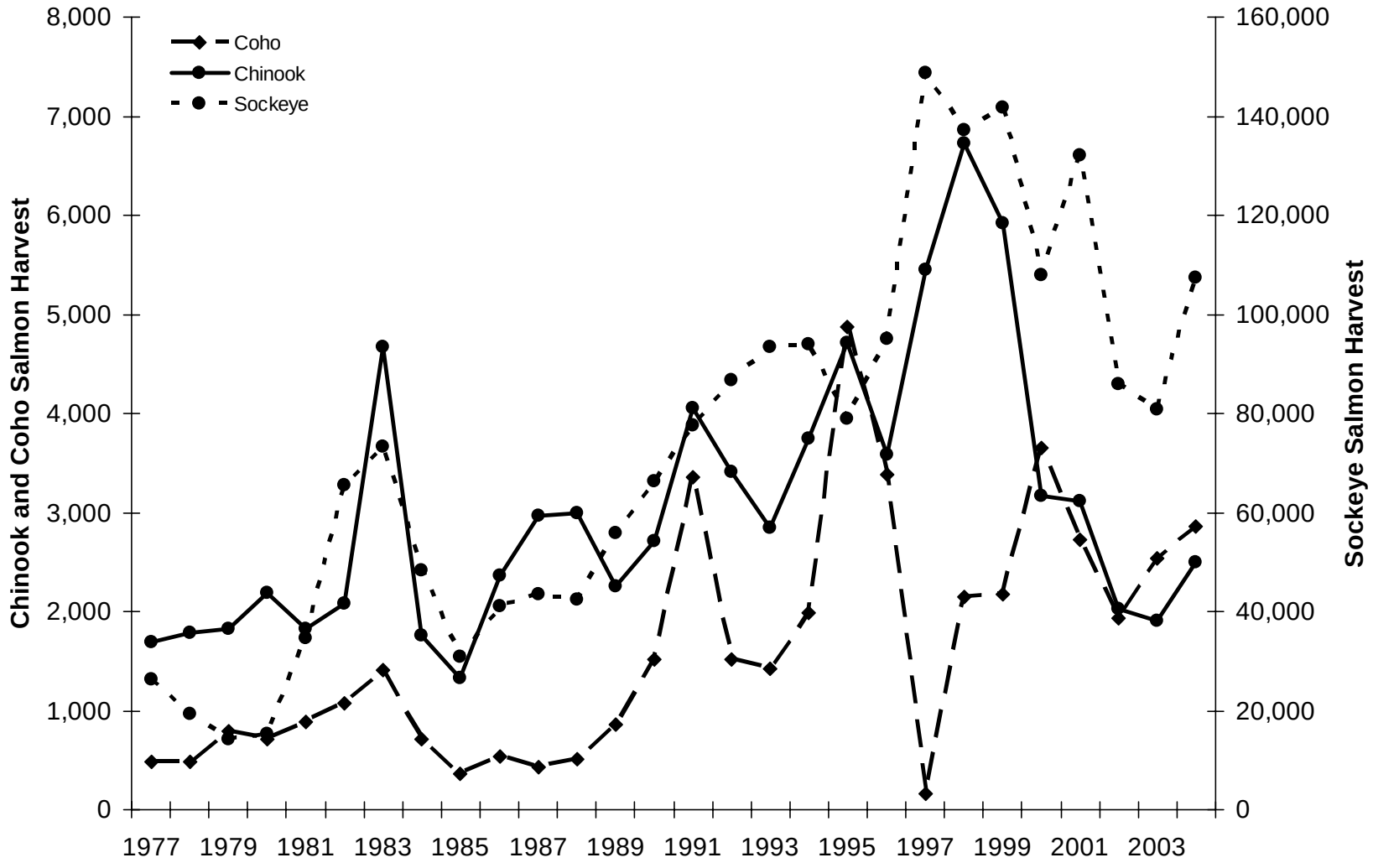

Figure 11.-Copper River Chitina Subdistrict harvest by species, 1977-2004.

Harvests in both the subsistence and personal use fisheries are dominated by sockeye salmon (Table 2). King salmon comprise the second largest harvest, while a nominal coho harvest also occurs.

Recent Fishery Performance

The number of permits issued and salmon harvests in both the subsistence and personal use fisheries have increased in recent years. In 2004, the Glennallen Subdistrict subsistence fishery participation was below 1,000 permits issued for the first time since 1996 (Table 16). In 2004, the Glennallen Subdistrict subsistence fishery participation was 956 permits issued and a total harvest of 59,497 salmon. In 2005, 961 Glennallen Subdistrict subsistence fishery permits were issued and a preliminary estimate of 71,901 salmon was harvested (based on 57% of permits being returned). The decline in permits and harvest beginning in 2002 is a result of the National Park Service issuing federal fishing permits, due to deviations in state and federal regulations. From 1999 to 2001, federally qualified subsistence users were issued state subsistence permits. In 2004, 261 federal permits were issued and 17,789 sockeye and 653 king salmon were reported harvested in the Glennallen Subdistrict (E. Veach, Biologist, National Park Service, Glennallen; personal communication).

In 2004, the Chitina Subdistrict fishery participation was 8,386 permits issued with a total harvest of 113,164 salmon (Table 17). In 2005, 8,171 Chitina Subdistrict personal use fishery permits were issued and a preliminary estimate of 120,704 salmon was harvested (based on 52% of permits returned).

Participation has declined in the Chitina Subdistrict from a high of 10,006 permits in 1998. The decline in 2000 is believed to be partly responsible due to the reduction in the king salmon limit from 4 to 1 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 increased.

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, as a result of Federal Subsistence Board (FSB) actions, federally qualified subsistence users were able to begin fishing on May 15 in the Glennallen Subdistrict, as federal subsistence limits remained identical to state limits, 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. In 2002, 201 Glennallen Subdistrict and 122 Chitina Subdistrict permits were issued to federal subsistence users. In 2003 and 2004, 221 and 261 Glennallen Subdistrict and 120 and 109 Chitina Subdistrict permits were issued, respectively. The decline in State Glennallen Subdistrict subsistence permits is likely a result of federal subsistence users receiving federal permits. Approximately 400 state permit holders in 2001 were federally qualified, so only a portion of those users chose to get federal subsistence permits in 2002.

Management Objectives

The Glennallen Subdistrict subsistence fishery is managed under a BOF adopted management plan, the *Copper River Subsistence Salmon Management Plan* (AAC 2004d). Since 2003 with the reclassification of the Chitina Subdistrict fishery to a personal use fishery, the Chitina Subdistrict has been managed under the *Copper River Personal Use Dip Net Salmon Fishery Management Plan* (AAC 2004e). These plans stipulate management objectives and guidelines, with allocations for each fishery outlined in the *Copper River District Salmon Management Plan* (AAC 2004c).

Currently, inseason 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* (AAC 2004e). Prior to 1996, under the *Copper River Personal Use Salmon Management Plan* (AAC 1996), the BOF established weekly harvest quotas and also allocated 25% of any escapement in excess of the in-river escapement goal of 560,000 to the Chitina Subdistrict personal use fishery. The weekly fishing periods and limits established by EO are based on the projected inriver returns. Inriver returns are estimated by sonar located at Miles Lake. The management plan was revised during the 1996 BOF meeting such that the harvest will be distributed throughout the season, based upon on the projected sonar counts. Adjustments will be made to the preseason schedule based on the actual sonar counts, by increasing or decreasing fishing time. At the 1999 meeting, the department requested the BOF to adopt the existing personal use management plan guidelines for the reclassified Chitina Subdistrict Subsistence fishery. These guidelines were then incorporated back into the personal use management plan following the 2003 BOF meeting.

Fishery Management

The 2004 Copper River Chitina Subdistrict personal use fishery opened by EO for a 90 hour opening on June 3 at 6:00 A.M. (Table 3). Based on numbers of fish passing the Miles Lake sonar (24,000 surplus to the weekly escapement goal) this first period was increased by 66 hours. The fishery re-opened June 7 for a 168 hour opening. Due to a 50,000 salmon surplus above the weekly salmon escapement objective, this second period was also a supplemental period. The fishery remained open the following week (June 14 – 20) due to sonar counts, which remained above escapement objectives by 10,000 salmon. Sonar counts declined slightly (9,700 salmon below projected), but based upon historic harvest and participation levels the fourth period remained open 168 hours. Sonar numbers improved and exceeded the projected counts by 9,800 allowing the fifth period to remain open 168 hours. Sonar counts continued above projected counts for the next two periods and the fishery remained open during the sixth and seventh period. By the eighth period with actual sonar counts continuing to exceed projected counts the fishery was open to continuous fishing beginning July 19th through August 31st and remained open through September 30 by regulation.

The 2005 Copper River Chitina Subdistrict personal use fishery opened by EO for a 104 hour opening on June 1 at 12:01 P.M. (Table 3). Based on numbers of fish passing the Miles Lake sonar (41,000 surplus 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.

Beginning in 2000, Chitina Subdistrict permits were available from ADF&G offices in Anchorage, Fairbanks, Glennallen, and Palmer to provide additional service to the dipnetting public, reduce fishery operating costs, and prevent excessive delays (up to 3 hours) at the Chitina ADF&G office for participants to receive permits. In 2001, permit issuance was expanded to over 40 license vendors in the Southcentral and Interior regions. This prevented any inseason estimation of weekly harvest and participation since 2000, but lack of this information did not influence management decisions during this time.

Fishery Outlook

In recent years, the participation in the Chitina Subdistrict leveled off at about 9,000. The changes in the Chitina Subdistrict fishery in 2000 have resulted in a decline in participation in the Chitina Subdistrict, but an increase in the Glennallen Subdistrict. The Federal subsistence fishery has caused a slight decline in Glennallen Subdistrict permits, but based upon combined State and Federal permits, participation in the fishery has actually remained stable or increased slightly. In July 2001, a landslide downstream of O'Brien Creek (approximately in the middle of the Chitina Subdistrict) blocked road access to the lower half of the fishery. Through the 2005 fishing season, the landslide had not been cleared and the road has remained closed. Some dipnetters have chosen to disregard the road closure and have cleared enough of the slide area to access the lower Chitina Subdistrict via foot, bike, ATV, and four wheel drive highway vehicle. The Department of Transportation has received bids for clearing the slide and stabilizing the road, but the costs were higher than anticipated and funding for this work has not been appropriated. The restricted access may have been partially responsible for the decline in the Chitina Subdistrict permits since 2002.

A bill was introduced in the 2002/2003 legislative session to remove the permit fee from regulation, this bill passed, but did not go into effect until the 2004 fishing season. As a result of the permit fee being eliminated and access monies no longer being paid to Ahtna and Chitina Native Corporations, the Corporations blocked access to the Copper River at O'Brien Creek in July 2004. This blockage has prevented the launching of boats from this site, but did not prevent the charter boat operators from transporting dipnetters from O'Brien Creek, or foot access to the Copper River by dipnetters. The DOT, DNR and ADFG have been directed by the administration to resolve the access issue at O'Brien Creek with Ahtna and Chitina Native Corporations, but at the end of the 2004 season no agreements had been reached. With the elimination of the permit fee, permit numbers increased in 2004 and remained similar in 2005, but whether the access issues at O'Brien Creek will result in a decline in permits in the future is uncertain. During the 2005 season, Chitina Native Corporation put a fee station at O'Brien Creek to provide access to the river and camping areas outside the ROW. While some dipnetters paid the fee, the actual numbers of dipnetters paying for access has not been released, but

observations by department staff at O'Brien Creek indicate a minority of dipnetters participated in the fee program.

Harvests of sockeye salmon in the Chitina Subdistrict personal use fishery will be dependent upon salmon run strength, if the harvest allocation for the Chitina Subdistrict personal use fishery is increased and escapement objectives are met, the fishery will likely have a greater period of time open to continuous fishing. There have been observations that many participants in the Cook Inlet personal use fishery also participate in the Copper River personal use fishery. Cook Inlet permits have been returned to the Chitina and Glennallen offices in past years. 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.

Recent Board of Fisheries Actions

Due to changes in the distribution of fishing effort since the inception of the plan in 1984, a revised management plan was developed during the 1996 BOF meeting. The revised plan distributes the personal use harvest throughout the season based upon the daily projected sonar counts at the Miles Lake sonar. The maximum harvest level was increased from 60,000 to 100,000 salmon, not including any salmon in excess of the inriver goal or salmon taken after August 31. During the February 1998 meeting, the BOF passed a proposal (originally an agenda change request) that allows personal use permit holders, who have filled their original limit, to be issued a supplemental permit for 10 additional fish in weeks when a harvestable surplus of 50,000 salmon or greater will be available in the Chitina Subdistrict.

Actual harvest numbers resulting from the issuance of supplement permits have been relatively low. The supplemental period is also a likely attractant to participants who anticipate high catch rates owing to the escapement surplus; the potential increased effort and catch however, are currently immeasurable.

The "insurance policy" in the *Copper River King Salmon Plan* resulted in a reduction of king bag limit from five to four salmon. King harvests continued to increase following this bag limit reduction with record harvests of king from 1997 to 1999. The plan was relatively ineffective in reducing king harvest due to increased participation in the fishery. Only 7,198 permits were issued in 1996, but from 1997-1999, in excess of 9,000 permits were issued each year. The increased participation is likely one of the reasons the king harvests did not decline.

During the 1999 BOF meeting, the Board ruled in favor of a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the upper Copper River. As a result of this decision, the Copper River Personal Use Salmon Dip Net Fishery was repealed and a Chitina Subdistrict subsistence fishery was established. The regulations for the Chitina Subdistrict subsistence fishery remained similar to the Copper River Personal Use Salmon Dip Net Fishery regulations with three exceptions. The three exceptions included an adjustment to the annual bag limit for king salmon, a maximum harvest level of wild stock sockeye salmon of 85,000 – 130,000, and permit holders are no longer required to possess a sport fishing license. Annual bag limits continued to be 30 salmon for a household of two or more, and 15 salmon for a household of one, of which only one fish can be a king salmon**.** The BOF determined that reducing the bag limit of king salmon from four in the personal use fishery to one in the subsistence fishery, provided for a reasonable opportunity to harvest a king salmon, but would also maintain king salmon harvests at historic levels. Based upon recent harvests the Board determined that 100,000 – 150,000 salmon were necessary for subsistence needs to be met for

the Chitina Subdistrict fishery. This number included contributions of hatchery fish, and after this contribution was subtracted, resulted in the 85,000 – 130,000 wild stock harvest level. As a result of this determination, there were two subsistence fisheries in the upper Copper River district from 2000 - 2002. The king harvests from 2000 – 2004 have averaged approximately 2,500 salmon annually, which is similar to historic levels.

During the 2003 BOF meeting in Cordova, the Board ruled against a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the Upper Copper River. As a result, the Chitina Subdistrict subsistence fishery was repealed and the Copper River Personal Use Dip Net Salmon Fishery was re-established. The Board viewed this as a name and allocation priority change only, management of the fishery continued as it had in the past, based upon the number of fish passing the Miles Lake sonar. There were no changes to the Glennallen Subdistrict subsistence fishery as a result of this decision. This action resulted in a new Copper River personal use dip net salmon fishery management plan (AAC 2004e). This plan was similar to the Copper River Personal Use Dip Net Salmon Fishery Management Plan in effect prior to 2000, with two exceptions (AAC 1999). The two exceptions included an adjustment to the bag limit for Chinook salmon and an allocation of sockeye salmon of 100,000 – 150,000. Bag limits continued to be 30 salmon for a household of two or more, and 15 salmon for a household of one, of which only one fish can be a Chinook salmon (as opposed to four Chinook salmon prior to 2000). The BOF desired to maintain the same bag limits in the personal use fishery as had been allowed in the Chitina Subdistrict subsistence fishery. The Chinook salmon bag limit of one, provides for an opportunity to harvest a Chinook salmon, but will continue to maintain Chinook salmon harvests at historic levels. The Board complied with the Copper River Chinook Management Plan (AAC 2004b) to see no increase in Chinook salmon harvest potential.

Current Issues

Whether the Chitina Subdistrict is a subsistence or personal use fishery continues to be a primary issue. Following the 1999 meeting, members of the Copper River Native Association, Chitina and Ahtna Native corporations filed a petition to the BOF to reconsider the subsistence ruling. The BOF agreed to have a committee meet in March 2000 to listen to information regarding the Chitina Subdistrict ruling. Following the March meeting, the committee presented its findings and recommendation to the BOF, which decided to not reconsider the ruling, since no new or compelling information was presented to the committee that would indicate a need to revisit the 1999 decision. At this time there was some resentment among the Native community towards urban participants in the Chitina Subdistrict regarding the subsistence classification. The repeal of the 1999 ruling at the 2003 BOF meeting was not well received by the Chitina Dipnetters Association and the Alaska Outdoor Council, as they feel the priority for the dipnetters should be above the commercial fishery. This priority was provided under the subsistence classification. The Fairbanks Advisory Committee has submitted a proposal for the 2005 BOF meeting (Proposal #3) to reclassify the Chitina Subdistrict as a subsistence fishery.

At the 2000 BOF meeting a proposal was submitted to allow 100,000 salmon past the sonar before the commercial fishery could begin fishing. This proposal was submitted as an Agenda Change Request under a conservation issue regarding early return sockeye salmon. The BOF voted against the proposal, but additional concerns voiced by the proposal author regarding subsistence needs of the Chitina Subdistrict dipnetters not being met may be an ongoing issue. 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 both 2004 and 2005, to allow upper Copper River salmon stocks to move through the lower Glennallen Subdistrict.

Another issue regarding this fishery relates to access. Much of the land in the area open to subsistence and personal use fishing is privately owned. In 1985 and 1986, the Chitina Native Corporation blocked the road to O'Brien Creek and charged a fee for access. In 1987 the state of Alaska negotiated a $15,000 contract with the Chitina Native Corporation for access and to build and maintain outhouses and collect and remove garbage. The contract was renewed in 1988. The legislature refused to appropriate funds for access in 1989 after roadwork done on the road in the fall of 1988 eliminated areas where the road passed on private land. In response, the Chitina Native Corporation refused dipnetters access to O'Brien Creek during the 1989 season. The legislature again appropriated funds for access to O'Brien Creek in 1991. Also in 1991, at the urging of the Chitina Dipnetters Association, the legislature instituted a $10 fee for the personal use fishery. The fee was to be used to develop a long-term lease. During 1994, a 5-year lease was negotiated with the Chitina Corporation. In 1995, a 4-year lease was negotiated with Ahtna Corporation for use of lands surrounding Haley Creek. Trespass on lands not included in the lease agreement remains an issue. During work group meetings in the fall and winter of 1995-1996, Native groups from the Chitina area expressed discontent with the adequacy of the negotiated leases. The lease agreements both expired December 31, 1998. Meetings with both corporations occurred during 1998 and 1999 and resulted in a 1-year extension of the existing contract and monthly meetings throughout the fishing season in 1999 to address current issues. These meetings provided input for developing new contracts and addressing issues in the previous contracts. Primary concerns from the corporations include operation of the commercial charter operators at O’Brien Creek, trespass on both east and west banks of Copper River where access was not provided by contract, and lack of enforcement for fishing and trespass violations. Negotiations for a new 1-year contract were completed in early 2000. As a result the access fee was increased to $25 for the 2000 season. This contract was renewed annually through 2003. In 2004, as described previously, due to legislative action the permit fee was removed, and the Chitina Native Corporation blocked Copper River access at O’Brien Creek. The state has tried to negotiate with the Corporation to permit access across these lands, but no agreement has been reached.

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. 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. These changes included: the modification of the subsistence fishery at Batzelnetas to conform with the regulations stipulated in a federal court injunction; a positive customary and traditional use finding and fishing season for the Chitina Subdistrict, and a season extension to the Glennallen Subdistrict fishery. As a result of Federal management, no State Batzulnetas permits have been issued since 1999; participants in this fishery have participated under Federal permits. Federal permit holders can use fish wheels, dip nets or rod and reel in the Chitina Subdistrict, though the open season mirrors the state season.

In the Glennallen Subdistrict, federal permit holders can begin fishing on May 15 (the state fishery does not open until June 1). As a result of these changes, separate federal fishery permits are now required. This added additional concerns on the quality of the harvest data collected by the federal agency, as permit return rates were less for federal permits than state permits. 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, as the federal regulations are less restrictive. 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. Since 2001, only federal permits have been issued for the Batzulnetas fishery, the last state permit for this fishery was issued in 1999.

The permitting process for the Chitina Subdistrict was changed in the 2000 season. Permit holders are no longer required to return permits at the end of each fishing trip. This has resulted in a lower percentage of returns and less timely harvest information. In addition, there are concerns by some of the Copper River stakeholders regarding quality of reporting data, based upon the memory of participants remembering the date and harvest from six months prior. This could potentially bias calculation of hatchery salmon contribution to the fishery, as these estimates are based upon daily harvest in the fishery.

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. During 1995, a program was initiated 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. Since that time, Sport Fish staff have collected king and sockeye salmon age and length data and heads of adipose fin clipped sockeye salmon from the Chitina Subdistrict fishery. This data is processed by Division of Commercial Fisheries staff in Cordova. Beginning in 2000, hatchery sockeye salmon fry were marked with strontium. The last year CWT marked fish were expected to return was 2003. Strontium marked fish began to return in 2004 and sampling for hatchery contribution has occurred through collection of a subsample of the sockeye harvest which will be examined for strontium marked otoliths. This marking technique allows an evaluation of the entire Gulkana Hatchery release; smolt leaving Paxson Lake were never marked with coded wire tags because the proportion of wild smolt among the out-migrants was unknown. In time, this

will allow managers to better target hatchery stocks while protecting wild fish. The king salmon radio-telemetry study conducted by the department from 1999 - 2004 provided information regarding king salmon passage through the fishery. In 2005, in conjunction with the Native Village of Eyak and LGL, Inc, the department initiated a radio-telemetry study on sockeye salmon to examine distribution of sockeye salmon throughout the upper Copper River drainage. This should also provide information on sockeye 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

From 1977 through 1995, more grayling were harvested by sport anglers fishing UCUSMA waters than any other fish (Table 6). Since 1990, more grayling have been caught than any other species of fish in the UCUSMA (Table 7). Harvests remained relatively stable from 1977 through 1987, averaging about 28,982 grayling. Since 1988, however, harvests have been declining, with the 2004 harvest of 4,115 grayling being the lowest on record (Table 18, Figure 12). This has been primarily the result of more restrictive regulations adopted to assure the sustained yield of the area's grayling stocks. The 2004 harvest accounted for 22% and 16% of the AYK and statewide harvest of grayling, respectively.

The largest grayling fishery in the UCUSMA has historically occurred in the Gulkana River drainage (Table 19). From 1994 through 2003, this drainage accounted for about 33% of the grayling harvest from UCUSMA waters (Table 20). In recent years, harvests from the drainage have remained relatively stable; 34% of the grayling harvest came from the drainage during the period 1999-2003. A discussion of the Arctic grayling fishery in the Gulkana River drainage follows this area-wide summary. Other UCUSMA drainages that have supported significant grayling fisheries include the Klutina and Tazlina drainages and various upper Susitna River drainage lakes and streams. Various lakes stocked with grayling catchables also provide fishing opportunity for this species.

To assure sustainable yield of grayling, 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 but only one grayling per day 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 5 per day and in possession. The bag and possession limit in stocked lakes remained at 10 per day and in possession. In 2004, a Regional Arctic Grayling Management Plan (AAC 2004g) was established. The plan created three management categories with associated regulatory options; Background Regulations, Conservative Harvest Regulations, and Special Management Regulations. The regulations adopted under the plan as Background Regulations (five fish bag

Table 18.-Harvest of Arctic grayling by recreational anglers fishing UCUSMA waters, 1977 – 2004.

Year	UCUS Harvest	Alaska Harvest	Percent[a]	Region III Harvest	Percent[b]
1977	25,991	113,691	23	93,159	28
1978	26,488	143,099	19	121,052	22
1979	37,232	160,069	23	126,704	29
1980	32,106	170,137	19	132,652	24
1981	32,982	159,924	21	129,162	26
1982	33,586	170,250	20	142,382	24
1983	27,094	181,006	15	149,995	18
1984	19,272	147,348	13	118,414	16
1985	32,511	139,171	23	113,737	29
1986	24,185	117,637	21	89,910	27
1987	27,359	110,714	25	85,315	32
1988	21,937	116,379	19	90,898	24
1989	16,629	105,469	16	88,266	19
1990	13,775	64,814	21	51,281	27
1991	13,278	82,831	16	65,632	20
1992	11,125	45,073	25	33,429	33
1993	12,504	49,740	25	38,363	33
1994	14,066	63,443	22	47,183	30
1995	14,289	46,168	31	37,574	38
1996	10,534	46,943	22	35,525	30
1997	8,583	45,844	19	33,968	25
1998	8,275	38,445	22	30,611	27
1999	8,245	37,252	22	28,275	29
2000	6,590	28,769	23	22,138	30
2001	4,450	25,656	17	18,608	24
2002	7,910	37,910	21	30,967	26
2003	5,908	30,742	19	24,755	24
2004	4,115	26,259	16	18,968	22
1994-2003[a]	**8,885**	**40,117**	**22**	**30,960**	**28**
1999-2003[a]	**6,621**	**32,066**	**20**	**24,949**	**27**

[a] Percent of all Arctic grayling harvested in state which were harvested in UCUS.
[b] Percent of all Arctic grayling harvested in Region III which were harvested in UCUS.
[c] Average value for the years depicted.

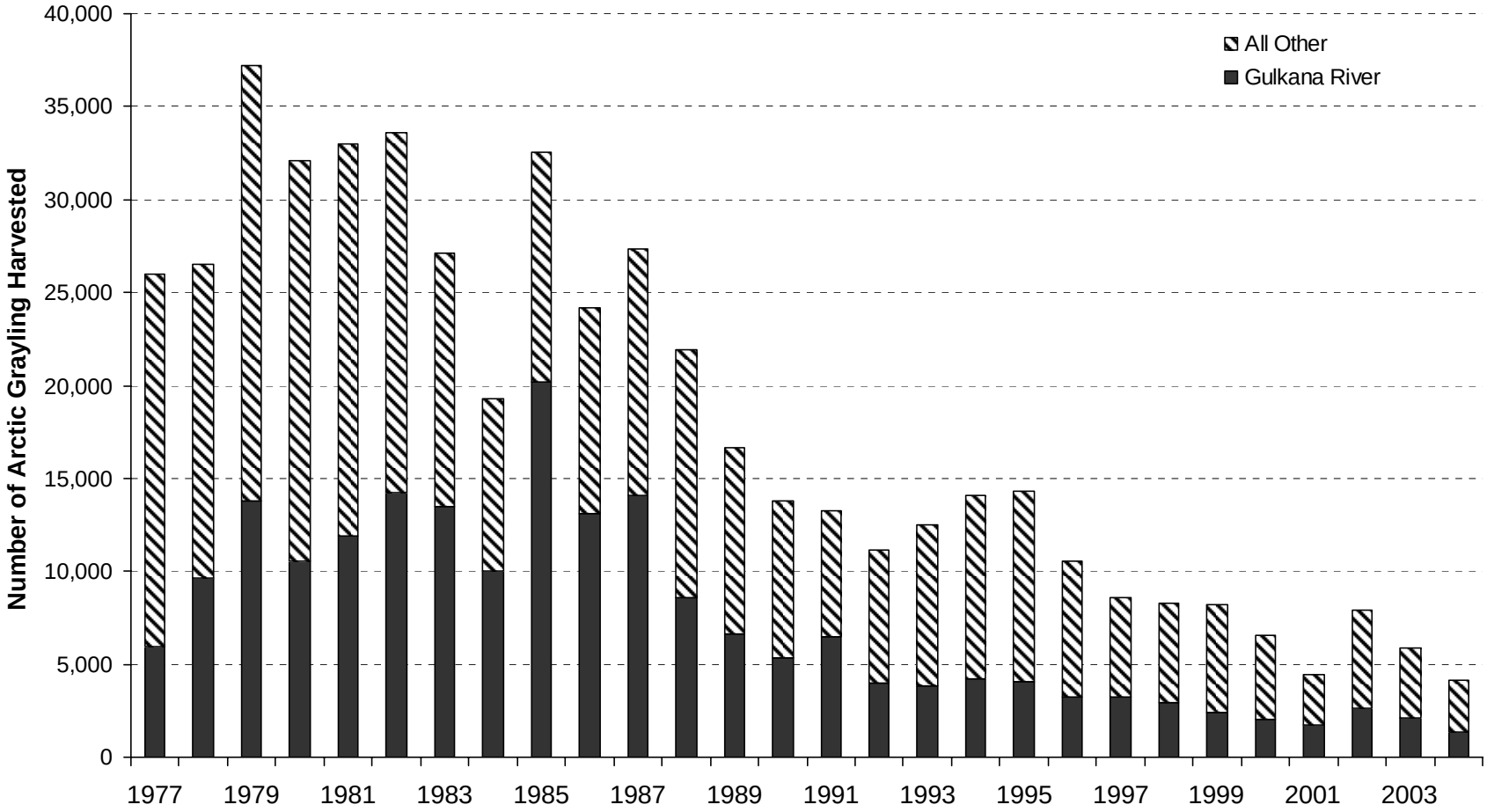

Figure 12.-Upper Copper/Upper Susitna Area Arctic grayling harvest, 1977-2004.

Table 19.-Harvest of Arctic grayling by recreational anglers fishing UCUSMA by drainage, 1977 – 2004.

Year	Gulkana River Drainage					Upper Susitna River Drainage					Klutina River Drainage			Tonsina River Drainage		
	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			3,355	5,929			3,557		3,557						
1978	2,125			7,494	9,619			2,278		2,278						
1979	5,063			8,726	13,789			2,936		2,936						
1980	3,754			6,776	10,530			4,477		4,477						
1981	2,775			9,158	11,933			4,892		4,892						
1982	5,124	4,150		4,999	14,273			3,532		3,532						
1983	3,063	3,651	545	6,221	13,480			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
1994-2003[b]	**710**	**1,520**	**410**	**239**	**2,879**	**670**	**447**	**227**	**669**	**2,013**	**17**	**342**	**359**	**3**	**223**	**225**
1999-2003[b]	**485**	**1,216**	**342**	**160**	**2,204**	**482**	**270**	**97**	**431**	**1,281**	**9**	**405**	**414**	**6**	**167**	**171**

-continued-

Table 19.-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		0									0	0	16,505	16,505	25,991
1978											0	0	14,591	14,591	26,488
1979		0									0	0	20,507	20,507	37,232
1980		0									0	0	17,099	17,099	32,106
1981		0									0	0	16,157	16,157	32,982
1982		0									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
1994-2003[b]	**400**	**344**	**241**	**985**	**156**	**272**	**428**	**76**	**30**	**106**	**838**	**552**	**501**	**1,891**	**8,885**
1999-2003[b]	**88**	**144**	**213**	**444**	**122**	**309**	**431**	**19**	**12**	**32**	**977**	**371**	**295**	**1,643**	**6,621**

[a] Includes harvests not specified as taken in lower or upper river.
[b] Average value for the years depicted.

Table 20.-Harvest and catch of Arctic grayling by recreational anglers fishing the Gulkana River drainage, harvest from 1977 – 2004 and catch from 1990 to 2004.

	Gulkana River Drainage Harvest					
Year	Rivers & Streams	Lakes	Total	Percentage of UCUS harvest	Number Caught[a]	Percent Released
1977	3,355	2,574	5,929	23		
1978	7,494	2,125	9,619	36		
1979	8,726	5,063	13,789	37		
1980	6,776	3,754	10,530	33		
1981	9,158	2,775	11,933	36		
1982	9,149	5,124	14,273	42		
1983	10,417	3,063	13,480	50		
1984	6,362	3,659	10,021	52		
1985	16,403	3,762	20,165	62		
1986	10,645	2,493	13,138	54		
1987	10,542	3,479	14,021	51		
1988	6,203	2,382	8,585	39		
1989	5,140	1,821	6,961	42		
1990	3,922	1,461	5,383	39	40,768	87
1991	4,526	1,932	6,458	49	34,600	81
1992	3,089	902	3,991	36	32,316	88
1993	2,345	1,483	3,828	31	45,865	92
1994	2,741	1,488	4,229	30	37,893	89
1995	2,830	1,241	4,071	28	29,172	86
1996	2,444	819	3,263	31	40,710	92
1997	2,598	630	3,228	38	43,575	93
1998	2,476	499	2,975	36	46,937	94
1999	1,801	625	2,426	29	39,266	94
2000	1,353	709	2,062	31	28,781	93
2001	1,475	278	1,753	39	31,496	94
2002	2,134	512	2,646	33	65,826	96
2003	1,830	302	2,132	36	66,014	97
2004	1,129	202	1,331	32	34,543	96
1994-2003[b]	**2,168**	**710**	**2,879**	**33**	**42,967**	**93**
1999-2003[b]	**1,719**	**485**	**2,204**	**34**	**46,277**	**95**

[a] Catch data is not available prior to 1990.
[b] Average value for the years depicted.

and possession limit, season open year round) did not change the general Arctic grayling regulations in the UCUSMA. Currently, only two fisheries within the UCUSMA are classified under the other categories, Mendeltna Creek (Conservative Harvest) and the upper Gulkana River above Paxson Lake (Special Management). Under these regulations, most grayling stocks in the UCUSMA are currently considered healthy.

Mendeltna Creek is a small stream in the Tazlina drainage located west of Glennallen and drains into Tazlina Lake. Main access points are at the Glenn Highway wayside and a single lane gravel road (Oil Well Road) off the Lake Louise Road. Harvests increased significantly between 1992 and 1993, 255 to 867 grayling, and peaked in 1995 at 1,041 (Table 19). 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 (approximately 8 in; Fish 1999, Scanlon and Fish 2000). The harvest of 65 Arctic grayling in 2004 is slightly below the 5 year average (1999-2003) of 88 fish.

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 limits 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 2 fish over 12 in total length. The open season was set from June 1 to March 31, to offer protection to the larger spawning grayling. The BOF supported this proposal and the regulation went into effect for the 2000 season.

Little is known about the distribution of Arctic grayling in the UCUSMA. Many of the roadside-accessible streams are located in the Tazlina drainage. 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 supports the largest grayling population in the UCUSMA. This clearwater drainage originates in the Alaska Range and flows south to join the Copper River near the community of Gulkana (Figure 7). Access to the river is available from various secondary roads and trails off the Richardson Highway, which parallels 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. Recently powerboat operators have begun launching from the Richardson Highway Bridge and fishing the 5-mile reach of the river above the bridge. The section of the Gulkana River upstream from Sourdough has been designated by the U.S. Congress as “wild” as part of the Wild and Scenic Rivers Act of 1968. 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 in which only single hook, artificial flies may be used from June 1 to July 31. This area has low use, except near the Richardson Highway, and is used primarily by walk-in

anglers from the Richardson Highway, but powerboat operators occasionally access the confluence of the Gulkana River with the Copper River after launching from Gakona or from the Richardson Highway Bridge.

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. 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, given that grayling stocks in several interior Alaska streams were depressed when subjected to similar harvest rates. Regulations were adopted in 1988 that reduced the bag and possession limit to five fish per day. Also, past research data 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). In an attempt to maintain historic size compositions, regulations were also adopted in 1988 that 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 have significantly reduced the total harvest of grayling in the Gulkana River drainage (Figure 12). The 2004 harvest of 1,331 Arctic grayling is the lowest harvest recorded (Table 20). No stock assessment was conducted on the Gulkana River in 2004; it is assumed that the Arctic grayling population remained 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 in 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. In 1998, stock assessment was conducted for comparison of age and size composition to previous assessment studies conducted in the early 1990s (Fish and Roach 1999). Data collected in 1998 indicates that the grayling population in the Gulkana River, through the restrictive regulations, has a larger proportion of fish, greater than 14”, than were present in the early 1990s (Fish and Roach 1999).

Fishery Outlook

It is anticipated that harvest levels of Arctic grayling will remain at recent levels. The current regulations appear to be maintaining the population at historic 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 is 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. The research conducted by Bosch (1995) indicated that the upper Gulkana grayling population was independent from the Middle Fork and mainstem populations, and though the population is small, the fish are large. The department determined that this population would be a candidate for a trophy catch-and-release fishery in order to preserve the current size composition of the population. This regulation has not affected the overall harvest of grayling in the Gulkana River drainage, it may be that the majority of grayling caught in the upper Gulkana River were released prior to the regulation.

During the 2003 BOF meeting, the Board adopted a department proposal that set the background bag and possession limit for Arctic grayling at five in flowing waters and lakes to provide consistency in the regulations for wild Arctic grayling populations. Arctic grayling bag and possession limit for stocked lakes in the UCUSMA was increased from five to 10. This regulatory change did not modify the Gulkana River drainage Arctic grayling regulations

In January 2004 the Board adopted a Regional Arctic Grayling Management Plan (AAC 2004g). The plan created three management categories with associated regulatory options; Background Regulations, Conservative Harvest Regulations, and Special Management Regulations. Within the UCUSMA, only Mendeltna Creek is categorized under Conservative Harvest management with a bag and possession limit of two fish, with a minimum size limit to 12 inches. The regulations adopted under the plan as Background Regulations (five fish bag and possession limit, season open year round) did not change the general Arctic grayling regulations in the UCUSMA. Regulations for waters already under special regulations did not change, which included the upper Gulkana River above Paxson Lake.

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.

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 (Table 20). Assuming a 5% release mortality rate, this appears acceptable given current harvest and abundance levels.

There has been some 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 desire to do so. This may result in a proposal during a future BOF meeting, to allow some minimal level of harvest in the upper Gulkana River.

Ongoing and Recommended Research and Management

An objective of the research program was to develop a plan for monitoring the status of grayling stocks in the Gulkana River drainage. It is recommended that the following monitoring program be conducted to assure the sustained yield of the fishery. 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 5 years. Stock assessment was conducted in the mainstem for 1998, to determine age and length composition (Fish and Roach 1999). This assessment indicated that the Arctic grayling population had a greater proportion of larger fish, when compared to data collected in the early 1990s, likely a result of the more restrictive regulations put in place in the 1980s and 1990s. 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 recent regulatory change and provide background information for the BOF meeting (Wuttig *In prep*).

LAKE TROUT SPORT FISHERIES

Background and Historical Perspective

Lake trout stocks of the UCUSMA provide significant fishing opportunities and economic benefit to the people of Alaska (Figure 13). This is the only area in Alaska where numerous lake trout fisheries exist along the road system. From 1977 through 1989, an average of 7,283 lake trout were harvested from UCUSMA lakes and streams annually, accounting for 41% of the statewide lake trout harvest and 71% of the AYK region harvests over this period (Table 21). From 1994 to 2003, lakes and streams of the UCUSMA have accounted for over 28% of the annual statewide harvest of lake trout and 45% of the AYK region harvests.

Most of the lake trout harvest in the UCUSMA has come from lakes within the Tyone River (Lake Louise and Susitna and Tyone lakes) and Gulkana River (Paxson, Susitna, and Crosswind lakes) drainages (Table 22). From 1994 to 2003, these two drainages have accounted for 85% of the UCUSMA lake trout harvest and an average of 24% of the statewide lake trout harvest. Paxson Lake and Lake Louise have supported the largest fisheries for lake trout in the UCUSMA and Alaska. Together, these two lakes have accounted for 44% of the UCUSMA lake trout harvest and an average of 13% of the annual statewide harvest of lake trout from 1994 to 2003. Other major sport fisheries for lake trout in the UCUSMA occur in Summit and Crosswind lakes (in the Gulkana River drainage) and in Susitna Lake (in the Tyone River drainage).

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 7,500 (Table 22). A study conducted in 1986, however, suggested 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 in 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.

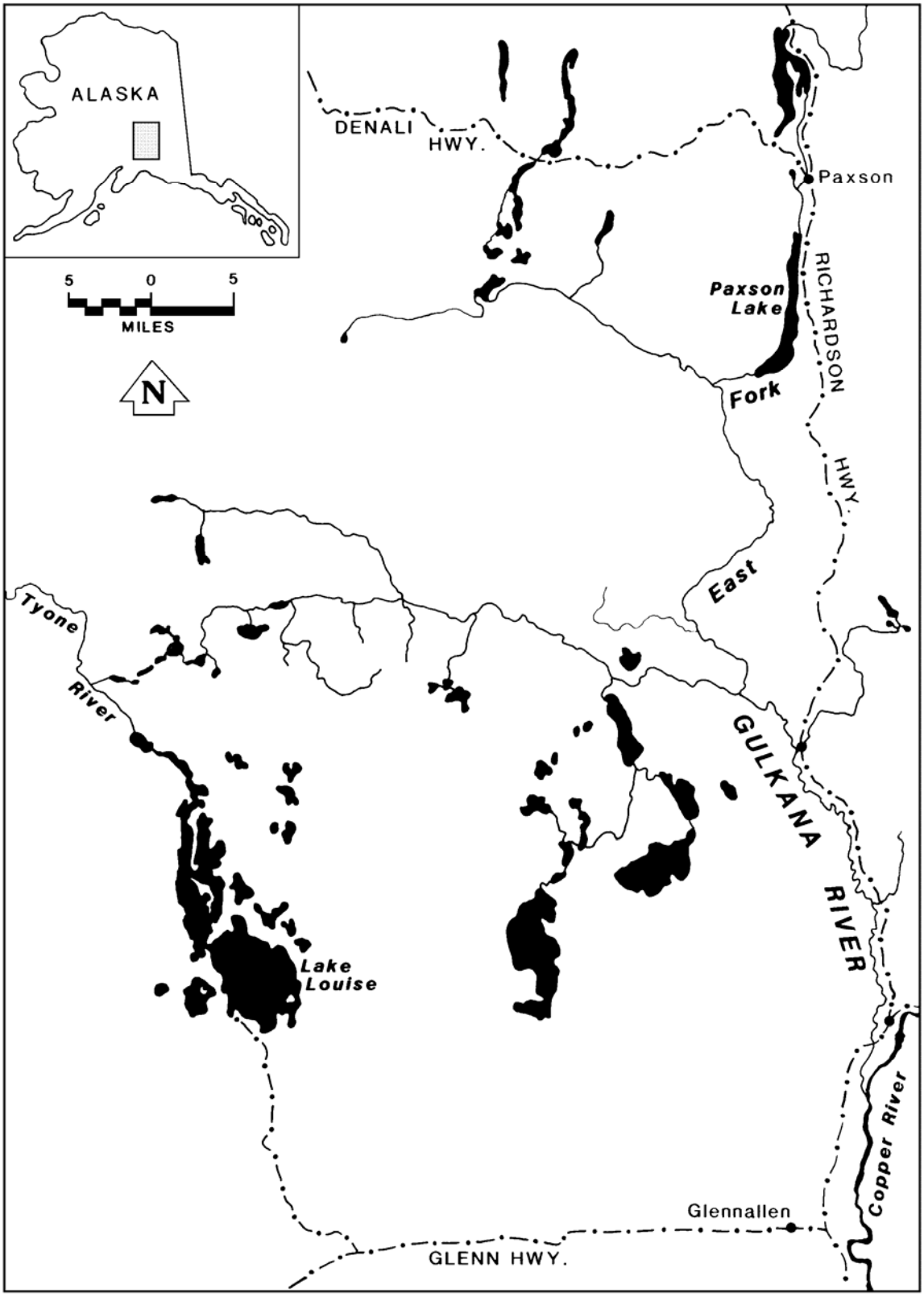

Figure 13.-Map of major lake trout fisheries in the UCUSMA.

Table 21.-Harvest of lake trout by recreational anglers fishing UCUSMA waters, 1977 - 2004.

Year	UCUS Harvest	Alaska Harvest	Percent[a]	Region III Harvest	Percent[b]
1977	7,699	17,469	44	9,968	57
1978	5,433	12,010	45	6,533	54
1979	7,271	15,477	47	8,872	57
1980	8,067	18,041	45	10,356	57
1981	8,337	18,316	46	11,158	61
1982	8,699	20,550	42	13,826	67
1983	7,246	20,304	36	11,309	56
1984	6,311	16,925	37	9,935	59
1985	8,686	18,473	47	14,040	76
1986	6,779	21,463	32	10,029	47
1987	6,721	15,209	44	7,834	52
1988	6,277	17,193	37	9,007	52
1989	7,147	17,070	42	10,752	63
1990	5,503	12,602	44	7,246	57
1991	4,864	13,772	35	7,897	57
1992	4,251	12,525	34	6,442	51
1993	4,569	13,094	35	7,167	55
1994	4,058	11,374	36	5,889	52
1995	2,934	8,412	35	4,266	51
1996	2,632	9,086	29	3,838	42
1997	1,923	7,486	26	3,289	44
1998	1,723	5,985	29	2,657	44
1999	2,135	9,948	21	4,131	42
2000	1,700	6,292	27	3,174	50
2001	1,185	4,995	24	1,903	38
2002	2,067	7,109	29	3,362	47
2003	1,831	7,084	26	3,101	44
2004	1,938	7,934	24	2,244	28
1994-2003[a]	**2,219**	**7,777**	**28**	**3,561**	**45**
1999-2003[a]	**1,784**	**7,086**	**25**	**3,134**	**44**

[a] Percent of all lake trout harvested in state which were harvested in UCUS.

[b] Percent of all lake trout harvested in Region III which were harvested in UCUS.

[c] Average value for the years depicted.

Table 22.-Harvest of lake trout by recreational anglers fishing UCUSMA waters by drainage, 1977 - 2004.

Year	Gulkana River Drainage				Upper Susitna Drainage			Klutina Drainage	Tazlina Drainage	Copper River Drainage		Other Sites	Area Total
	Paxson Lake	Summit Lake	Crosswind Lake	Other Lakes & Streams	Lake Louise	Susitna Lake	Other Lakes & Streams			Upstream of Gulkana	Downstream of Klutina		
1977			252	1,435			2,838		0			3,174	7,699
1978			714	1,103			2,522					1,094	5,433
1979			609	2,281			2,618		0			1,763	7,271
1980			895	2,324			2,609		0			2,239	8,067
1981			540	2,041			4,093		0			1,663	8,337
1982			734	2,777			4,056		0			1,132	8,699
1983			388	2,769			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
1994-2003 [a]	**332**	**146**	**276**	**106**	**638**	**189**	**208**	**33**	**33**	**118**	**18**	**121**	**2,219**
1999-2003 [a]	**320**	**108**	**314**	**69**	**421**	**139**	**129**	**24**	**44**	**86**	**23**	**106**	**1,784**

[a] Average value for the years depicted.

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 fallen. The 2004 harvest of 1,938 lake trout was 13% below the recent 10-year average and 9% above the recent 5-year average (Table 22). In general, harvests from both the Gulkana River and Tyone River drainages have remained relatively stable since 1994.

As a result of 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) has increased (Table 23). Theoretically, under the current regulations a greater number of lake trout are allowed to spawn once before harvest, resulting in an increase of lake trout production. As this larger number of small lake trout reach the 24” size, the percent of lake trout released in these lakes will likely decrease. Recently, there are concerns that hooking mortality may have a greater impact on the lake trout population under current regulations, than the benefit the minimum size may produce. The department initiated a regional review of lake trout regulations and management in 2002 and developed a lake trout management plan that has been submitted as a proposal to the BOF at the 2005 meeting.

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 approximately 1.0 to 4.0 kg, depending on the area of the lake. Based on the Evans et al. approach 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

Table 23.-Percent of lake trout released in lakes with 24” minimum size limit, 1990-2004.[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
1990-1993	**53**	**60**	**72**	**63**	**69**	**63**
1994-2004	**83**	**77**	**79**	**80**	**80**	**80**

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

accessible (e.g., Paxson, Summit, Susitna lakes and Lake Louise), the Evans et al. (1991) method provides yield estimates (based on current regulations of 24" minimum size) of 306 lake trout from Paxson Lake, 540 lake trout from Lake Louise, 321 lake trout from Susitna Lake, and 306 lake trout from Summit Lake. Based upon these estimates of yield, current harvests of lake trout appear to be at or below sustainable levels for Susitna and Summit lakes, but slightly above for Paxson Lake and 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 yield in 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. Based upon this information, 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. To date, regulations have been written to assure that maximum 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. Within the proposed management plan that will be presented to the BOF at the 2005 meeting the management objective for lake trout populations in the UCUSMA is for sustained yield through a conservative harvest regime to maintain harvests below defined maximum sustained yield.

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. Bag limits in the Tyone River drainage and Crosswind Lake are limited to one fish 24" or greater per day; any increase in

harvest opportunity could potentially result in a doubling of harvests. Assessment of lake trout stock status is currently based on evaluation of the SWHS. Stock assessment was discontinued in 1995 and information regarding the 2005 fishery will not be available until 2006. Since the majority of Alaskan lakes do not get the temperature stratification seen in Ontario lakes, the preferred method for maximum sustained yield estimation is the Lake Area Model. As mentioned previously, these estimates are guidelines and actual maximum sustained yield should be considered to be below the Lake Area Model estimates.

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, particularly in the Gulkana drainage where the 5-year average is approximately 70% of the 10-year average. The upper Susitna drainage has seen a similar decline. The lake trout populations in the Tyone River drainage and Crosswind Lake are larger on average than Gulkana River drainage trout populations and the 24-inch minimum size restriction would likely have a greater impact on harvest in those lakes with a larger population of smaller fish.

Recent Board of Fisheries Action

No proposals regarding lake trout were considered by the BOF during the 1996 meeting. A proposal regarding rainbow trout, but impacting lake trout and burbot was adopted at the 1999 BOF meeting. This proposal allowed only unbaited, single-hook, artificial lures in all flowing waters of the UCUSMA and Paxson and Summit lakes to protect rainbow trout populations. Another proposal requesting an increased bag limit to two lake trout on Crosswind Lake was not adopted by the BOF.

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 of which 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.

Current Issues

The present regulatory regime should protect all UCUSMA lake trout stocks from overharvest and allow abundance to increase. Angler preferences for small lake trout to eat and trophies to admire are not being met in the larger lakes in the UCUSMA, however. 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, to date, 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.

Anglers who wish to harvest burbot with bait in Paxson and Summit lakes have expressed their dissatisfaction with the current no bait, single-hook artificial lure regulation. 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. The Department has developed an area Lake Trout Management Plan to submit to the BOF at the 2005 meeting. This plan will provide guidelines for bag limits, length restrictions, and thresholds.

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 size and weight data, and conduct a mark-recapture study to estimate abundance (Scanlon 2004, *In prep*). Weight data will provide specific information for Paxson Lake in application with the Lake Area model. Weight information for the Tyone River drainage lakes (Lake Louise and Susitna Lake) and Crosswind Lake needs to be collected to update the Lake Area Model yield estimates. Current regulations for Paxson and Crosswind lakes and Lake Louise need to be assessed, as harvests have exceeded MSY estimates in some years over the past 10 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 and, prior to 1990, supported an average of 56% of the statewide sport harvest of this species (Table 24; Figure 14). The largest fishery has historically occurred in the Lake Louise complex (consisting of Lake Louise, Susitna and Tyone lakes; Table 25). 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.

Table 24.-Harvest of burbot by recreational anglers fishing UCUSMA waters, 1977 – 2004.

Year	UCUS Harvest	Alaska Harvest	Percent[a]	Region III Harvest	Percent[b]
1977	5,628	8,425	67	7,401	76
1978	7,223	9,988	72	9,112	79
1979	3,808	7,304	52	5,905	64
1980	10,159	14,948	68	13,522	75
1981	9,007	14,342	63	13,813	65
1982	8,006	15,445	52	13,789	58
1983	6,555	14,465	45	12,150	54
1984	10,329	19,164	54	16,262	64
1985	19,355	27,230	71	24,570	79
1986	10,030	18,849	53	15,641	64
1987	4,386	13,543	32	8,403	52
1988	3,747	9,478	40	7,625	49
1989	3,396	9,268	37	8,290	41
1990	1,836	10,577	17	7,319	25
1991	793	4,882	16	3,848	21
1992	1,495	7,245	21	5,748	26
1993	1,694	9,858	17	8,160	21
1994	2,869	10,868	26	8,572	33
1995	995	7,128	14	6,270	16
1996	981	5,841	17	4,792	20
1997	1,358	12,189	11	8,614	16
1998	1,485	6,882	22	5,304	28
1999	1,861	6,903	27	5,530	34
2000	2,290	9,809	23	7,257	32
2001	1,506	3,744	40	3,004	50
2002	2,224	9,119	24	7,652	29
2003	1,457	6,099	24	4,721	31
2004	1,127	5,704	20	4,456	25
1994-2003[c]	**1,703**	**7,858**	**23**	**6,172**	**29**
1999-2003[c]	**1,868**	**7,135**	**28**	**5,633**	**35**

[a] Percent of all burbot harvested in state which were harvested in UCUS.
[b] Percent of all burbot harvested in Region III which were harvested in UCUS.
[c] Average value for the years depicted.

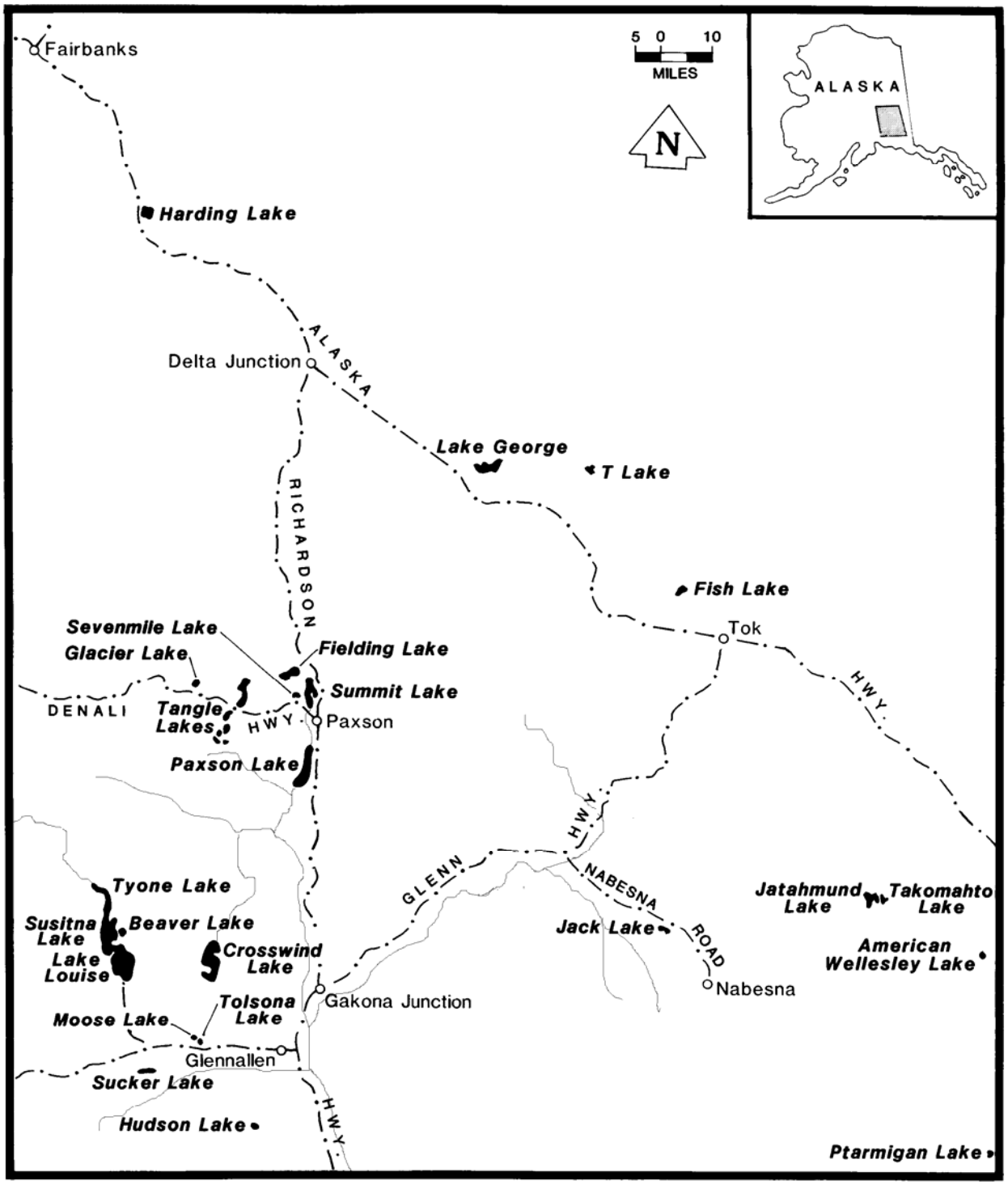

Figure 14.-Lakes supporting major burbot fisheries in the UCUSMA.

Table 25.-Harvest of burbot caught by recreational anglers fishing in the UCUSMA by drainage, 1977 – 2004.

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		291	216	507				3,157			467		467		0	1,497	5,628
1978		868	316	1,184				2,947					0		0	3,092	7,223
1979		100	418	518				2,363			118		118		0	809	3,808
1980		646	904	1,550				6,612			34		34		0	1,963	10,159
1981		367	778	1,145				5,292			0		0		0	2,570	9,007
1982		262	282	544				5,565			0		0		0	1,897	8,006
1983		178	661	839				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
1994-2003 [b]	**312**	**325**	**158**	**795**	**3**	**347**	**51**	**401**	**8**	**20**	**48**	**129**	**168**	**144**	**25**	**163**	**1,703**
1999-2003 [b]	**379**	**453**	**223**	**1,055**	**6**	**398**	**20**	**424**	**16**	**0**	**0**	**138**	**138**	**53**	**26**	**157**	**1,868**

[a] Includes Tonsina River drainage harvest estimates
[b] Average value for the years depicted.

Prior to 1979, there were 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 set lines 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.

The rapid growth in the fishery raised concern that several UCUSMA burbot stocks were either being, or in imminent danger of becoming, overexploited. In response, 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 set-lines 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 EO based on findings that this burbot stock had been severely overexploited and was depressed (Lafferty and Vincent-Lang 1991).

During its 1988 meeting, the BOF adopted a management plan for the burbot fisheries in lakes of the UCUSMA. The plan was adopted as regulation (AAC 2004h) to insure 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 EO 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 EO 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), Perry-Plake and Bernard *In prep*, Schwanke and Bernard (2005a-b), 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 BOF 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 EOs for the past several years and were expected to be closed through additional EOs 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 EO, with a bag limit of two burbot. During the 1994 BOF meeting, the department submitted a proposal to reopen Hudson Lake to burbot through regulation. In addition, a proposal to allow limited use of unattended setlines in the Copper River was submitted jointly by ADF&G and the Copper Basin Advisory Committee. The BOF approved both recommendations but they could not be implemented due to improper notification of the regulation proposal. The proposals were resubmitted and approved at the BOF meeting in December 1996.

Recent Fishery Performance

With the adoption of the more conservative regulations, harvests of burbot from UCUSMA waters decreased (Table 24). The harvest of 793 burbot during 1991 was the lowest on record. The reduction in harvest has allowed some of the previously overexploited burbot stocks in smaller lakes (e.g., Tolsona, Moose and Hudson lakes) and moderately sized lakes (e.g., Susitna and Paxson lakes) to recover to permit sustainable fisheries. For some lakes, however, these sustainable yields are substantially lower than maximum sustained yields the fisheries are capable of supporting. 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, however, has leveled off at 4,000 in recent years (Taube et al. 2000). The current level of burbot abundance in this lake has remained stable since 1991.

Stock assessment on Tolsona Lake has continued on a yearly 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 EO 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).

The harvest of 1,127 burbot in 2004 was the lowest since 1996. The 2004 harvest was 34% below the 10-year average and 40% below the 5-year average harvest. It is anticipated that future burbot harvests will remain near current levels.

Management Objectives

As outlined in the lake burbot management plan (AAC 2004h), the burbot fisheries in lakes of the UCUSMA are to be managed for *maximum sustained yield and opportunity to participate.* In

order to achieve this fishery objective, the plan gives the department the authority to use time and area closures *and* method and means restrictions to manage the area's burbot sport fisheries. Healthy stocks are managed to permit maximum sustained yield while depressed stocks are managed to allow the stocks to rebuild. Fishing is permitted on some depressed stocks, however exploitation levels allow the stocks to rebuild to permit a fishery capable of maximum sustained yield.

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 3 to 5 year rotation. These lakes currently include Tolsona Lake and Lake Louise. Assessment includes estimation of abundance, catch per unit effort (CPUE), and length composition. Tolsona Lake has been assessed annually since 1986, following the population decline in 1996 and 1997 the population is slowly rebuilding, but will remain closed until historic population levels are attained. Based upon stock assessment in 2002, it did not appear the population would recover to the desired level prior to 2005 (Perry-Plake and Bernard *In prep*). As a result, BOF adopted a department proposal at the 2003 BOF meeting to close Tolsona Lake by regulation (it had been closed by EO since 1998). At the time the population recovers to historic levels the department will submit a proposal to open the lake to burbot fishing.

The population at Lake Louise has maintained its current level of approximately 4,000 burbot since 1989. It appears the population may not rebuild to historic levels, due to competition from the lake trout population (Taube et al. 2000). As the lake has not been open to fishing since 1991, it was not anticipated that continued closure of the fishery would increase abundance. As a result, the Board adopted a department proposal at the 2003 BOF meeting to open Lake Louise to sport fishing with a one fish per day bag limit.

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.

Recent Board of Fisheries Actions

The Copper River Personal Use Burbot Fishery adopted in 1996 during the BOF meeting had seen no participation since its inception. The lack of participation may be a result of limited access to the Copper River and unsafe ice conditions during the open season (November 1 – April 15). The BOF supported the department proposal at the 1999 BOF meeting to repeal the Personal Use fishery and allow a sport fishery that permits unattended setlines year round on the mainstem Copper River with a bag and possession limit of two burbot. The BOF also supported a second department proposal that reduced the bag and possession limit of burbot from five to two on Tolsona and Moose lakes. This proposal was a result of the recent population declines in Tolsona Lake.

Three proposals regarding burbot regulations were adopted at the 2003 BOF meeting for the Upper Copper River drainage. The first 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. The second proposal closed Tolsona Lake to burbot fishing. Tolsona Lake had been closed to burbot fishing by EO since 1998 due to a decline in the burbot population. This action will afford the burbot population protection until it reaches a level that can sustain harvests and reduce public confusion regarding the EO. The third opened Lake Louise to burbot fishing with a bag and possession of one burbot. Lake Louise had been closed to burbot fishing since 1991, and the population stabilized at a level that can sustain a modest harvest.

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* set lines 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. This reduces participation in fisheries capable of supporting effort and harvest. To promote participation, staff have encouraged anglers to shift to alternative gear types that are legal (attended set lines 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 EOs.

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 3 to 5 year schedule. Lake Louise was last assessed in 1999 and was again in 2005 to assess the impact of the fishery re-opening in 2003 (Schwanke and Perry-Plake *In prep*). 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 (such as Crosswind Lake). 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 2005b). 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. Given this, the area's widely distributed stocks of wild rainbow and steelhead trout stocks 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 BOF 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 also 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 also guided the 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.

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 creeks (tributaries to Moose Lake), which are closed from May 5 through June 15 to protect, spawning grayling. Under this regulation package, the harvest of wild rainbow and steelhead trout has been lowered.

In 2003, the BOF adopted a statewide *Policy for the Management of Sustainable Wild Trout Fisheries* (AAC 2004i). This policy provides guidelines to the BOF and department for developing regulations and managing wild trout populations.

Recent Fishery Performance

An estimated 696 wild rainbow trout were harvested in 2004, which was 13% less than the 1994-2003 average and 5% greater than the 1999-2003 average (Table 26). The catch of wild rainbow trout for 2004 was estimated at 6,212, which was 42% less than the 1994-2003 average and 37% less than the 1999-2003 average (Table 27).

No steelhead trout were reported harvested in 2004 or have been since 1999 (Table 28). The 64 steelhead caught in 2004 was the lowest number caught in the UCUSMA since 1995 (Table 29). 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 outlined in the *Upper Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy*.

Table 26.-Harvest of wild rainbow trout by sport anglers fishing UCUSMA waters by drainage, 1977 – 2004.

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		447	752		0				1,465	2,217
1978	316		940	1,256						669	1,925
1979	473		982	1,455		0				1,345	2,800
1980	293		956	1,249		0				1,317	2,566
1981	216		1,253	1,469		0				2,560	4,029
1982	565		692	1,257		21				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
1994-2003[b]	**0**	**4**	**0**	**4**	**20**	**19**	**26**	**0**	**126**	**602**	**798**
1999-2003[b]	**0**	**9**	**0**	**9**	**27**	**18**	**23**	**0**	**39**	**545**	**662**

[a] In 1991, the river was closed to the harvest of rainbow trout.
[b] Average value for the years depicted.

Table 27.-Catch of wild rainbow trout by sport anglers fishing UCUSMA waters by drainage, 1990 - 2004.

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		2,395	34	645	17	509	153	2,768	6,521
1991	1,256	14		1,270	246	792	41	342	109	1,106	3,906
1992	1,496	166		1,662	103	253	293	0	1,908	2,581	6,800
1993	2,468	305		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
1994-2003 [b]	**4,739**	**1,072**	**237**	**6,048**	**85**	**55**	**88**	**52**	**1,749**	**2,606**	**10,683**
1999-2003 [b]	**4,904**	**1,437**	**240**	**6,581**	**124**	**31**	**60**	**28**	**633**	**2,435**	**9,893**

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

[b] Average value for the years depicted.

Table 28.-Harvest of steelhead trout by sport anglers fishing UCUSMA waters by drainage, 1977 - 2004.

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		0	0		0				187	187
1978	0		0	0						45	45
1979	0		0	0		0				55	55
1980	0		0	0		0				34	34
1981	0		0	0		0				76	76
1982	21		31	52		0				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
1994-2003 [b]	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**3**
1999-2003 [b]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**

[a] In 1991, the river was closed to the harvest of rainbow trout/steelhead.
[b] Average value for the years depicted.

Table 29.-Catch of steelhead trout by sport anglers fishing UCUSMA waters by drainage, 1990 - 2004.

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
1994-2003 [b]	**65**	**58**	**7**	**129**	**2**	**0**	**21**	**0**	**38**	**2**	**191**
1999-2003 [b]	**104**	**70**	**2**	**177**	**3**	**0**	**0**	**0**	**35**	**2**	**217**

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

[b] Average value for the years depicted.

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 both 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 approved 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 in. 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).

Current Issues

Public concern over poor stock condition and no rainbow trout greater than 20 inches in the trophy fishery at Summit Lake has increased during recent years. Stock assessment in this system to determine if this is the case was conducted in 1999 and 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 were reported at Summit Lake from 2001 – 2003. 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 out-stocked 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 was conducted in spring 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 has 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 is 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 is to determine steelhead distribution in the upper Copper River using radio-telemetry. Steelhead are captured with a fishwheel or dip nets and implanted with radio tags and tracked via aircraft and tracking stations. Feasibility work was conducted in September in 2004 and the full project was implemented in August 2005 (Savereide 2005c).

A research plan should be developed for assessment of new areas of potential concern or creating and/or expanding existing databases on rainbow/steelhead trout populations in the UCUSMA.

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. Populations, both resident and anadromous, 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 occur 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, co-funded by ADF&G, BLM and the Alaska Cooperative Fishery Research Unit (ACFRU), 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 co-funded by BLM and the ACFRU, collected aquatic habitat data on the Tiekel River and studied which habitat was 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, since the inception of the SWHS in 1977, have ranged from 835 fish in 1980 to 6,001 in 1985. In 1985, 51% and 34% of the UCUSMA harvest occurred in the Klutina and Tonsina river drainages, respectively. The bag and possession limit for Dolly Varden has been at 10 per day and 10 in possession since at least the early 1970s. Creel surveys were conducted on the Klutina River in 1988 and 1989, but no data on Dolly Varden harvests were collected, as the creel surveys were directed at estimating king and sockeye harvests (Roth and Delaney 1989; Potterville and Webster 1990).

Recent Fishery Performance

Harvests of Dolly Varden prior to 1983 were not separated by individual systems in the SWHS. From 1983 to 1989, harvests averaged 4,451 fish, the Klutina and Tonsina rivers accounted for 54% and 24% of the UCUSMA harvest during this period, respectively (Table 30). From 1994 to 2003, UCUSMA harvests averaged 1,589 fish, the Klutina and Tonsina river harvests contributing 56% and 22% to the harvest total during this period. The current harvest trends appear to be stable, with the harvest of 2,166 in 2004 the highest since 1999, and above the recent 10-year average by 36% and 5-year average by 48%.

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

Table 30.-Harvest of Dolly Varden by sport anglers fishing UCUSMA waters by drainage, 1977 – 2004.[a]

Year	Klutina River Drainage	Tazlina River Drainage	Tonsina River Drainage	Copper River Drainage		Other Sites	Area Total
				Upstream of Gulkana	Downstream of Klutina		
1977		0				2,251	2,251
1978						904	904
1979		0				5,890	5,890
1980		0				835	835
1981		0				2,452	2,452
1982		0				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
1994-2003 [b]	889	20	341	133	49	157	**1,589**
1999-2003 [b]	891	26	405	6	69	72	**1,468**

[a] Dolly Varden are not present in the Gulkana River drainage.
[b] Average value for the years depicted.

to assess the proportion of effort directed at individual species, the current effort data is specific to drainage or system trends. If fishing effort in the UCUSMA as a whole increase, 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 in recent years 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 radio-telemetry study that indicated the Tonsina River Chinook 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 from the 1960s and 1970s, on distribution of Dolly Varden in the UCUSMA. Based upon 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. In an oversight following the 2003 BOF meeting, in the current regulatory language bait and multiple hook lures were again prohibited in the tributaries of the Tonsina River. The department has submitted a proposal to the 2005 BOF meeting to allow bait in all waters of the Tonsina River drainage downstream of Tonsina Lake to provide for the Dolly Varden fishery.

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 ADF&G stocks approximately 30 lakes in the upper Susitna River drainage and the upper Copper River drainage management area (UCUSMA) to provide fishing opportunities for popular game species in locations were fishing opportunities don't exist or are limited. 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.

The ADF&G stocks fingerling size fish (2-4 inches) in some lakes and catchable size fish (6 to 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:

Species	Daily Bag and Possession Limit	Size Limit
Rainbow trout	10	Only 1 over 20 inches
Arctic grayling	10	No size limit
Silver salmon	10	Less than 16 inches
King salmon	10	Less than 20 inches
Arctic char	10	No size limit
Lake trout	2	No size limit

Objectives

1. Manage important endemic fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 5,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stockings for specific lakes are listed in Table 31. Fish stockings for 2001 - 2005 are summarized in Table 32 and projected fish stockings for 2006 and 2007 are summarized in Table 33.

Evaluations

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

Table 31.-Stocking schedule for remote lakes in the UCUSMA.

Area (Access)Lake	Lake Size in Acres	Species	Stocking Years
Glenn Highway			
Arizona Lake	25	Grayling	Alternate
Buffalo Lake	4	Rainbow	Annual
DJ Lake	4	Rainbow	Alternate
Gergie Lake	60	Rainbow	Alternate
Little Junction Lake	5	Grayling	Alternate
Ryan Lake	45	Rainbow	Annual
Tex Smith Lake	15	Rainbow	Annual
Richardson Highway			
Dick Lake	40	Arctic Char	Alternate
Pippin Lake	160	Rainbow	Annual
Squirrel Creek Pit	5	Grayling, Rainbow	Annual, Annual
Lake Louise Road			
Connor Lake	18	Grayling	Alternate
Crater Lake	16	Rainbow	Alternate
Junction Lake	18	Grayling	Alternate
Little Crater Lake	2	Rainbow	Alternate
Old Road Lake	1.5	Rainbow	Annual
Peanut Lake	12	Rainbow	Alternate
Round Lake	2	Rainbow	Annual
Edgerton Highway			
Three Mile Lake	20	Rainbow	Alternate
Town Lake	40	Rainbow	Annual
Two Mile Lake	17	Rainbow	Alternate
McCarthy Road			
Sculpin Lake	190	Rainbow	Annual
Silver Lake	500	Rainbow	Annual
Strelna Lake	290	Coho, Rainbow	Annual, Alternate
Van Lake	280	Rainbow	Alternate
Remote Lakes			
John Lake	160	Rainbow	Alternate
North Jans Lake	58	Rainbow	Alternate
South Jans Lake	100	Coho, Rainbow	Annual, Alternate
Tolsona Mt. Lake	75	Rainbow	Alternate

Table 32.-Summary of stocking activities for stocked lakes in the UCUSMA 2001-2005.

Species	Catchable	Subcatchable	Fingerling	Total
2001				
Arctic Char				
Arctic Grayling	4,716			4,716
Rainbow Trout	15,228		185,000	200,228
Coho Salmon				
Total	**19,944**		**185,000**	**204,944**
2002				
Arctic Char			4,000	4,000
Arctic Grayling				
Rainbow Trout	10,354			10,354
Coho Salmon			34,000	34,000
Total	**10,354**		**38,000**	**48,354**
2003				
Arctic Char	2,162			2,162
Arctic Grayling			2,368	2,368
Rainbow Trout	11,409		66,542	77,951
Coho Salmon				
Total	**13,571**		**68,910**	**82,481**
2004				
Arctic Char				
Arctic Grayling				
Rainbow Trout	9,433		58,610	68,043
Coho Salmon			17,147	17,147
Total	**9,433**		**75,757**	**85,190**
2005				
Arctic Char	2,014			2,014
Arctic Grayling				
Rainbow Trout	6,981		28,015	34,996
Coho Salmon				
Total	**8,995**		**28,015**	**37,010**

Table 33.-Summary of projected game fish stockings for rural and remote lakes in the UCUSMA, 2006-2007 (these numbers are dependent on hatchery production).

Number of Lakes 2006/2007	Species	Lifestage	Target Size (in)	2006 Projected	2007 Projected
0/1	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
13/13	Rainbow Trout	Catchable	6-8	11,400	11,400
9/4	Rainbow Trout	Fingerling	2-4	118,000	67,500

Fishery Statistics

During the period 1994 through 2003, the annual effort on stocked species ranged from 2,160 in 1997 to 5,561 angler-days in 1994 and averaged about 3,794 angler-days (Table 34). From 1994 to 2003, 66% of the catch and 74% of the harvest of stocked game fish was made up of rainbow trout. Arctic grayling and coho salmon contribute 30% and 3% to catch and 20% and 5% to harvest, respectively (Figure 16). The average catch rate for stocked fish in the UCUSMA was about 3.6 fish per angler-day of effort. Five-year moving averages from 1994 through 2003, for number of anglers, effort, catch and harvest are shown in Figure 15.

Of all the stocked lakes in the UCUSMA, Silver Lake is the most popular. From 1994 to 2003, it accounted for about 38% of the angler-days of effort generated on stocked waters. It also accounted for 45% of the catch and 48% of the harvest of all stocked fish.

Recent Board of Fisheries Action

During the January 2004 AYK BOF meeting the Board adopted a Regional Stocked Waters Management Plan (AAC 2004j). 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 region-wide, and changed the general regulations for stocked waters in some areas. All regulations for stocked waters that were previously under special regulations remained unchanged.

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Table 34.-Effort, harvest, and catch statistics by species for stocked lakes in the UCUSMA 1990-2004.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	1994-2003	1999-2003
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	2,106	1,736
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	3,794	3,535
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	8,528	7,479
Coho Salmon	51	347	508	56	496	109	693	444	1,039	309	800	513	0	0	0	440	324
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	3,907	4,248
Arctic char	68	243	0	0	45	0	0	0	0	22	298	43	179	495	0	108	207
Total	8,441	13,446	25,118	20,492	17,270	14,568	16,113	6,938	13,652	9,530	12,090	17,075	14,015	8,581	7,155	12,983	12,258
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	3.6	3.6
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	3,176	2,576
Coho Salmon	17	69	379	56	80	42	414	274	395	232	436	282	0	0	0	216	190
Arctic grayling	935	726	1,623	852	1,167	804	726	570	223	1,265	521	473	1,939	688	62	838	977
Arctic char	34	243	0	0	0	0	0	0	0	0	57	43	22	495	0	62	123
Total	3,160	7,196	10,171	7,235	5,456	5,098	5,140	2,521	5,357	4,541	3,560	2,762	4,862	3,609	1,677	4,291	3,867

[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.

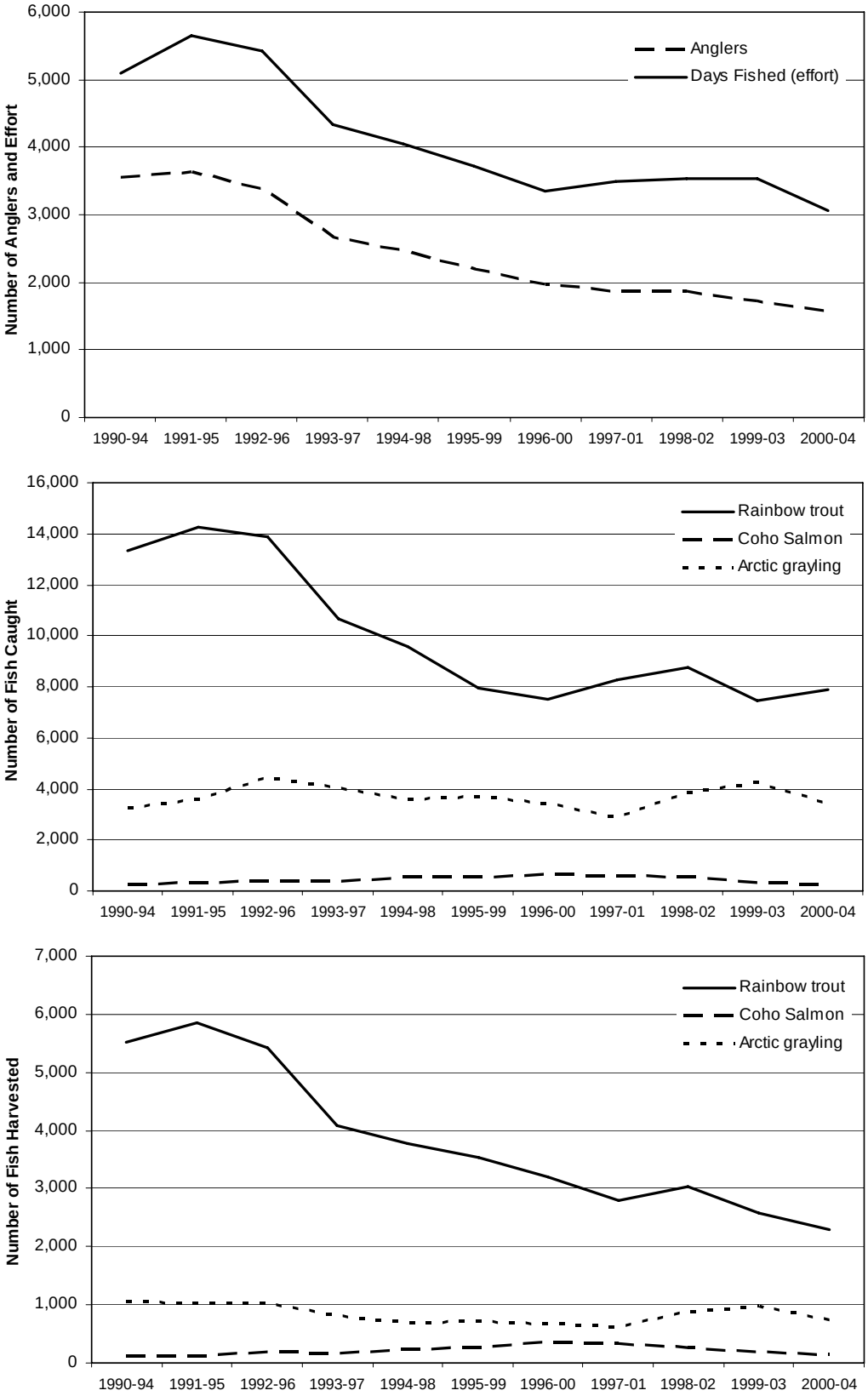

Figure 15.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from stocked lakes in the UCUSMA 1990-2004.

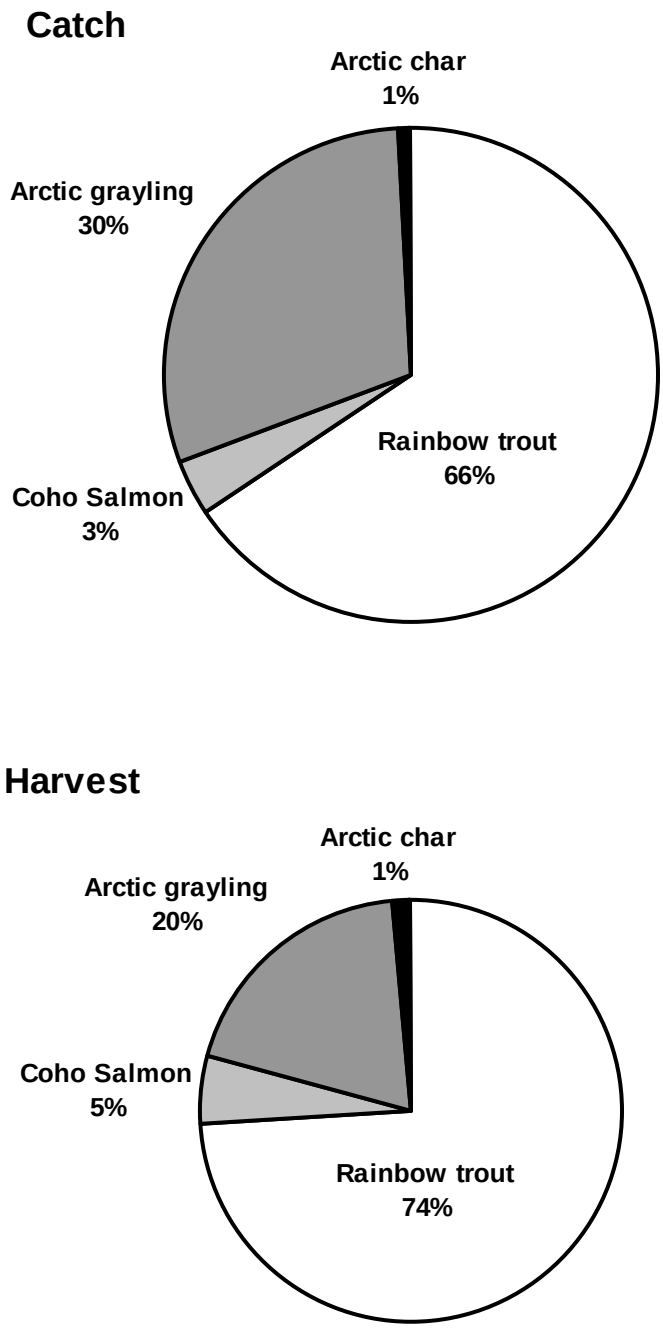

Figure 16.-Ten year average catch and harvest composition by species for all stocked lakes in the UCUSMA, 1994-2003.

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APPENDIX A

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
Wrangell-St. 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

Appendix B.–Reference information specific to 2005 Alaska Board of Fisheries proposals.

Proposal(s)	Reference Text	Page	Tables	Page	Figures	Page
3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	Copper River Personal Use and Subsistence Salmon Fisheries	69	16, 17	73, 75	10, 11	74, 76
56, 57, 59, 60, 62	Chinook Salmon Sport Fisheries	30	9, 11, 12	35, 40, 41	6	39
58	Gulkana River Chinook Salmon Sport Fisheries	43	11, 12	40, 41	6, 7	39, 45
54, 55, 59	Klutina River Chinook Salmon Sport Fisheries	52	11, 12	40, 41		
62	Sockeye Salmon Sport Fisheries	62	15	65		
66, 67, 68	Arctic grayling Sport Fisheries	84	19	87-88		
68	Gulkana River Arctic grayling Sport Fisheries	89	19, 20	87-88, 90	12	86
70, 71	Lake Trout Sport Fisheries	93	22, 23	96, 98	13	94
63, 64	Wild Rainbow Trout and Steelhead Trout Sport Fisheries	108	26, 27, 28, 29	110-113		
69	Dolly Varden Sport Fisheries	115	30	117		