Fishery Management Report No. 09-46

Fishery Management Report for Recreational Fisheries in the Lower Tanana River Management Area, 2008

by

Audra L. J. Brase

December 2009

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

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

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December 2009

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

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This document should be cited as:
Brase, A. L. J. 2010. Fishery management report for recreational fisheries in the Lower Tanana River management area, 2008. Alaska Department of Fish and Game, Fishery Management Report No. 09-46, Anchorage.

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PREFACE

This report provides information for the Lower Tanana Management Area (LTMA) and is one in a series of reports annually updating fisheries management information within Region III. The report is provided for the Alaska Board of Fisheries (BOF), Fish and Game Advisory Committees (ACs), 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.

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

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

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

This area management report provides information regarding the LTMA and its fisheries for 2008, with preliminary information from the 2009 season. This report is organized into two primary sections: a management area overview including a description of the LTMA and a summary of effort, harvest, and catch for the area, and a section on the significant area fisheries including specific harvest and catch by species and drainage.

ABSTRACT

Historic, current, and future performance and management of the recreational fisheries of the ADF&G Region III Lower Tanana River Management Area (LTMA) is presented in this report. Particular emphasis is placed on the performance and management of LTMA fisheries for 2008 with preliminary information for 2009.

The Tanana River drainage is the second largest tributary system of the Yukon River. The mainstem Tanana River is a large glacial system formed by the confluence of the Chisana and Nabesna rivers near Tok and the Alaska–Canada border which flows in a generally northwest direction for some 570 river miles to the Yukon River. The LTMA consists of all waters of the Tanana River drainage downstream from the Banner Creek drainage flowing into the Tanana River from the north and the Little Delta River drainage on the south.

Much of the human population in Region III is located within the Tanana River drainage along the Alaska, Richardson, and Parks highways, and along the road system around Fairbanks. These highways and their secondary roads provide much of the access to LTMA sport fisheries.

The majority of fishing effort in the LTMA occurs on the Chena, Salcha, Chatanika, and Nenana rivers; Minto Flats; Harding Lake, and various stocked waters. Sport anglers target many species in the LTMA; however the most commonly targeted species are: Chinook (king) salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, Arctic grayling *Thymallus arcticus*, burbot *Lota lota*, northern pike *Esox lucius*, lake trout *Salvelinus namaycush*, and stocked rainbow trout *Oncorhynchus mykiss.*

Key Words: Arctic grayling, burbot, Chatanika River, Chena River, chum, king, coho, Harding Lake, lake trout, LTMA, management, Minto Flats, Nenana River, northern pike, personal use, rainbow trout, recreational, Salcha River, salmon, sport, stocked waters, Tanana River, UTMA, whitefish, Yukon River.

EXECUTIVE SUMMARY

This document provides a wide array of information specific to the recreational angling opportunities and personal use and subsistence fisheries that exist within the Lower Tanana River Management Area. Information specific to the proposals that the Alaska Board of Fisheries will address at its January 26–31, 2010 meeting are contained within numerous sections of this report. As a means to assist board members in acquiring information in a timely manner, Appendix D has been constructed on page 99. This table guides the reader to specific information contained within the text, tables, and figures that, may be useful in evaluating regulatory proposals.

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into eighteen regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47–74. The Division of Sport Fish of Alaska Department of Fish and Game (ADF&G) divides the state into three administrative regions with boundaries roughly corresponding to groups of the board regulatory areas. Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River Drainage, Cook Inlet–Resurrection Bay Saltwater, Anchorage Bowl Drainages, Knik Arm Drainages, Susitna River Drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes the Upper Copper River and Upper Susitna River area and the Arctic–Yukon–Kuskokwim Region (including the North Slope, Northwestern, Yukon River, Tanana River, and Kuskokwim–Goodnews regulatory areas).

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 1,146,000 km^2 (442,500 mi^2) of land, some of the state's largest river systems (Yukon, Kuskokwim, Colville, Noatak, Upper Copper and Upper Susitna River drainages), thousands of lakes, 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 30,000) is the largest community.

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

- Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);
- Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);
- 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);
- Upper Tanana River Management Area (the Tanana River drainage upstream from Banner Creek and the Little Delta River);
- Lower Tanana River Management Area (the Tanana River drainage downstream from Banner Creek and the Little Delta River); and,
- Kuskokwim Management Area (the entire Kuskokwim River drainage and Kuskokwim Bay drainages).

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

ALASKA BOARD OF FISHERIES

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

Under the current operating schedule, BOF considers fishery issues for regulatory areas or groups of regulatory areas on a 3–year cycle. Proposals to create new or modify existing regulations and management plans are submitted by ADF&G and the public (any individual can submit a proposal to the BOF) for evaluation by the BOF. During its deliberations the BOF receives input and testimony through oral and written reports from ADF&G staff, members of the general public, representatives of local Advisory Committees (ACs), and special interest groups, such as fishermen's associations and clubs. The public provides its input concerning regulation changes and allocation through submission of written proposals and testifying directly to the BOF, by participating in local AC meetings, or by becoming members of local ACs.

ADVISORY COMMITTEES

Local ACs have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes. AC members are nominated from the local public and voted on by all present during an AC meeting. Most active committees in urban areas meet in the fall and winter on a monthly basis. Rural committees generally have only one fall and one spring meeting due to funding constraints. AC meetings allow opportunity for direct public interaction with department staff attending the meetings that answer questions and provide clarification concerning proposed regulatory changes regarding resource issues of local and statewide concerns. The Boards Support Section within the Division of Administration provides administrative and logistical support for both boards (Fisheries and Game) and ACs. During 2008, the department had direct support responsibilities for 82 ACs in the state.

Within Lower Tanana River Management Area (LTMA) there are four ACs: Fairbanks, Minto/Nenana, Middle Nenana River and Lake Minchumina. In addition, the Delta Junction AC occasionally comments on proposals concerning LTMA fisheries.

RECENT BOARD OF FISHERIES ACTIONS

The BOF meets annually, but deliberates on each individual regulatory area on a 3–year cycle, most recently for the LTMA in February 2007. At the 2007 meeting several changes were made to the sport fish regulations in the LTMA. These included gear restrictions in the Chena River (to promote catch-and-release of Arctic grayling *Thymallus arcticus*, yet still allow anglers to target salmon, burbot *Lota lota*, and northern pike *Esox lucius*); minimum length requirements for lake trout *Salvelinus namaycush* and gear restrictions (to reduce lake trout harvest and hooking mortality) in Harding Lake; adding spears as a legal gear in the Chatanika River personal use whitefish fishery; and adding a regulatory management plan for lake trout (5 AAC 74.040). Details of the changes may be found in the individual fisheries sections of this report.

In 2004, the changes the BOF made to the fisheries in the LTMA included: adding a regulatory management plan for stocked waters (5 AAC 74.055) and adding a regulatory management plan for wild Arctic grayling (5 AAC 74.065).

For additional BOF actions from 1986 through 2003, see: Arvey 1991, 1992, 1993; Arvey and Parker 1991; Arvey et al. 1990, 1991, 1995; Burr et al. 1998; Clark et al. 1992; Doxey 2000, 2001, 2007.

ADF&G EMERGENCY ORDER AUTHORITY

ADF&G has emergency order (EO) authority (5 AAC 75.003) to modify time, area, and bag/possession limit regulations. EOs are implemented to deal with conservation issues that are not adequately controlled by existing regulations. Once implemented, an EO deals with the situation until it is resolved or the BOF can formally take up the issue. EOs are also used as a tool for inseason management of fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the BOF. EOs issued under this authority for the LTMA from 2005 to 2009 are summarized in Appendix A.

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for federally qualified rural residents on lands and waters for which the federal government asserts jurisdiction. The state of Alaska also has established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258), but cannot discriminate between rural and urban residents (Alaska State Constitution Article VIII, sections 3 and 15). Because of this difference, the federal government asserted authority to ensure a priority subsistence use of fish and game for rural residents on federal lands and certain adjacent waters. On October 1, 1999 the federal government asserted regulatory authority for assuring the rural priority for subsistence fisheries on federal public lands, which includes non-navigable waters on public lands. Following the "Katie John" decision by the 9th Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which the federal agencies assert federal reserved water rights. Under current practice, the federal land management agencies adopt regulations to provide for the priority subsistence use by qualified rural residents in non-navigable waters within federal public lands (including BLM lands) and in navigable waters adjacent to or within federal conservation system units (generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land.

The development of regulations for subsistence fisheries under the federal subsistence program occurs within the established Federal Subsistence Board (FSB) process. The public provides its 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.

Within the LTMA the subsistence fisheries under federal regulation only includes those occurring within the boundaries of Denali National Park. The LTMA fisheries fall under the purview of the Eastern Interior RAC. The most recent meeting was held in October 2009 in Fort Yukon.

REGION III SPORT FISH DIVISION 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, ACs, and the general public. The stocked waters biologists plan and implement the regional stocking program for recreational fisheries. The regional management biologist assigned to the Region III office in Fairbanks also administers the regional fishing and boating access program.

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

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey (Mills 1979–1980, 1981a–b, 1982–1994; Howe et al. 1995–1996, 2001a–d; Walker et al. 2003; Jennings et al. 2004, 2006a–b, 2007, 2009a-b, *In prep a–b*). The Statewide Harvest Survey (SWHS) is designed to provide estimates of effort, harvest, and catch on a site–by–site basis. It is not designed to provide estimates of effort directed towards a single species. Species–specific catch–per–unit–effort (CPUE) information can seldom be derived from the report. Two types of questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or nonresident). Information gathered from the survey includes participation (number of anglers and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler–days of fishing effort expended by sport anglers fishing Alaskan waters as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site–by–site basis. The survey results for each year are not available until the following year; hence, the results for 2008 were not available until fall 2009. 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 utility of SWHS estimates depends on the number of responses received for a given site (Mills and Howe 1992). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation. Therefore, the following guidelines were implemented for evaluating survey data:

1. Estimates based on fewer than 12 responses should not be used other than to document that sport fishing occurred;
2. Estimates based on 12 to 29 responses can be useful in indicating relative orders of magnitude and for assessing long–term trends; and,
3. Estimates based on 30 or more responses are generally representative of levels of fishing effort, catch, and harvest.

The Tanana River drainage is divided by Division of Sport Fish into two management areas – the Upper Tanana River Drainage Management Area (UTMA; commonly called the "Delta Management Area"), and the Lower Tanana River Drainage Management Area (LTMA; commonly called the "Fairbanks Management Area"). The Tanana River drainage in its entirety is included in Statistical Area U of the SWHS. While most sites for which effort, catch, and harvest are estimated are clearly within one of the two management areas, a few site categories such as the "Middle Tanana River", "Other Lakes", and "Other Streams", overlap both areas. An attempt has been made to segregate those estimates between the LTMA and the UTMA.

In preparation for the development of this report, SWHS estimates of effort, catch, and harvest for the entire Tanana River drainage were segregated into separate sets of estimates for the UTMA and LTMA. In 1990, both catch and harvest estimates were produced for most individual waters. Because of this and the relevance to the present status of the fisheries or more recent estimates, considerable emphasis is placed on estimates from 1990 to present. For previous years data readers should refer to previous years' management plans.

SECTION I: MANAGEMENT AREA OVERVIEW

LTMA DESCRIPTION

After the Porcupine River drainage, the Tanana River drainage is the second largest tributary system of the Yukon River (Brabets et al. 1999). The Tanana River basin (Figure 2) drains an area of approximately 45,918 square miles (73,898 km^2). The mainstem Tanana River is a large glacial system formed by the confluence of the Chisana and Nabesna rivers near Tok and the Alaska–Canada border, which flows in a generally northwest direction for some 570 river miles to the Yukon River. The LTMA consists of all waters of the Tanana River drainage downstream from the Banner Creek drainage flowing into the Tanana River from the north, and the Little Delta River drainage on the south.

Much of the human population in Region III is located within the Tanana River drainage along the Alaska, Richardson, and Parks highways, and along the road system around Fairbanks. These highways and their secondary roads provide much of the access to sport fisheries. The Fairbanks North Star Borough lies entirely within the LTMA, as does part of the Denali Borough. Approximately 85,000 people live in this area which encompasses the city of Fairbanks; Fort Wainwright; Eielson Air Force Base; and the communities of Nenana, North Pole, and Salcha. Other communities and municipalities located within the LTMA include Anderson, Healy, Cantwell, Manley, Livengood, Minto, Two Rivers, Chatanika, Fox, and Ester (US Census Data 2004).

FISHERY RESOURCES

Throughout the LTMA both indigenous (wild stocks) and introduced (produced in hatcheries and stocked) fish are available to anglers. There are 18 fish species indigenous to the Tanana River drainage, 6 of these are commonly targeted by sport anglers, and all occur within the LTMA. They include: Chinook (king) *Oncorhynchus tshawytscha* and coho salmon *Oncorhynchus kisutch*, Arctic grayling, burbot, lake trout, and northern pike.

Chum salmon *Oncorhynchus keta*, Dolly Varden *Salvelinus malma*, sheefish (inconnu) *Stenodus leucichthys*, least cisco *Coregonus sardinella*, humpback whitefish *C. pidschian*, broad whitefish *C. nasus*, and round whitefish *Prosopium cylindraceum* are taken occasionally by sport anglers.

Longnose suckers *Catostomus catostomus*, Alaska blackfish *Dallia pectoralis*, lake chub *Couesius plumbeus*, slimy sculpin *Cottus cognatus*, and Arctic lamprey *Lampetra japonica* are present but not targeted by sport anglers.

Rainbow trout *Oncorhynchus mykiss* are not native to the drainage, but have been stocked in many locations. Arctic char *Salvelinus alpinus*, coho salmon, king salmon, and Arctic grayling are also stocked in selected waters of the Tanana River drainage.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

The regulations governing fisheries in the LTMA in 2008 and 2009 are found in 5 AAC 74.001 through 5 AAC 74.030 (sport fishing), in 5 AAC 77.171 through 5 AAC 77.190 (personal use), and in 5 AAC 01.200 through 5 AAC 01.249 (subsistence fishing). The specific management plans that affected the LTMA sport fisheries are the: *Minto Flats Northern Pike Management Plans* (5 AAC 74.044 for the sport fishery and 5 AAC 01.244 for the subsistence fishery), *Tanana River Wild Arctic Grayling Management Plan* (5 AAC 74.055), *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060), *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065), *Tanana River Area Wild Lake Trout Management Plan* (5 AAC 74.040), *Yukon River Drainage Fall Chum Management Plan* (5 AAC 01.249), *Yukon River King Salmon Management Plan* (5 AAC 05.360), and *Yukon River Summer Chum Salmon Management Plan* (5 AAC 05.362).

MAJOR ISSUES

Salmon fisheries are often the most controversial fisheries in Alaska and the LTMA is no exception. In terms of allocation of fish, subsistence fisheries have a priority over commercial, personal use, and/or sport fisheries during times when salmon runs are low. This priority can lead to regional and user group conflicts when commercial fisheries occur in the Lower Yukon River before the subsistence users in the upper portion of the drainage have even seen any salmon in their fish wheels and nets.

Although hook-and-line is a recognized gear type used by subsistence salmon fishers in some parts of Alaska, subsistence users often perceive the catch-and-release practices of sport anglers as "playing with food". This often creates conflict between subsistence users who are fishing for food and sport anglers who may be fishing for an experience and do not necessarily want to keep the fish they catch.

The catch-and-release practices of sport anglers may become more accepted in rural Alaska as more residents are exposed to the style of fishing and have positive experiences with responsible sport anglers. However, like any perception problem, it only takes a few careless anglers to give sport anglers as a whole a poor image.

Conversely, the practice of subsistence users harvesting large numbers of fish is often objectionable to sport fishermen. Such a conflict has arisen in recent years between subsistence and sport users who fish for northern pike in Minto Flats. Some sport fishermen felt that relatively few subsistence fishermen were locally depleting the northern pike population and this would have an adverse affect on the summer spawning population and sport fishery.

One other issue in the LTMA is the decline in the number and size of "catchable" (currently approximately 7.5 inches down from the historic 8–12 inch size range) stocked fish provided by state hatcheries. Until the new Fairbanks hatchery is able to start outstocking fish (scheduled date 2011) the LTMA (and UTMA) will continue to receive sub–optimal fish and this may contribute to the continued decline in angler effort.

ACCESS PROGRAMS

The Wallop-Breaux amendment to the Federal Aid in Sport Fish Restoration Act (D–J) mandates that at least 15% of the federal funds collected from taxes on boat gas and sport fishing equipment be used by the states for the development and maintenance of motorized 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 2008, no major access projects were constructed in the LTMA. Planning continues on development of the Tanana Lakes Recreation Area in which stocked lakes, river access, and campgrounds are planned adjacent to the Tanana River south of Fairbanks. This project is modeled after the existing Chena Lakes project that was developed when the Moose Creek Dam was built. Access funds have also been used to construct public use ice houses that are placed on Chena and Birch lakes.

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and emergency orders for the LTMA can be found at the ADF&G, Division of Sport Fish website (www.sf.adfg.state.ak.us/statewide/index.cfm).

There are three regional information and education (I&E) staff located in the Fairbanks office. An Information Officer II and a seasonal Fisheries Technician III respond to questions from the public at the office and via phone and e-mail. In addition, I&E staff distribute and update fishery brochures, fishing regulations, the regional webpage, coordinate the Fairbanks Outdoor Show booth, Kid's Fish & Game Fun Day, and the Becoming an Outdoors Woman (BOW) program. An Education Associate II coordinates the sport fishing component of the Alaska Conservation Camp and works with schools in various communities throughout the region to provide a curriculum in sport fishing and aquatic education.

SPORT FISHING EFFORT, HARVEST, AND CATCH

Angling within the LTMA occurs at numerous rivers, lakes, ponds, and streams. Some of these water bodies are accessible directly from the road system and have some type of boat launch accommodating watercraft appropriate to the size and characteristics of the water body. Access to off–road waters may be made by foot (or skis), overland use of ATVs, snowmachines, and/or dog teams. Access to the most remote sites may require light aircraft equipped with tundra tires, floats, or skis.

Opportunities for sport angling are available year–round in the LTMA. During the open water seasons sport fishing may occur wherever game fish are present, subject to time and/or area closures. Winter effort focuses on stocked lakes, with some effort directed toward lake and river populations of burbot and northern pike. Over the past 10 years (1998–2007), the LTMA has averaged approximately 35% of the Region III and 3% of the total statewide sport fishing effort (number of angler-days, Table 1). The majority of fishing effort in the LTMA occurs in the Chena River (Appendix C).

In terms of fish harvested, the LTMA has averaged 4% of the statewide sport harvest, but 27% of the Region III sport harvest over the past 10 years (Table 2). The majority of fish caught and harvested in the LTMA are Arctic grayling, northern pike, and stocked species (rainbow trout and landlocked salmon; Appendix B).

Fishing guides, outfitters, and transporters take anglers to areas of higher quality fishing. Most transport is by aircraft or boat. Some commercial operators provide cabins or some sort of shelter, and/or boats for angler use. In the LTMA guides are known to operate in Minto Flats, Chena Lakes Recreation Area, and the Nenana, Salcha and Chena rivers. All freshwater guides must be licensed annually with ADF&G and fill out a logbook recording their clients' fishing location, license number, residency, and their daily catch and harvest by species. In the LTMA these data may provide the area management biologist with previously unavailable information that may be useful for identifying areas that guides are using. This information may be used for making decisions regarding future research and/or management needs.

SECTION II: FISHERIES

Recreational angling occurs throughout the LTMA in diverse habitats, where anglers may target a large variety of fish species. This report will focus on the major fisheries that consistently get the highest amount of fishing effort and had recent changes to the regulations which affect angling opportunity.

KING COHO AND CHUM SALMON

CHENA RIVER

Background and Historic Perspective

The Chena River is a rapid run-off, tannic-stained river that flows slowly through the city of Fairbanks near its mouth with the Tanana River (Figure 3). It is approximately 160 miles long and in the summer of 1967, caused severe flooding in downtown Fairbanks. The flood was the impetus to begin construction in 1973 on the Moose Creek Dam at river mile 45 (near the city of North Pole) to divert any future high water events away from populated areas. The dam was completed in 1979 and is operated and maintained by the U.S. Army Corps of Engineers.

The Chena River supports one of the largest king salmon populations in the Alaskan portion of the Yukon River drainage, with average annual returns of over 4,800 fish from 2004 to 2008 (Table 3). Adult king salmon enter the Yukon River during or shortly after breakup and migrate into the Tanana River to appear in the Lower Chena River (920 miles from the Bering Sea) between late June and the second week of July. They move up the Chena River to spawning areas which are primarily upriver from the fishery (the fishery is closed above the dam). The run ends in late July or early August.

Summer chum salmon are primarily available in July and August during and just after the king salmon fisheries, and are targeted or caught incidentally as a secondary species. While summer chums are generally more abundant than king salmon, are subject to a more liberal daily bag and possession limit (3 fish/day), and are readily taken on certain types of spinning gear; the average harvest and catch is lower than that for king salmon. The poor quality of summer chum salmon flesh for human consumption is likely a contributing factor. The 5-year (2003–2007) average total chum salmon harvest and catch in the LTMA was 108 and 874 fish, respectively (Appendix B).

Coho salmon are not present in the Chena River drainage.

Chena River king and chum salmon escapements have been annually assessed since 1986 by mark-recapture experiments or by a counting tower located at the Moose Creek dam (Table 3; Barton 1987, 1988; Barton and Conrad 1989; Brase *In prep a*; Brase and Doxey 2006; Burkholder 1991b; Doxey 2004; Doxey et al. 2005; Evenson 1991-1993, 1995, 1996; Evenson and Stuby 1997; Savereide *In prep a-c*; Skaugstad 1988-1990b, 1992-1994; Stuby and Evenson 1998; Stuby 1999-2001). The recent 5-year (2004–2008) average escapement was 4,842 king salmon (Table 3). Counting conditions at the dam can be highly variable depending on water height and river turbidity. In 2005, the Chena River was extremely high and turbid for most of the king salmon run; therefore, escapement was not estimated. In contrast, 2006 through 2009 have had good counting conditions throughout the majority of the run and satisfactory estimates of escapement have been produced.

Historically, the Chena River king salmon sport fishery was managed under a management plan with an escapement goal and a guideline harvest allocation for the sport fishery. An aerial survey escapement goal of 1,700 fish was set by Division of Commercial Fisheries in 1992. In 1993, Division of Sport Fish staff expanded this aerial survey escapement goal into an actual escapement abundance goal of 6,300 fish, as measured by the counting tower. This point objective was calculated based on averages of escapement data available at the time. A guideline sport harvest objective of 300-600 king salmon was set by the BOF in 1990. Inseason management for the guideline harvest objectives was next to impossible because there was no mechanism for day-to-day enumeration of the harvest and the harvest objectives were repealed in 2001.

In 2000, a biological escapement goal (BEG) committee was formed to evaluate and calculate BEGs for Chena and Salcha River king salmon and for some Yukon River drainage chum salmon stocks. The BEG process was designed to set escapement ranges which maximize potential yield. The BEG committee recommended a BEG range of 2,800–5,700 king salmon, measured by the counting tower, for the Chena River based on an analysis of run reconstruction data related to brood year returns.

The escapements in the Chena and Salcha rivers mirror each other sufficiently so that inferences regarding attainment of BEGs for both rivers can be made even if good data is available from only one of the rivers (Table 3). If high water disrupts the counts in one of the rivers, but not the other, the escapement projections and estimates for the river in which an accurate estimate can still be made are considered an index of the king escapement in the other river, and are to be used as a measure of run strength versus the BEG.

A king salmon sport fishery has occurred at the Chena River since before statehood and remained relatively small throughout the 1980s. The daily bag and possession limit for king salmon in the Tanana River drainage has remained unchanged since the early 1960s, at one fish ≥ 20 inches per day. The fishery is very easily accessible in the lower portion of the Chena River with multiple boat launch and walk-in sites located throughout Fairbanks and North Pole. The fishery is closed above the Moose Creek Dam.

The Chena River king salmon sport fishery continues to be relatively small, especially when compared with fisheries in Southcentral and Southeast Alaska; however, it remains very popular as it is one of the few opportunities to catch large fish near Fairbanks. Most sport anglers release their catch as the salmon flesh is quite deteriorated by the time the fish have traveled the 1000+ miles from the Bering Sea (Table 4).

Recent Fishery Performance

Estimated harvests between 1983 and 1992 ranged from 0 to 375 fish, and then increased dramatically in the mid-1990s (Table 4, Brase 2009b). The 2008 king salmon harvest was 150 fish with a catch of 530 fish; which was well below the 5-year average (2003–2007) harvest of 428 fish and average catch of 2,024 fish. This drop in harvest and catch was likely due to high and turbid water that led to poor fishing conditions late in the run.

The 2009 preliminary estimate of escapement was 5,253 king salmon which was 8% above the 2004-2008 average (Table 3). This estimate should be considered relatively precise as no counting days were missed throughout the whole summer due to high and/ or turbid water conditions (Savereide *In prep c*).

Fishery Objectives and Management

In 2001, the BOF adopted policy directing ADF&G to manage salmon harvests so that escapements fall within the BEG ranges set by ADF&G and adopted by the BOF. The BEGs are evaluated and modified as needed on a 3-year cycle in synchrony with the BOF meeting cycle for the Yukon River drainage. The guideline harvest ranges for the sport fishery were repealed at the 2001 BOF meeting.

Commercial and subsistence salmon harvests occur along almost the entire length of the mainstem Yukon and Tanana rivers (Figure 4; Tables 5 and 6). In 2001, the BOF adopted the *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060) which mandated that all the downriver fisheries (commercial, subsistence, personal use, and sport) be managed in a manner such that the Chena River king salmon BEG range of 2,800–5,700 fish is achieved at the counting tower. In order to get that number of fish past the counting tower, restrictions may be placed on any or all of the Tanana River fisheries.

In 2009, an in-house *Sport Fish Management Plan for King Salmon in the Chena and Salcha Rivers* (Brase 2009a) was developed to guide the sport fish manager and provide the basis for management actions in the most popular king salmon sport fisheries in the Tanana River drainage. The plan provides a prescription for fishery management actions based on projections of final escapement from counting tower data on or after Day 20 of the run relative to the BEG range for each river. The first day salmon are seen at the counting tower is considered Day 1 of the run and the run typically lasts around 40 days with the midpoint on Day 20. Historical run-time data suggest that by Day 20 projections accurately predict escapements relative to meeting or not meeting the BEG and allow a sufficient number of days in the run to provide additional harvest opportunity or conservation potential. Potential management actions include: closing the fishery if the lower end of the BEG range will not be met; restricting the fishery to catch-and-release only if there is a small chance of not achieving the lower end of the BEG range; maintaining the status quo regulations if projections indicate escapements will fall within the BEG range; liberalizing the regulations to allow a daily bag limit of two large king salmon if it is likely escapement will exceed the upper end of the BEG range; and, liberalizing the regulations to allow a daily bag limit of three large king salmon if it is likely escapement will greatly exceed the upper end of the BEG range.

In 2009, the plan suggested that no actions be taken in the Chena River to restrict or liberalize the inriver sport fishery as the king salmon run was projected to fall within the BEG range. This proved to be the appropriate management action to take as the run did not exceed the upper end of the BEG range.

There have been no EOs issued to restrict the Chena River king salmon fishery since 2000 (Brase 2008, Appendix A). Management actions on the mainstem Yukon and Tanana river subsistence, commercial, and personal use fisheries have enabled the Chena River king salmon BEG goal to be met or exceeded every year since 1990 (Table 3). In both 2008 and 2009, the mainstem Yukon River commercial and subsistence fisheries were restricted in order to meet Canadian border passage obligations.

In 2009, downriver salmon assessment projects indicated that the fall chum salmon run was very weak; therefore, in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 AAC 01.249), the chum salmon sport fisheries were closed throughout the Yukon River drainage, including the Tanana River (Appendix A).

Current Issues and Fishery Outlook

While run strength and river conditions can override effort in affecting harvest and catch, the harvest potential of this fishery may be increasing due to a combination of increased public awareness of its availability and improvements in the gear and fishing techniques used to target king salmon.

At the 2010 BOF meeting, the board will be presented with the *Escapement Goal Review of Select AYK Region Salmon Stocks*; this report recommends no change to the current Chena River king salmon escapement goal.

The BOF will also deliberate over **proposals 87, 193, and 194** which address the *Yukon River King, Summer Chum and Fall Chum Salmon Management Plans* (5 AAC 05.360, 5 AAC 05.362, and 5 AAC 01.249). Any changes to these management plans may affect the salmon sport fisheries in the Tanana River drainage.

Recent Board of Fisheries Actions

There have been no actions taken by the board with regards to the Chena River salmon fisheries since 2001 when the *Chena and Salcha River King Salmon Sport Harvest Management Plan* was adopted.

Current or Recommended Research and Management Activities

There has been some concern raised about the effect Moose Creek Dam may have on Chena River salmon passage. The dam is designed to allow water to pass freely through three floodgates at normal river stages. Fish passage is unimpeded until the river rises, placing property downstream at risk of flooding. When flow exceeds 8,000 cfs, the floodgates are partially closed to maintain that flow rate downstream from the dam. Water is diverted along the floodway to the Tanana River. The floodgates have seldom been lowered while adult king salmon were passing through the structure, and then only for short periods of time. A fishway built into the side of the structure is designed to allow fish passage if a large volume of water is backed up behind the dam. Because the water rarely gets high enough to flow down the fishway, its potential to pass migrating salmon is essentially untested. In 2009, the flood gates were partially lowered from May 5-7 to regulate flow between 8,000 and 8,100 cfs.

Historically, king salmon escapements to the Chena and Salcha rivers have roughly mirrored one another, with high or low escapements being seen in both rivers in a given year (Table 3). However, in 2006 the Chena River barely made escapement, whereas the Salcha River escapement was significantly higher than the upper end of the BEG range. A similar situation occurred in 2009, when the escapement on the Chena River was close to the upper end of its goal, but the Salcha River escapement was almost twice the upper end of its goal. It is suggested that in a future king salmon escapement goal review, an analysis be performed to determine whether the Chena and Salcha rivers are indeed good surrogates for each other's escapement.

In 2008, a pilot sonar project began on the Chena River. ADF&G Division of Commercial Fisheries supplied a Dual-frequency Identification Sonar (DIDSON®) unit, which was to be tested to evaluate salmon passage rates during periods of high water events. In 2008, the sonar was only operated successfully for 16 days, but in 2009 the sonar was successfully operated throughout the entire king salmon run.

SALCHA RIVER

Background and Historic Perspective

The Salcha River is located approximately 40 miles east of Fairbanks via the Richardson Highway. It is a tannic stained rapid-runoff system, approximately 120 miles long originating in the Tanana Hills to the north (Figure 5). Numerous recreational cabins are located along the lower 70 miles of the river.

The Salcha River supports the largest king salmon escapement in the Tanana River drainage, with average annual returns of over 8,600 fish from 2004 to 2008 (Table 3). Adult king salmon enter the Yukon River during or shortly after breakup, and migrate into the Tanana River to appear at the mouth of the Salcha River (965 miles from the Bering Sea) between late June and the second week of July, and continue up the Salcha River to spawning areas. The run ends in late July or early August.

Similar to the Chena River salmon fishery, summer chum salmon are caught incidental to the king salmon in the Salcha River. Coho salmon are not present in the Salcha River drainage.

The Salcha River king and chum salmon runs have been annually assessed since 1987 using mark-recapture experiments or by a counting tower located near the Richardson Highway Bridge (Table 3; Barton 1988; Barton and Conrad 1989; Brase *In prep a*; Brase and Doxey 2006; Burkholder 1991b; Doxey 2004; Doxey et al. 2005; Evenson 1991-1993, 1995, 1996; Evenson and Stuby 1997; *Savereide In prep a-c;* Skaugstad 1988-1990a, 1992-1994; Stuby and Evenson 1998; Stuby 1999-2001). The operation of the Salcha River counting tower is currently contracted to Bering Sea Fishermen's Association (BSFA) with funding from the US/Canada Yukon River Pacific Salmon Treaty. BSFA closely follows the project design and methodology established by Division of Sport Fish (which operated the tower from 1993 to 1998) for this project. Contractor staff report king salmon passage counts to the Division of Commercial Fisheries at the end of each day so that ADF&G can calculate and track cumulative passage. Counting conditions on the Salcha River can be highly variable depending on water height and river turbidity.

Until 1989, the Salcha River king salmon fishery had a higher profile and greater king salmon harvests than were seen on the Chena River. Estimated harvests between 1983 and 1992 ranged from 47 to 871 fish (Brase 2009b). Subsequently, harvest and catch did not increase as dramatically in the Salcha River as in the Chena River, but the average harvest continues to be higher on the Salcha River (Table 4), even with a much smaller portion of the river open to salmon fishing.

There has been a king salmon sport fishery at the Salcha River since before statehood. The salmon fishery is accessible from either a vehicle trail just west of the Richardson Highway Bridge or the nearby Salcha River State Recreation Site (campground). Boaters launch at the campground and travel downstream to fish near the confluence of the Tanana and Salcha rivers. The salmon fishery on the Salcha River is closed above a marker located about 2 1/2 miles upriver from the Richardson Highway Bridge (about 5 miles upstream from the confluence of the Salcha and Tanana rivers). Most of the spawning occurs upstream of this area.

The daily bag and possession limits for king salmon in the Tanana River drainage have remained unchanged since the early 1960s, at one fish $\geq$ 20 inches per day.

Recent Fishery Performance

The 2008 king salmon harvest was 74 fish with a catch of 299 fish; this was well below the 5-year average harvest (2003–2007) of 549 fish and average catch of 1,634 fish (Table 4). These low numbers can be attributed to high water events that occurred in 2008, rather than a lack of fish. It is difficult to determine if effort is increasing in the salmon fishery using the SWHS data because the Salcha River supports a multi-species sport fishery.

The 2009 preliminary escapement estimate was 12,788 king salmon (Table 3). Similar to the Chena River, the Salcha River had good counting conditions throughout the king salmon run (Savereide *In prep c*).

Fishery Objectives and Management

Like the Chena River, the Salcha River is managed under the *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060), and as previously described under the Chena River king salmon section of this report, an in-house management plan was developed in 2009 to guide the sport fish manager and provide the basis for management actions in the Chena and Salcha rivers king salmon fisheries (Brase 2009a).

In 2009, the plan suggested that the Salcha River king salmon sport fishery could be liberalized by two large king salmon per day (up from the standard limit of one fish per day). However, no action was taken due to the restrictions that had been placed on downriver subsistence users. If 2009 had been a "normal" year with little to no subsistence restrictions, the liberalization of the Salcha River king salmon sport fishery would have been the appropriate management action to take, as the run came in well above the upper end of the BEG range.

Similar to the process already described under the Chena River king salmon section of this report, the BEG committee recommended and the BOF adopted, a Salcha River king salmon BEG of 3,300-6,500 fish in 2001. Similar to the Chena River, the Salcha River king salmon BEG range has been met or exceeded every year since 1990 (Table 3).

In 2009, downriver salmon assessment projects indicated that the fall chum salmon run was very weak; therefore, in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 AAC 01.249) the chum salmon sport fisheries were closed throughout the Yukon River drainage, including the Tanana River (Appendix A).

Current Issues and Fishery Outlook

Typically, more sport anglers target king salmon on the Salcha River than on the Chena River; this may be because of water clarity, the larger run size, and the ease of access to good fishing locations.

At the 2010 BOF meeting, the board will be presented with the *Escapement Goal Review of Select AYK Region Salmon Stocks*; this report recommends no change to the current Salcha River king salmon escapement goal.

The BOF will also deliberate over **proposals 87, 193, and 194**, which address the *Yukon River King, Summer Chum and Fall Chum Salmon Management Plans* (5 AAC 05.360, 5 AAC 05.362, and 5 AAC 01.249). Any changes to these management plans may affect the salmon sport fisheries in the Tanana River drainage.

Recent Board of Fisheries Actions

There have been no actions taken by the board with regards to the Salcha River king salmon fisheries since 2001 when the *Chena and Salcha River King Salmon Sport Harvest Management Plan* was adopted.

Current or Recommended Research and Management Activities

The continued cooperation with BSFA contractors operating the Salcha River escapement monitoring project in order to receive daily updates of the number of salmon passing the counting tower and river conditions is recommended.

As previously mentioned in the Chena River salmon section, historically, king salmon escapements to the Chena and Salcha rivers have roughly mirrored one another, with high or low escapements being seen in both rivers in a given year (Table 3). However, in both 2006 and 2009, there were significant differences between escapements of the Chena and Salcha Rivers. Future king salmon escapement goal reviews should include an analysis to determine whether the Chena and Salcha rivers are indeed good surrogates for each other's escapement.

CHATANIKA RIVER

Background and Historic Perspective

The Chatanika River is located approximately 30 miles north of Fairbanks and is accessible via both the Elliot and Steese Highways (Figure 6). The Chatanika River is a clear or lightly tannic stained rapid-runoff stream, and flows through valleys between summits and uplands for about four-fifths of its length before it enters Minto Flats. At that point the character of the river changes from one typical of rapid-runoff upland streams with pools, riffles, cutbanks and gravel bars, and a substrate consisting largely of gravel or broken rock; to a slower stream with an incised channel with high, fairly stable banks and a bottom substrate consisting primarily of sand and organic material. Mining activity dominated the Upper Chatanika during the first half of the 20^{th} century. Today recreational cabins are scattered along the river's length with a few small mining claims still in operation.

The Chatanika River supports small spawning populations of king and chum salmon. A fishery for king salmon occurs on the Chatanika River downstream from a marker located one mile upstream from the Elliot Highway Bridge. Salmon fishing is closed upstream from that marker to protect spawning fish. Chum salmon are caught incidental to the king salmon in the Chatanika River.

King salmon run timing on the Chatanika River is similar to that of the Salcha and Chena rivers, with the run and fishery occurring in July. The king salmon population was assessed sporadically by boat survey and then annually from a counting tower from 1998 to 2005 (Table 3; Brase and Doxey 2006; Doxey 2004; Doxey et al. 2005; Stuby 1999-2001). The counting tower project was discontinued in 2005 due to consistently annual high water conditions which resulted in poor viewing conditions and poor quality estimates in most years. No further attempts to enumerate salmon on the Chatanika River have been done by the department since.

Recent Fishery Performance

The Chatanika River king salmon run is small and attracts little effort. The 5-year (2003–2007) average harvest is 10 fish and catch is 39 fish (Table 4). In 2008, there were 86 king salmon reported as caught and 30 fish harvested from the Chatanika River. This was the largest catch and harvest in the Chatanika River since 2004.

The daily bag and possession limits for king salmon in the Tanana River drainage have remained unchanged since the early 1960s, at one fish ≥ 20 inches per day.

Fishery Objectives and Management

Due to a lack of a long time series of return data, there is no BEG associated with the Chatanika River king salmon population.

When an EO is implemented restricting the fishing regulations for king salmon based on information from the Chena and Salcha rivers or downriver (Yukon and Tanana River) run indicators, it covers all of the king salmon fisheries in the Tanana drainage, including the Chatanika River. However, EOs relaxing inseason restrictions or liberalizing standard regulations may not apply to the Chatanika River and other Tanana River drainage stocks if the information is based only on tower count information from the Chena and Salcha rivers, and there is not specific information as to run status in the other streams.

In 2009, downriver salmon assessment projects indicated that the fall chum salmon run was very weak; therefore, in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 AAC 01.249), chum salmon sport fisheries were closed throughout the Yukon River drainage, including the Tanana River (Appendix A).

Current Issues and Fishery Outlook

Although effort and catch rates are currently sporadic and low, this may change as more development occurs in the area.

At the 2010 BOF meeting the board will deliberate over **proposal 56** which will relocate the regulatory boundary marker between the upper and lower Chatanika River from the current regulatory sign, located one mile upstream from the Elliott Highway Bridge, to the Elliott Highway Bridge itself. If adopted, this new location will provide a more permanent and recognizable boundary, rather than an easily removed, destroyed, or obscured regulatory sign. The current regulatory boundary on the Chatanika River was originally put in place for the sport whitefish spear fishery that occurred in the area through 1993. Other regulations used this point as a reference in order to maintain consistency.

The BOF will also deliberate over **proposals 87, 193, and 194**, which address the *Yukon River King, Summer Chum and Fall Chum Salmon Management Plans* (5 AAC 05.360, 5 AAC 05.362, and 5 AAC 01.249). Any changes to these management plans may affect the salmon sport fisheries in the Tanana River drainage.

Recent Board of Fisheries Actions

There have been no recent actions taken by the board with regards to the Chatanika River salmon fisheries.

Current or Recommended Research and Management Activities

The Chatanika River drainage was an important mining area from the 1920s through 1950s. In 1926 the Davidson Ditch Diversion Dam was built. It was used to support industrial activity in the area until it became inoperable in 1967 due to flood damage. In 2002, the dam was removed through a cooperative partnership among several state, federal, and private non-profit organizations. This project restored fish passage to more than 65 miles of upstream habitat for king and chum salmon. Staff from BSFA annually monitor the watershed above the old dam site for recolonization by salmon adults and/or juveniles. In 2009 no juvenile king salmon were observed upriver of the old Davidson Ditch (C. Stark, Fisheries Biologist, BSFA, Fairbanks; personal communication).

NENANA RIVER

Background and Historic Perspective

The Nenana River drainage is a turbid, glacier-fed system located approximately 45 miles south of Fairbanks. The lower portion of the drainage is accessible via the Parks Highway and the upper portion of the drainage is accessible via the Denali Highway (Figure 7). Most angling effort occurs in the clearwater tributaries of the Nenana River such as Brushkana, Julius, and Clear creeks. There are recreational cabins scattered throughout this area and there is some sport fish guide activity in the area.

Small numbers of king and chum salmon are found in the Nenana River, but the primary salmon species in this drainage are coho salmon, which become available in the Tanana River drainage fisheries during September. They spawn in groundwater-fed stream systems (commonly known as "clearwaters"). The Nenana River drainage is believed to support the largest coho salmon spawning population in the LTMA and has been surveyed relatively consistently by boat and aerial survey since 1993. These surveys indicate that the Nenana River drainage coho salmon population is between 2,000 and 9,000 fish in any given year (Table 7). This is a small population compared to the Delta Clearwater River (DCR) in the UTMA. Coho salmon escapement to the DCR has averaged over 31,000 fish annually in the past 5 years (Parker 2009).

Recent Fishery Performance

In the LTMA coho salmon are harvested in tributaries of the Nenana River system near the community of Anderson and in a few unnamed "other streams" as defined by the SWHS. These coho fisheries are relatively small. In 2008, 86 coho salmon were reported as harvested in the

Nenana River Drainage and the reported catch was 298 fish (Table 8). The 2008 coho salmon harvest was well above the 5-year (2003–2007) average harvest of 25 fish, but the catch was below the average of 324 fish. The relatively low level of harvest may be attributed to the low numbers of fish, the flesh quality and the inaccessibility of most of the Nenana River clearwater streams during the late fall.

The coho salmon bag and possession limit is 3 fish/day throughout the LTMA.

Fishery Objectives and Management

Inseason management of coho salmon sport fisheries is driven by downriver indicators and also by run strength in the Delta Clearwater River in the Upper Tanana River Management Area.

In 2009, downriver salmon assessment projects indicated that the fall chum salmon run was very weak; therefore, in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 AAC 01.249), chum salmon sport fisheries were closed throughout the Yukon River drainage, including the Tanana River (Appendix A).

Current Issues and Fishery Outlook

Although effort and catch rates are currently sporadic and low, this may change as people continue to build more recreational cabins in the area and natural gas exploration/development in the area comes to fruition.

Recent spring and fall flood events in the drainage appear to have opened some of the Nenana River clearwater systems to the silty mainstem. What effect this may have on salmon spawning areas is unclear at this time.

At the 2010 BOF meeting the board will deliberate over **proposals 87, 193, and 194**, which address the *Yukon River King, Summer Chum and Fall Chum Salmon Management Plans* (5 AAC 05.360, 5 AAC 05.362, and 5 AAC 01.249). Any changes to these management plans may affect the salmon sport fisheries in the Tanana River drainage.

Recent Board of Fisheries Actions

There have been no recent actions taken by the board with regards to the Nenana River salmon fisheries.

Current or Recommended Research and Management Activities

More consistent surveys should be performed on the clearwater coho systems of the Nenana River drainage to better assess the size, distribution, and changes to the coho salmon stock.

ARCTIC GRAYLING

CHENA RIVER

Background and Historic Perspective

Because of its accessibility, the Chena River grayling stock offers high-quality angling opportunity to a broad socio-economic and age spectrum of anglers. These range from youngsters to adults; anglers of varying levels of income and angling experience; those living within easy walking distance to the river; and those able to afford guiding services or transportation to the upper river away from the road system. There is road access from Eielson Air Force Base and the river flows through Fort Wainwright Army Base, giving military personnel direct access. The Chena River State Recreation Area is a popular destination for residents and non-resident visitors traveling along the road system.

From the late 1970s through the mid-1980s, the Arctic grayling fishery on the Chena River was the largest Arctic grayling fishery in Alaska. The average annual fishing effort (for all species) for the 10-year period (1977–1986) was about 30,500 angler-days (Brase 2008). Between 1986 and 1987, estimates of abundance declined (Table 9; Clark and Ridder 1987, 1988a). Although there was no stock assessment performed on Chena River Arctic grayling prior to 1985, the decline in average harvest from 1977 to 1984 (28,440 fish, Brase 2008) compared to the 1985–1986 average harvest (7,051 fish, Table 10) was a reasonable indicator of the decline in the Chena River population. Therefore, in 1987 the bag limit was reduced from 10 per day to 5 per day, fishing was restricted to catch-and-release during the spring spawning period, and the use of bait was eliminated.

Although harvest decreased for two years after the imposition of these restrictions and abundance estimates increased after 1989, both harvest and effort increased substantially in 1989 (Table 10, Appendix C), prompting the lowering of the bag limit from five per day to two per day. This additional restriction was not sufficient to reduce harvest to a sustainable level, and in 1991 the fishery was further restricted by EO to catch-and-release only (Brase 2008). The BOF made this a permanent regulatory change in 1994. After the change in fishing regulations, catches and effort dropped off; however, they have remained relatively stable in recent years due to the river's close proximity to Fairbanks and ease of access (Table 10, Appendix C).

In addition to eliminating sport harvest through regulation changes, the department initiated a program of Chena River stock enhancement by stocking hatchery and pond-reared Arctic grayling that were spawned from Chena River stock. In 1993 and 1994 approximately 61,000 fish/year were stocked into the Chena River. Survival of these fish was estimated as part of the ongoing stock assessment efforts during 1993, 1994, and 1995. Survival of introduced fish was determined to be too low to justify the cost of the enhancement effort and stocking was not continued after 1994 (Clark 1994, 1995, and 1996).

The Chena River Arctic grayling population continued to be assessed with mark-recapture experiments from 1991 to 1998 and then again in 2005 (Table 9; Clark et al. 1991; Clark 1994, 1995, 1996; Ridder 1998, 1999; Ridder and Fleming 1997; Wuttig and Stroka 2007). These surveys show an Arctic grayling population that is stable, but likely cannot sustain a large annual harvest that would be similar to historic levels.

The Chena River Arctic grayling fishery has been popular since before statehood, and has increased in popularity as Fairbanks and the surrounding area has been developed and access has improved. The Arctic grayling fishery is almost entirely an open water fishery, occurring from April through October. Anglers target Arctic grayling throughout the road and boat accessible sections of the river and its tributaries, and some are transported to the headwaters by aircraft to begin float trips during which they fish for Arctic grayling. Chena (Badger) and Piledriver sloughs are important components of the Chena River Arctic grayling fishery as they provide rearing areas for lower river Arctic grayling and are easily accessible fishing locations.

Prior to 2007, the SWHS divided the Chena River into the "upper river" and "lower river" at river mile 71; from 2007 on, the Chena River was divided into the upper and lower sections at the Moose Creek Dam (river mile 45) (Figure 3). The SWHS provides separate estimates of effort, catch, and harvest of all species for each section. Species distributions and the regulations restricting salmon fishing and the use of bait above the dam suggests that almost all of the effort in the SWHS-designated upper river is directed toward Arctic grayling. The lower river supports a multi-species fishery, including a king salmon fishery which may be growing. While the majority of the effort in the Chena River is probably directed toward Arctic grayling, effort has not yet been apportioned between species and the multi-species fishery confounds attempts to describe the total effort targeting Arctic grayling within the Chena River fisheries.

Recent Fishery Performance

From 2004 to 2006, the reported catches of Arctic grayling in the Chena River declined; in 2007 the catch went up and then appeared to decline again in 2008. The 2008 catch was 28,909 fish; this was below the 5-year average (2003–2007) catch of 38,899 fish (Table 10). This was likely due to the high rainfall experienced throughout Interior Alaska in 2008, which led to turbid water conditions and poor weather for fair-weather fishermen.

In 2008, effort also appeared to decrease on the Chena River, with anglers reporting 14,802 days fished, compared to the 5-year average (2003–2007) of 21,640 days fished.

Fishery Objectives and Management

In 2004, the BOF adopted the *Tanana River Area Wild Arctic Grayling Management Plan* (5 AAC 74.055) that stated that ADF&G would manage Arctic grayling fisheries for long-term sustained yield while providing and/or maintaining fishery qualities that angler's desire. The *Tanana River Area Wild Arctic Grayling Management Plan* has three management approaches: regional, conservative, and special. Each of these approaches has different ways of meeting the goals of sustained yield (reduce bag and possession limits, reduce fishing season, only allow catch-and-release, and/or modify other methods and means). The Chena River is in the special management category.

In addition, the department has drafted an in-house *Fishery Management Plan for the Chena River Arctic Grayling Sport Fishery* (Doxey and Brase *In prep*). After this plan has gone through a full review it will be used to manage the Chena River Arctic grayling population. The management objectives in the draft plan are:

- In the upper river (river-miles 45-90) maintain a minimum abundance of 8,500 Arctic grayling over 12 inches (~305mm) in total length.
- In the lower river (downriver from river mile 45 (the Moose Creek dam)) maintain a minimum abundance of 2,200 Arctic grayling over 12 inches (~305mm) in total length.

Current Issues and Fishery Outlook

The 2005 Chena River Arctic grayling assessment showed that the numbers of large (≥270mm) Arctic grayling in the upper portion of the drainage (5,203 fish, SE = 543) had dropped from the 1998 estimate of 12,519 fish, SE = 2,051 (Table 9). The number of large Arctic grayling in the lower river was estimated at 2,190 fish, SE = 268. Both of these estimates are below the draft management objective.

At the 2010 BOF meeting there are two proposals which could impact the Chena River Arctic grayling fishery:

Proposal 52 seeks to clarify that Chena Slough (aka Badger Slough) is part of the Chena River and therefore, falls under the same regulations. Sport anglers often do not realize that Chena Slough is part of the Chena River because the slough is occasionally cut off from the river due to low water levels and seasonal dewatering of the slough. Because of this, anglers often attempt to harvest Arctic grayling from the slough with multi-hook lures or bait, when in fact, regulations for the slough are catch-and-release, unbaited single-hook artificial lure only, just like the remainder of the lower Chena River.

Proposal 53 would modify the gear regulations on the Chena River so that only one single-hook artificial lure could be used throughout the drainage (with the exceptions for large treble hooks and bait remaining in the lower river). Currently, the upper and lower portions of the Chena River have differing regulations which may be confusing to anglers. Two single hooks are allowed upriver from the dam and only one single hook is allowed downriver from the dam. The Chena River Arctic grayling fishery is managed under the special management approach of the *Tanana River Area Wild Arctic Grayling Management Plan* (5 AAC 74.055) to maintain current population characteristics or levels, or rebuild the population to previous population characteristics or levels. Under the special management approach it is appropriate to restrict gear to one single-hook, artificial lure rather than allowing two single hooks or artificial flies per line.

Recent Board of Fisheries Actions

At the 2007 BOF meeting the board deliberated over a proposal that sought to allow a limited harvest of Arctic grayling less than 12 inches from June 1–July 15 below the Nordale Bridge on the Chena River. No action was taken on the harvest aspects of this proposal; rather the board decided to amend the existing regulations to allow only one unbaited single-hook, artificial lure when fishing for Arctic grayling in the lower portion of the Chena River drainage (previously unbaited single-hook, artificial lures were mandatory only above the dam).

Treble hooks with a gap between hook and shank of 1/2 inch or larger may still be used in the Chena River below the dam to provide for the salmon and northern pike fisheries that occur in the lower river. In addition, bait may only be used on a single hook with a gap between hook and shank of ¾ inch or larger to provide for the lower river burbot fishery.

Current or Recommended Research and Management Activities

The Chena River Arctic grayling population should continue to be monitored on a regular basis to assess whether additional actions should be taken in order to meet management objectives.

SALCHA RIVER

Background and HistoricPerspective

The Salcha River Arctic grayling fishery has supported increasing catch and fairly consistent harvest over recent years and provides a substantial proportion of the harvest opportunity for Arctic grayling in the LTMA (Table 10). The majority of the Arctic grayling fishing opportunity is accessible only by boat, and a high proportion of the effort is from people who have property along the river and their visitors. Some sport fish guiding for Salcha River Arctic grayling is also taking place.

Effort on this multi-species fishery may be impacted by many factors including: the strength of the king salmon run, high water events that can make Arctic grayling fishing very difficult, low water events that can limit boat access to fishing areas, the weather, and the timing of breakup and freeze-up (Appendix C).

Prior to 1987 the Salcha River Arctic grayling bag limit was 5 fish per day, 10 fish in possession, with no size limit and no seasonal closures. The current Salcha River Arctic grayling regulations have been in place since 1987. The current bag and possession limit is 5 fish ≥12 inches per day and Arctic grayling may not be kept during the spawning period (April 1–May 31).

The Salcha River Arctic grayling harvest was higher prior to restrictive regulations imposed in 1987, which instituted a 12-inch minimum length limit, prohibited the use of bait (except on hooks ¾ inch or larger), and permitted catch-and-release only during the spring spawning period (Table 10). These restrictions, along with the fact that the fishery is located primarily off of the road system, are likely the reasons the Arctic grayling harvest rate has remained steady. Catch peaked at about 27,000 Arctic grayling in 1997 and harvest at about 3,000 fish; recent harvest and catch levels have been less than 50% of the peak level (Table 10).

The Salcha River Arctic grayling population was annually assessed from 1988 to 1994 and appeared to be stable or possibly increasing (Table 11; Clark and Ridder 1987, 1988b, 1990; Clark et al. 1991; Ridder et al. 1993; Roach 1994, 1995). It is difficult to make direct population comparisons from year to year because different areas were sampled, sampling occurred at different times of year, and different size classes were available. The Salcha River Arctic grayling population was most recently assessed in 2004. The summer index population of 2,042 fish (SE = 434) ≥ 270 mm is similar to the 1994 index estimate of 2,767 fish (SE =) ≥ 270 mm. (Table 11; Gryska *in prep*).

Recent Fishery Performance

In terms of harvest, catch, and effort, the Salcha River Arctic grayling fishery is stable, with a recent 5-year average (2003–2007) harvest of 1,120 and catch of 6,957 fish (Table 10). However, in 2008, the Salcha River Arctic grayling harvest was a record low with only 576 fish taken. The catch was 4,531 which was also below average, but not dramatically so. The low numbers were likely due to the high and turbid water levels seen throughout the summer of 2008 when Interior Alaska experienced near record rainfall.

Fishery Objectives and Management

In 2004 the BOF adopted the *Tanana River Area Wild Arctic Grayling Management Plan* (5 AAC 74.055) which stated that ADF&G would manage Arctic grayling fisheries for long-term sustained yield while providing and/or maintaining fishery qualities that anglers desire. The *Wild Arctic Grayling Management Plan* has three management approaches: regional, conservative, and special. Each of these approaches has different ways of meeting the goals of sustained yield (reduce bag and possession limits, reduce fishing season, only allow catch-and-release, and/or modify other methods and means). Salcha River Arctic grayling are managed under the regional management approach.

Current Issues and Fishery Outlook

The current Salcha River Arctic grayling regulations appear to be satisfactory to anglers as there have been no proposals put forth in recent years by the public to change the bag and possession limits on the Salcha River.

At the 2010 BOF meeting the board will deliberate over **proposal 50**, which is a housekeeping proposal to align the end dates for Arctic grayling spawning catch and release limitations in the *Tanana River Wild Arctic Grayling Management Plan* (May 30) with those dates in the specific area regulations (May 31).

The BOF will also deliberate over **proposal 51** which will bring the Salcha River into compliance with the *Tanana River Wild Arctic Grayling Management Plan* (5 AAC 74.055). The plan has three management approaches: regional, conservative, and special. The Salcha River is classified under the regional management approach which states: "*Under the regional management approach, sport anglers may use baited or unbaited artificial lures and the bag and possession limit is five fish. The season is open year round, however there are fisheries where catch-and-release is imposed during part or all of the spawning period from April 1 through May 30.*" This proposal will bring the Salcha River in compliance by removing the spawning closure and the length restrictions on Arctic grayling in this system.

Recent Board of Fisheries Actions

There have been no actions taken by the board with regards to the Salcha River Arctic grayling fishery since 2004 when the *Wild Arctic Grayling Management Plan* was adopted.

Current or Recommended Research and Management Activities

A Salcha River Arctic Grayling Management Plan may be developed that sets thresholds for regulatory action if stocks should decline, and reinstates the present regulatory regime when stocks recover.

CHATANIKA RIVER

Background and Historic Perspective

The Chatanika River Arctic grayling sport fishery has been in existence in one form or another since the gold rush in the early 1900s. The Arctic grayling population undoubtedly went through periods of severe decline while either or both fishing and mining activity were unrestricted. Although it is difficult to say to what extent the stock has subsequently recovered, the Chatanika River continues to support a low density but viable Arctic grayling population.

In the upper river, anglers focus almost entirely on Arctic grayling; while in the lower river Arctic grayling, northern pike, burbot, sheefish, salmon, and whitefish are all targeted by anglers. Prior to 1992, the Chatanika River Arctic grayling bag and possession limit fell under the background regulations of 5 fish/day with no size limit. Current regulations allow for a daily bag and possession limit is 5 fish, all $\geq$ 12 inches in total. Arctic grayling may not be retained during the spawning closure from April 1 through May 31.

Arctic grayling have been assessed intermittently in the Chatanika River since 1972 (Table 12; Clark et al. 1991; Fish 1996; Fleming et al. 1992; Holmes 1983, 1985; Holmes et al. 1986; Ridder et al. 1993; Roach 1994, 1995; Tack 1973; and Wuttig 2004). Because the Chatanika River is difficult to survey due to its length and shallow depth, abundance has often been reported as a density index, rather than a point estimate (Table 12). In the most recent surveys, researchers reported no immediate conservation problem for Chatanika River Arctic grayling, but stream productivity may be low (Fleming 1998; Wuttig 2004). Arctic grayling densities were lower in the upper river (between Perhaps and Sourdough creeks) and concerns were expressed about the potential for stock depletion in the upper river should fishing mortality increase.

Recent Fishery Performance

Harvest and catch of Arctic grayling on the Chatanika River has remained relatively stable since 2003. The 2008 harvest was 989 fish with a catch of 11,229 fish. This compares to the recent 5-year average (2003–2007) harvest of 650 fish and catch of 9,902 fish (Table 10).

An extensive population assessment was performed in 2007, and it indicated a significant increase in the number of large Arctic grayling in the Chatanika River (Table 13).

Fishery Objectives and Management

In 2004 the BOF adopted the *Tanana River Area Wild Arctic Grayling Management Plan* (5 AAC 74.055) that stated that ADF&G would manage Arctic grayling fisheries for long-term sustained yield while providing and/or maintaining fishery qualities that anglers desire. The *Tanana River Area Wild Arctic Grayling Management Plan* has three management approaches: regional, conservative, and special. Each of these approaches has different ways of meeting the goals of sustained yield (reduce bag and possession limits, reduce fishing season, only allow catch-and-release, modify other methods and means). Chatanika River Arctic grayling are managed under the regional management approach.

Current Issues and Fishery Outlook

The current Chatanika River Arctic grayling regulations appear to be satisfactory to anglers as there have been no proposals put forth by the public in recent years to change the regulations on the Chatanika River.

At the 2010 BOF meeting the board will deliberate over several proposals which could impact the Chatanika River Arctic grayling fisheries:

Proposal 50 is a housekeeping proposal to align the end dates for Arctic grayling spawning catch and release limitations in the *Tanana River Wild Arctic Grayling Management Plan* (May 30) with those dates in the specific area regulations (May 31).

Proposal 51 will bring the Chatanika River into compliance with the *Tanana River Wild Arctic Grayling Management Plan* (5 AAC 74.055). The Chatanika River is classified under the regional management approach which states: "*Under the regional management approach, sport anglers may use baited or unbaited artificial lures and the bag and possession limit is five fish. The season is open year round, however there are fisheries where catch-and-release is imposed during part or all of the spawning period from April 1 through May 30.*" This proposal will bring the Chatanika River in compliance by removing the spawning closure and the length restrictions on Arctic grayling in this system. In addition, it will modify the gear restriction to allow any hook throughout the drainage (rather than single hooks only).

Proposal 56 will relocate the regulatory boundary marker between the upper and lower Chatanika River from the current regulatory sign, located one mile upstream from the Elliott

Highway Bridge, to the Elliott Highway Bridge itself. If adopted, this new location will provide a more permanent and recognizable boundary, rather than an easily removed, destroyed or obscured regulatory sign. The current regulatory boundary on the Chatanika River was originally put in place for the sport whitefish spear fishery that occurred in the area through 1993. Other regulations used this point as a reference in order to maintain consistency.

Recent Board of Fisheries Actions

There have been no actions taken by the board with regards to the Chatanika River Arctic grayling fishery since 2004 when the *Wild Arctic Grayling Management Plan* was adopted.

Current or Recommended Research and Management Activities

A Chatanika River Arctic Grayling Management Plan may be developed that sets thresholds for regulatory action if stocks should decline and reinstates the present regulatory regime when stocks recover.

NENANA RIVER

Background and Historic Perspective

The Nenana River drainage Arctic grayling fishery occurs primarily in small clearwater streams off of the mainstem Nenana and Teklanika rivers. Fishing occurs during the open water periods. A radiotelemetry study performed in 2001–2002 demonstrated the importance of the Brushkana River as a spawning system within the upper portion of the Nenana River drainage. Radio-tagged Arctic grayling that spawned in the Brushkana River overwintered in the mainstem Nenana River or other large tributaries (Gryska 2006). As a result of this work, the Nenana River Arctic grayling stocks are considered one stock for management purposes.

The current regulation for Nenana River Arctic grayling is the Tanana Area “background” bag and possession limit of 5 fish/day with no size limit, no gear restriction, and no spawning closure.

Recent Fishery Performance

The 2008 Nenana River harvest of 928 Arctic grayling was above the recent 5-year (2003-2007) average harvest of 815 fish (Table 10). In 2008, effort on the Nenana River was 8% above average, with 1,721 days fished, compared to the recent 5-year average of 1,599 days fished (Appendix C).

Fishery Objectives and Management

The Nenana River drainage falls under the *Wild Arctic Grayling Management Plan* Regional Management Approach.

Current Issues and Fishery Outlook

As people continue to build more recreational cabins in the area and natural gas exploration in the area comes to fruition, sport fish effort and harvests may continue to increase.

Recent Board of Fisheries Actions

There have been no actions taken by the board with regards to the Nenana River Arctic grayling fishery since 2004 when the *Wild Arctic Grayling Management Plan* was adopted.

Current or Recommended Research and Management Activities

A Nenana River Arctic Grayling management plan may be developed that sets thresholds for regulatory action if stocks should decline, and reinstates the present regulatory regime when stocks recover.

OTHER LTMA GRAYLING FISHERIES

Arctic grayling are popular with recreational anglers, are generally abundant, and occur in many LTMA rivers and streams besides the major fisheries previously detailed. Access ranges from roadside fisheries to those accessible only by boat along major rivers to the mouth of the tributary. As with almost all Arctic grayling fisheries in the Tanana River drainage, these fisheries take place during the open-water season.

With the exception of Five-Mile Clearwater (located on the south side of the Tanana River between Fairbanks and Delta Junction), the Arctic grayling fisheries in these other small streams fall under the *Tanana River Area Wild Arctic Grayling Management Plan* regional management approach and the background bag and possession limit that was instituted in 1975 for Arctic grayling in the Tanana River drainage (5 fish/day with no size limit and no spawning closure).

The Five-Mile Clearwater Creek is in the *Tanana River Area Wild Arctic Grayling Management Plan* conservative management approach, with a daily bag and possession limit of 2 fish, only one of which may be over 12 inches long.

Reported catch and harvest rates vary considerably, in part because many of these small fisheries enter and drop out of the SWHS report from one year to the next, depending upon whether any of the small number of anglers utilizing them are selected for inclusion in the SWHS. The effort, catch and harvest rates for these small fisheries are not broken out separately in this report as they are based on few angler responses, and therefore, the precision of the estimates of catch, harvest, and effort are generally much lower than those for fisheries where there is a high SWHS response rate.

These small fisheries will continue to be monitored through the SWHS to watch for trends that may indicate a fishery is getting higher use and may warrant further research or management activities.

At the 2010 BOF meeting the board will deliberate over **proposal 50**, which is a housekeeping proposal to align the end dates for Arctic grayling spawning catch and release limitations in the *Tanana River Wild Arctic Grayling Management Plan* (May 30) with those dates in the specific area regulations (May 31).

The BOF will also deliberate over **proposal 53** which clarifies the methods and means in the water bodies in which there are either catch-and-release regulations or exceptions to the general bag and possession limits for Arctic grayling, and are under the conservative or special management approach of the *Tanana River Area Wild Arctic Grayling Management Plan* (5 AAC 74.055). The Piledriver Slough Arctic grayling fishery is managed under the special management approach to maintain current population characteristics or levels, or rebuild the population to previous population characteristics or levels. The Five-Mile Clearwater Creek is managed under the conservative management approach to maintain a high quality Arctic grayling fishing experience (a higher percentage of large fish). Under either the conservative or special management approach of the management plan it is appropriate to restrict gear to one single-hook, artificial lure rather than allowing two single hooks or artificial flies per line.

NORTHERN PIKE

MINTO FLATS

Background and Historic Perspective

Minto Flats is located about 35 miles west of Fairbanks between the communities of Nenana and Minto (Figures 8 and 9). It is an approximately 500,000 acre area of marsh and lakes interconnected by numerous sloughs and rivers. Most of the area is included in the Minto Flats State Game Refuge which was established by the Alaska Legislature in 1988 to ensure the protection and enhancement of habitat, the conservation of fish and wildlife, and to guarantee the continuation of public uses within the area. The Chatanika, Tolovana, and Tatalina rivers and Washington, Goldstream, and numerous smaller creeks flow into Minto Flats. These flowing waters come together as tributaries to the Tolovana River, itself a tributary to the Tanana River at its mouth at the southwestern end of the Flats. The waterways of the Flats are slow and meandering.

A group of large interconnected lakes in the eastern Flats is called the Minto Lakes. These lakes are generally shallow and heavily vegetated. The Minto Lakes are a popular northern pike fishing and waterfowl hunting area. In addition to those who use boats, there are both guiding services and private pilots that travel to the lakes in floatplanes. Guides and private individuals have cabins on some of the sparse areas of higher ground that are not regularly flooded. The Minto Lakes are thought to support the majority of the northern pike sport fishery within the Tolovana River drainage, although the SWHS does not separate the lakes' harvest and catch data from the rest of Minto Flats.

The Minto Lakes are a major northern pike spawning and summer feeding area. In winter, much of the flowing and standing water within the Flats becomes anoxic, forcing fish to move to waters of the Chatanika and Tolovana rivers or up tributary rivers to oxygenated areas. Winterkill is common and can be a confounding factor in attempts to predict fish population dynamics and assess angler impact. Northern pike are typically the only fish targeted by sport anglers in the Minto Flats area. These large piscivores are located throughout the Flats and can be readily taken on many types of lures.

The northern pike fishery of the Lower Chatanika River is included in this section because northern pike move between Minto Lakes and Chatanika River, and the lower 35 miles of the Chatanika River is within Minto Flats. Similarly, because effort, catch, and harvest estimates for the Tolovana River appear occasionally in the SWHS data and because Minto Flats and all of its waters are within the Tolovana River drainage, general references in this section to the Minto Flats complex and/or Tolovana drainage should be considered a summation of effort/harvest or catch of northern pike in the Tolovana River, Minto Flats, and the Lower Chatanika River drainage.

The Tolovana River drainage/Minto Flats complex sport fishery has supported a major proportion of the LTMA northern pike sport fishery for many years (Table 14). It was primarily a summer fishery until the mid-1980s, when an intensive sport fishery developed on concentrations of northern pike that were overwintering in the Chatanika River just upstream from the mouth of Goldstream Creek. A subsistence fishery for northern pike (and whitefish) occurs near Minto Village and at historically used sites in the eastern portions of Minto Flats (Andrews 1988). Gillnets are used throughout the open-water period and northern pike are taken through the ice with hook and line.

From 1984 to 1986, the total harvest of northern pike from the Minto Flats complex doubled (Table 14) and many of the fish harvested were likely large females caught during the winter ice fishing season. It was believed, and later demonstrated by radiotelemetry studies (Roach 1998b) that these fish were the spawning stock for the Minto Lakes. After 1987, regulations were implemented closing sport fishing for northern pike at Minto Flats between October 1 and May 31, and the bag limit was reduced from 10 to 5 fish per day, only 1 of which may be ≥ 30 inches long.

Estimated sport catch and harvest of northern pike in the Minto Flats complex peaked in 1994 with a harvest of 9,489 fish and a catch of 52,191 fish. Estimated sport harvest and catch continued to decline until 2001, when reported catches started to increase. A significant increase in the recent years' catch and harvest began in 2003 when harvest went from 650 fish in the Minto Flats complex, to 1,284 fish (Table 14). Harvests have remained at that higher level since.

Currently Minto Flats is closed to sport fishing for northern pike from October 1–May 31; the daily bag and possession limit is 5 fish, only 1 of which may be ≥ 30 inches long.

Northern pike population assessments have been performed in the Minto Lakes area every 3 to 5 years since 1987. The 2008 estimate of 9,854 northern pike ≥400mm was significantly less than the estimates from either 2003 or 1997 (25,227 and 16,546 fish respectively) (Table 15, Figure 10). Similar results were also observed for pike >600mm, with the 2008 estimate of 2,092 fish being significantly smaller than the 2000 and 1997 estimates (5,331 and 3,251 fish respectively) (Joy *In prep*).

Recent Fishery Performance

The 2008 catch was 2,926 fish, which was dramatically lower than the recent 5-year average (2003–2007) of 12,276 fish (Table 14); this was likely due in large part to an EO that reduced the sport fish bag limit from 5 to 2 fish during the 2008 season in the Minto Flats area. The northern pike harvest of 258 fish in 2008 was also below the 5-year average of 1,397 fish.

In 2008, the fishing effort in Minto Flats was also dramatically lower, with an estimated 887 days fished, which was 37% of the recent 5-year average of 2,410 days (Appendix C). The majority of the effort at Minto Flats is probably directed toward northern pike, even though effort is not estimated by target species in the SWHS.

Although Minto Flats is closed to northern pike sport fishing from October 15 through May 31, there is a subsistence fishery that occurs throughout the winter. To participate in any subsistence fishery, one needs to be an Alaska resident. If a resident wishes to participate in the subsistence fishery in the Tolovana River drainage, they must acquire a Tolovana Subsistence Northern Pike Permit from the ADF&G Division of Commercial Fisheries in Fairbanks. Subsistence users commonly harvest northern pike near the confluence of the Chatanika River and Goldstream Creek late in the winter/early in the spring. The winter subsistence northern pike harvest has averaged 949 fish over the past 5 years (2004–2008) from an average number of 52 permit holders (Table 16).

Fishery Objectives and Management

The Minto Flats northern pike population is managed under the sport and subsistence *Minto Flats Northern Pike Management Plans* (5 AAC 74.044 and 5 AAC 01.244), which stipulate that the maximum exploitation rate of all users in the Lower Chatanika River and Minto Lakes/Goldstream Creek area may not exceed 20% annually.

The sport plan also states that the fishery is open from June 1 to Oct 14 and the daily bag and possession limit is 5 fish, only 1 may be ≥ 30”. Additionally, if the subsistence harvest in the Chatanika River drainage upstream of the confluence of the Chatanika River and Goldstream Creek is > 750 northern pike from January 1 to the ice free period, the sport daily bag and possession limit will be reduced by EO to 2 fish, of which only 1 ≥ 30” in the lakes and all flowing waters of Minto Flats for the remainder of the calendar year.

The subsistence management plan is slightly different: 1) subsistence is open year round; however, a permit is required (Alaska residents only); 2) there are no daily and/or annual limits; 3) gillnets may be used only April 15–October 14; and 4) a hook and line may be used only if fishing through the ice. If the subsistence harvest in the Chatanika River drainage upstream of the confluence of the Chatanika River and Goldstream Creek is greater than 1,500 northern pike from January 1 to the ice free period, these waters will be closed by EO to fishing for northern pike through the ice.

Finally, both the sport and subsistence management plans for northern pike state that in the Chatanika River drainage upstream of the confluence of the Chatanika River and Goldstream Creek to the Fairbanks Nonsubsistence Area boundary (approximately one mile below the boat launch), only single hooks may be used.

In 2007, over 1,500 northern pike were harvested in the winter subsistence fishery; therefore, on February 16 Division of Commercial Fisheries closed the subsistence fishery by EO for the remainder of the winter in that portion of the Chatanika River drainage upstream from the confluence of the Chatanika River and Goldstream Creek. On May 1 an EO was issued by Division of Sport Fish reducing the summer season sport daily bag and possession limits throughout the Minto Flats area to 2 fish per day, only 1 of which could be greater than or equal to 30 inches (Appendix A).

In 2008, over 1,200 northern pike were harvested in the winter subsistence fishery, therefore on May 1 an EO was issued by Division of Sport Fish reducing the summer season sport daily bag and possession limits throughout the Minto Flats area, similar to the actions taken in 2007 (Appendix A).

Current Issues and Fishery Outlook

The harvest of northern pike in the lakes and flowing waters of the Minto Flats area may be approaching the maximum 20% exploitation rate specified in regulation. The 1998–2007 (10 year) average sport fish harvest of northern pike in the Minto Flats was 1,002 fish and the 1998–2007 (10 year) average subsistence harvest was 628 fish; these two harvest estimates added together equal 1,630 northern pike. The 2008 abundance estimate in the Minto Flats index area was 9,854 northern pike greater than or equal to 400mm (15.7 inches); 20% of this abundance is 1,971 fish. Therefore, if the sport and subsistence harvests continue to maintain their current level and the population of pike in Minto Flats does not increase, there will likely have to be further restrictions to the sport fishery.

At the 2010 BOF meeting the board will deliberate over several proposals which could impact the sport and subsistence northern pike fisheries in the Minto Flats:

Proposal 63 is a housekeeping proposal which will align the language in the subsistence and sport fish versions of the *Minto Flats Northern Pike Management Plan* (5 AAC 01.244 and 5 AAC 74.044). The description of the area used to estimate the exploitation rate of northern pike in the two versions of the plan is not the same, whereas, the intent of the plan is to include the same area and fish stocks. The proposed language will align the description of the area for which the exploitation rate is calculated.

Proposal 64 will establish a household bag and possession limit for northern pike in the winter subsistence fishery that occurs in that portion of the Chatanika River upstream from the confluence of the Chatanika River and Goldstream Creek. There is no bag or possession limit in this subsistence fishery.

Proposal 65 will limit both the summer sport fishery and winter subsistence northern pike fishery in the Chatanika River, Minto Lakes, and Goldstream Creek to single hooks (may be multiple single hooks). This is suggested as a way to reduce catch-and-release mortality in both the summer and winter hook-and-line northern pike fisheries.

Recent Board of Fisheries Actions

There have been no actions taken by the board with regards to the Minto Flats northern pike fishery since 2001 when both the sport and subsistence *Minto Flats Northern Pike Management Plans* were adopted.

Current or Recommended Research and Management Activities

Verbal angler reports suggest that there are more guided and/or drop-off northern pike fishing trips occurring in the Minto Flats complex (fly-in and boat-in trips). The SWHS estimates show that catch, harvest and effort may be increasing in years with no fishing restrictions and it appears that this is primarily among the unguided anglers.

HARDING LAKE

Harding Lake is currently closed to northern pike fishing. This section is included to give the reader a historical perspective and an update to the fishery.

Background and Historic Perspective

Harding Lake is located about 45 road miles southeast of Fairbanks along the Richardson Highway (Figure 11) and is the largest roadside lake north of the Alaska Range. Harding Lake is a very popular recreational destination and approximately 75% of the lake's shoreline contains road-accessible cabins.

Northern pike were a high profile game fish in Harding Lake because they were readily caught and their preference for shallow water habitats made them highly visible to anglers. This is in contrast to the other large predators (burbot, lake trout, and Arctic char), which are available to anglers at lower density populations in deep water. In 1991, northern pike fishing at Harding Lake was closed between April 1 and May 31, spear fishing was closed and a 26 inch minimum length limit was imposed by EO (Arvey 1993).

As northern pike generally increased in popularity as a game fish (Doxey 1991) and anglers became more aware of their presence in Harding Lake, harvests increased through the 1980s (Table 17), then fell dramatically during the early 1990s (in part due to regulatory changes) and declined again after 1995. Catches peaked in 1993 at about 8,500 fish and declined slowly thereafter to about 1,400 in 1998.

Prior to the fishery's closure, the majority of the effort at Harding Lake was probably directed toward northern pike. Estimated effort increased through the mid-1980s and averaged around 5,000 angler-days from 1991 to 1994 (Appendix C). Effort increased to approximately 6,700 angler-days in 1995 and 1996, and then declined thereafter to about 3,400 angler-days during 1997 to 1998.

Abundance estimates for northern pike were conducted at Harding Lake annually from 1990 to 1999 except in 1994 (Table 17). Abundance of northern pike $\geq$ 300 mm FL increased from about 2,300 fish in 1990 to about 3,800 fish in 1993. Estimated abundance increased between 1995 and 1996, from 2,338 to 3,337, but declined to 1,780 northern pike in 1997 (Roach 1998a). The abundance estimate in 1998 was 1,376 northern pike $\geq$ 300 mm (~12 inches).

In 1998, a risk and sustained-yield analysis was completed as part of the research studies on the Harding Lake northern pike population. The risk analysis assessed the likely ability of various regulatory regimes to maintain the northern pike spawning population at about 1,728 fish (the abundance calculated to produce the maximum sustained yield of approximately 400 fish). The recommendation was to increase the minimum length limit for harvest from 26 inches to 30 inches (Roach and McIntyre 1999). Plans were made to pursue this recommendation at the January 2001 BOF meeting.

Estimated harvest (38) and catch (828) of northern pike in Harding Lake during 1999 was the lowest recorded. An abundance and age composition estimate revealed that the population of northern pike $\geq$ 300 mm (~12 inches) had declined to 583 fish and that a recruitment failure was occurring (Table 17; Scanlon and Roach 2000). Only about 11% of the population consisted of young fish between age-1 and age-6. These diminished cohorts (ages 2-5) were the recruitment from strong parent classes (1993–1997) when adult northern pike were abundant in the lake.

The loss of most of the high-quality spawning and rearing habitat as the lake level dropped in the mid-to-late 1990s probably caused the recruitment failures. Scanlon and Roach (2000) describe the importance of vegetated zones like those that have disappeared in Harding Lake to the survival of young of the year northern pike. Young northern pike prefer warm, shallow, productive, and sheltered areas. Cannibalism is a major mortality factor on young of the year fish and fingerlings when cover is not available.

Recent Fishery Performance

Over the past 10 years the water level at Harding Lake has declined from approximately 717 to 715 feet above sea level (ASL) (Table 17), resulting in the loss of shallow wetland habitat primarily at the north end of the lake. This area comprised the majority of the northern pike spawning and rearing habitat on the lake. The loss of northern pike habitat resulted in recruitment failures in the late 1990s (Scanlon and Roach 2000) and led to an emergency closure on May 1, 2000 (Brase 2008), followed by a complete closure of the Harding Lake northern pike fishery in 2001 by the BOF. The demise of this northern pike fishery was a great loss to residents of the Interior as Harding Lake supported the only road accessible quality northern pike fishery in Region III.

Fishery Objectives and Management

The management plan, *Fishery Management and Restoration Plan for the Harding Lake Northern Pike Sport Fishery, 2001-2004* (Doxey 2003) was written to document the step-wise approach proposed to the BOF regarding when and how the fishery will be reopened once the Harding Lake northern pike population begins to recover. It is unclear how long it will take for the northern pike population to recover to sufficient levels to allow a targeted fishery to occur.

Current Issues and Fishery Outlook

In 2005, funding was secured to build a structure to restore the flow of Rogge Creek into Harding Lake. The water control structure was completed in April 2007 and is designed to restore and maintain the Rogge Creek-Harding channel. The channel now flows directly into Harding Lake and will help restore the lake's water level and recover approximately 135 acres of wetlands on the north shore. ADF&G presumes that the remaining northern pike in Harding Lake will take advantage of the spawning habitat once the dry northern shoals are again covered with sufficient water.

In 2008, the water level rose approximately 18 inches due to high rainfall and the contributions from the diversion structure operation. However in 2009 there was less rainfall through most of the summer. The lake level dropped, but then rose in August when rainfall increased. By October the lake was down approximately 6 inches from its peak (Dr. John Fox, University of Alaska Fairbanks, personal communication).

Recent Board of Fisheries Actions

There have been no actions taken by the board with regards to the Harding Lake northern pike fishery since 2001 when the fishery was closed.

Current or Recommended Research and Management Activities

Recommended activities for Harding Lake would include continued monitoring of the lake level, maintenance of the Rogge Creek restoration structure, and assessment of the northern pike population as it recovers.

OTHER LTMA NORTHERN PIKE FISHERIES

Northern pike are common in many smaller lakes and in sloughs and tributaries of the Tanana River, and small harvests are reported annually from many locations throughout the LTMA. The

Lower Chena, Zitziana, and Salcha rivers; Piledriver Slough; and gravel pits in south Fairbanks and on Eielson Air Force Base are examples of the types of areas that produce northern pike for anglers. Other fisheries occur in lakes in the Kantishna River drainage (such as East Twin and Mucha lakes) and in clear boat-accessible sloughs, backwaters, and small tributaries off of the Tanana River. The northern pike present in the Tanana River system and in waters connected to the river provide the population reservoir which, through the movements of individual fish, ensures the continued viability of small stocks and availability of fishing opportunity wherever suitable habitat occurs. This includes the colonization of ponds. Northern pike colonize suitable gravel pits and other ponds either when the river floods them, the pits are connected to the river, or when people illegally introduce northern pike into those waters. Many of these areas are road-accessible. None of these produce large numbers of fish or very many large fish. It is not presently possible to develop a direct estimate of effort because of the mixed stock fisheries of which these northern pike fisheries are a part.

The wide range of accessibility for anglers and the diversity of types of angling opportunity add value to these fisheries. Angler interest in road-accessible northern pike fisheries is high. However, the nature of northern pike as a piscivore that takes the hook readily, but requires many years to grow to the larger sizes valued by anglers, makes it difficult to manage for high quality northern pike fisheries in roadside situations.

Abundance and age and sex composition studies were conducted in East Twin Lake in 1993 (Pearse 1994) and Deadman Lake in 1994 (Hansen and Pearse 1995). In both cases, the populations were judged to be healthy and capable of sustaining existing harvest levels. A radiotelemetry study done in 1993 and 1994 in the Chena River indicated that adult northern pike in that river move little during the year, although difficulties with some aspects of the studies caused the results to be somewhat qualified (Pearse 1994).

Management on a sustainable basis is an overriding obligation. However, in roadside ponds stocked with salmonids such as rainbow trout, where northern pike have been illegally introduced, maximum harvest rate (in excess of sustainability) is beneficial to the put-and-take fishery for stocked species.

In 1992, northern pike fishing in lakes of the Tanana drainage was closed during all of April and May to protect pike just prior to, during, and immediately after spawning. This closure was subsequently judged to be unnecessarily restrictive and in 1997 the BOF adopted a revision leaving all lakes in the LTMA except Harding Lake open from June 1 through April 20.

The department will continue to monitor these small fisheries through the SWHS and assess trends which may indicate a fishery is getting higher use and may, therefore, warrant further research and/or management activities.

BURBOT

TANANA RIVER

Background and Historic Perspective

The Tanana River is the second largest tributary of the Yukon River; it is approximately 570 miles long and is highly turbid in the summer due to glacial run-off. The largest Tanana River mainstem sport fishery is the winter burbot fishery. Burbot are members of the cod family (*Gadidae*), and are unique among freshwater fishes in the fact that they are active and spawn in the coldest part of winter when most other fish are in a torpor state.

Burbot are commonly caught through the ice using set-lines on which up to 15 hooks may be used. In flowing waters of the Tanana River drainage the daily bag and possession limit for burbot is 15 fish/day, with no size limit. Burbot stocks in the Tanana River system are harvested most heavily near population centers such as Fairbanks, North Pole, and Nenana.

Population assessments were conducted annually from the late 1980s through 1998 in the Lower Chena River and the Tanana River near Fairbanks, and they showed a population that was stable and was possibly increasing (Table 18; Evenson 1988, 1994, 1997; Stuby and Evenson 1999). Radiotelemetry studies on burbot have also been conducted. Extensive movements and exchange of burbot within the Tanana River drainage tends to minimize effects of concentrated local fishing effort, and overall, stocks in the Tanana River appear to be lightly exploited (Evenson 1997).

While most of the effort in the Tanana River fishery is probably directed toward burbot, it can be difficult to make inferences about burbot fisheries because the Tanana River supports fisheries for other species as well. The SWHS bases its estimates on calendar years, which divide the winter fishery into two segments and assigns the first portion to the end of one year and the second portion to the beginning of the next. Anglers fish for burbot all winter. Casual observations indicate that effort increases as the ice becomes safer for surface travel in November. Effort declines in late December, and then climbs again after mid-January. This decline coincides with the darkest, coldest time of the year, and with the general timing of burbot spawning in the rivers.

Prior to 1988 there was no bag and possession limit for burbot if taken by hook and line. There was a 10 fish/day limit if the fish were taken by spear or bow and arrow. In 1988 the current bag and possession limits went into effect: 15 fish/day in flowing waters, and 5 fish/day in lakes.

Recent Fishery Performance

The estimated catch of burbot in the LTMA varies from year to year within a range of about 2,000 to 4,000 fish. The recent 5-year average total harvest of 1,815 burbot is 75% of the total catch of 2,435 fish (Table 19), which is a higher retention rate than any other fishery in the Tanana drainage, indicating the consumptive value of this fishery to Interior Alaska residents. The Tanana River and the Lower Chena River fisheries provide most of the catch and harvest in the LTMA (Table 19). These fisheries are on the same stock of burbot, which could be characterized as a "middle Tanana" stock.

Fishery Objectives and Management

There are no specific management plans or fishery objectives in place for Tanana River burbot.

Current Issues and Fishery Outlook

Residents of Fairbanks typically target specific winter fishery locations near the mouth of the Chena River and nearby, on the Tanana River. These targeted areas may be experiencing some depletion of the local burbot populations.

Recent Board of Fisheries Actions

There have been no recent actions taken by the board with regards to the Tanana River burbot fishery.

Current or Recommended Research and Management Activities

A Tanana River Burbot Management Plan may be developed that sets thresholds for regulatory action if harvest rates change such that they appear to be unsustainable.

OTHER LTMA BURBOT FISHERIES

Within the LTMA, burbot also occur in the lower sections of clear tributaries such as the Lower Chatanika, Salcha, and Tolovana rivers, and in deeper lakes such as Harding Lake and West Twin Lake. They can also colonize suitable ponds and gravel pits when flooding from a nearby river occurs. Fishing occurs year-round, but the majority of the effort in the LTMA appears to occur in fall and winter. The most common gear type in flowing waters of the drainage is set lines, but hand held gear is used by anglers in lakes and to a certain extent in rivers.

Although exploitation rates of burbot in the Tanana River are not considered excessive, studies suggest low burbot abundance in most of the easily accessible lakes examined within the Tanana drainage. Population density of burbot in many lakes declined dramatically in the early 1980s due to unsustainable rates of sport fishing exploitation. More recent stock assessment studies conducted in lakes of the Tanana River drainage demonstrate the detrimental effects of long-term high exploitation rates on stocks (Lafferty et al. 1992). Such effects resulted in the restrictive regulations of no set lines allowed in Harding Lake and a burbot bag and possession limit of 2 fish/day. Set lines may be used in the other lakes of the LTMA; however, they may only be used from October 15 to May 15. The burbot bag and possession limit in all lakes of the LTMA (except Harding) is 5 fish/day.

The department will continue to monitor these small fisheries through the SWHS and assess trends which may indicate a fishery is getting higher use and may therefore warrant further research and/or management activities.

WHITEFISH

CHATANIKA RIVER

Background and Historic Perspective

The Chatanika River supports a large spawning population of whitefish (humpback and least cisco). During late summer and fall, humpback whitefish and least cisco migrate up the Chatanika River to spawn in the middle section of the river between Hard Luck Creek and a few miles upstream of the Elliot Highway Bridge. They then move downriver to as yet undefined overwintering areas. It’s quite possible that some of overwintering areas are outside of the Minto Flats complex. Fleming (1999) described the potential compound life history of the stocks, which might include long migrations in the Tanana and Yukon rivers. During the course of northern pike research, humpback whitefish and least ciscos have been observed moving into the Minto Lakes immediately after breakup. They probably feed for a period of time during the summer before moving on to spawning areas.

The only major sport fishery for whitefish in the LTMA was the spear fishery on the Chatanika River in the vicinity of the Elliot Highway Bridge. This fishery historically took place in September, while least cisco and humpback whitefish were migrating upstream to spawn. Both of these species were harvested, as were a small percentage of round whitefish. The fishery became very popular during the 1980s, and harvests had increased to 25,000 fish by 1987 (Table 20).

This fishery had no bag limit until 1988, when a 15 fish per day limit was implemented. Harvest decreased in 1988 after the bag limit was imposed, but increased again in 1989. The decline in humpback whitefish abundance from 41,211 fish in 1988 to 17,322 fish in 1989 (Table 21; Hallberg 1989; Timmons 1990), combined with harvest estimates that were considered unsustainable prompted the department to close the fishery by EO in October 1990 and again in September 1991 (Brase 2008). In 1992, the BOF adopted a department proposal to limit the fishery to the month of September and to limit the area where the fishery took place to downstream of a point one mile above the Elliot Highway Bridge. During 1992, the department also adopted the *Chatanika River Sport Fish Management Plan* that set threshold abundance levels required to allow harvest. The threshold abundance level for humpback whitefish was 10,000 spawners, and the threshold abundance level for least cisco was 40,000 spawners.

Stock assessments done in 1992 and 1993 (Table 21; Fleming 1993, 1994) indicated abundance levels above the threshold levels in the management plan. However, harvest rates in those years were very low and attributed to poor weather conditions during the peak of migration (Burr et al. 1998)

Stock assessment during 1994 (Fleming 1996) indicated that the abundance level of least cisco was below the management plan threshold allowing harvest; therefore, the fishery was closed by EO in September 1994. The fishery remained closed by EO through 2001, when the BOF closed the spear fishery by regulation.

Recent Fishery Performance

When the BOF closed the spear fishery, it established a hook-and-line fishery in the Chatanika River for whitefish, with a daily bag and possession limit of 5 fish. Least ciscos may not be retained in the hook-and-line fishery. There is little participation in this sport fishery due to the difficulty in catching whitefish by artificial lures.

Alaska residents holding a sport fishing license may apply for a *Personal Use Whitefish and Sucker Permit* (5 AAC 77.190) which allows them to harvest whitefish with dip nets, fyke nets, beach seines, or fish wheels in the Fairbanks Nonsubsistence Area (5 AAC 99.015(a)(4)). To apply for a permit, anglers must contact ADF&G in Fairbanks.

In 2007, the BOF added spears as a legal gear type in the personal use whitefish fishery. Separate permits were designed that designated the dates, fishing area, and household limits for this fishery. On August 27, the department began issuing 100 household permits with a household limit of 10 whitefish. The 2007 fishery occurred from September 21 to October 8. In 2007, fifty-two of the 100 permittees participated in the fishery and harvested 267 whitefish (Table 22). Forty-five of the permitees did not participate in the fishery. This may have been due to a difficulty finding adequate spears in local stores or because people were occupied with other fall season activities (hunting). Weather and river conditions were optimal for spearing; therefore, it is unlikely they had any effect on permittees decision to go spearing.

In 2008 and 2009, because of high demand for permits, the low number of participants, and the low level of harvest; the number of issued permits was doubled to 200. Permits were issued beginning in mid-August with a household limit of 10 whitefish. The fishery occurred from the fourth weekend in September to the fourth weekend in October.

Although twice as many permits were issued in 2008 over 2007, approximately the same proportion of anglers participated in the fishery and they harvested a slightly higher average number of fish per permit. The permit results showed that 92 permitees fished and harvested 522 whitefish (Table 22). The weather in 2008 was much colder than 2007, with the river actually icing up in places where fishing occurred, preventing some permit holders from spear fishing on the last weekend the fishery was open.

Preliminary results from 2009 indicate that harvest rates increased; of the 125 permits returned by December 3, there was a harvest of 591 whitefish from 94 permit holders. This increase in participation and success may be due to people improving their spearing technique and finding a good location to harvest whitefish.

Fishery Objectives and Management

An in-house *Chatanika River Personal Use Whitefish Spear Fishery Management Plan* was developed in 2007. This plan outlines a history of the Chatanika River whitefish fishery and the fishery's current management objectives.

The draft management objectives are as follows:

1) To maintain an orderly fishery that produces a sustainable harvest; and,

2) To stay within these permit guidelines:

- Permits will be issued starting in mid-August;
- Permits will be only issued to Alaska residents who hold a sport fish license;
- Permits will be issued from the Fairbanks ADF&G office;
- Permits must be filled out and returned after fishing is complete or October 31;
- If a permit is not returned, the permittee may not be eligible to receive another the following year;
- Permit will specify fishery area & fishery dates; and
- Maximum total fishery harvest level of 1,000 whitefish (any species).

Current Issues and Fishery Outlook

If the 2009 permit results indicate that once again, only about 50% of the permit holders participated in the fishery and harvested less than the 1,000 whitefish "cap", there may be some changes made to the permitting process in 2010. The department may issue permits closer to the opening date of the fishery (to cut down on the number of people whose fishing plans change in the month between getting the permit and the fishery starting up) or more permits may be issued. However, no decision will be made until the results of the 2009 season are compiled.

At the 2010 BOF meeting there are two proposals that may affect the Chatanika River whitefish sport fishery (not the personal use fishery):

Proposal 56 will relocate the regulatory boundary marker between the upper and lower Chatanika River from the current regulatory sign, located one mile upstream from the Elliott Highway Bridge, to the Elliott Highway Bridge itself. If adopted, this new location will provide a more permanent and recognizable boundary, rather than an easily removed, destroyed or obscured regulatory sign. The current regulatory boundary on the Chatanika River was originally put in place for the sport whitefish spear fishery that occurred in the area through 1993. Other regulations used this point as a reference in order to maintain consistency.

Proposal 57 will repeal the exceptions to the general sport bag and possession limits and seasonal closures for whitefish in the Chatanika River. There is not a conservation concern in opening the hook and line sport fishery for whitefish year round, as whitefish are difficult to harvest using hook and line gear compared to personal use gear (spear). From 2003 to 2007, the catch and harvest of whitefish in the Chatanika River by hook and line averaged 194 and 60 fish, respectively. This change will reduce the complexity of the regulations for the Chatanika River as the sport fishing regulations for whitefish will revert back to the area-wide season (year round) and bag limits (15).

Recent Board of Fisheries Actions

In 2007, the BOF added spears as a legal personal use gear in the Chatanika River.

Current or Recommended Research and Management Activities

In 2008, separate abundance estimates were obtained for Chatanika River populations of least cisco and humpbacked whitefish (Wuttig 2009). The humpback whitefish estimate was 22,490 fish (SE = 2,777); the estimate of least cisco was 15,870 fish (SE = 1,429). These results suggest that the humpbacked whitefish population is at or slightly above the historical average, whereas the least cisco population remains below the historical average. The 2008 least cisco estimate reinforces the department's view that the population remains low as the estimate was more precise than previous years' estimates (Table 21).

The lack of recovery in the least cisco population indicates that continued conservative management of the Chatanika River personal use whitefish spear fishery is prudent.

OTHER LTMA WHITEFISH FISHERIES

Small harvests of whitefish are consistently reported in the SWHS from the Chena, Salcha, and Tanana rivers, and various lakes throughout the LTMA. These fisheries may involve hook-and-line angling and some inriver spearing of fish migrating to spawning grounds in the fall. Round whitefish share a common habitat preference with Arctic grayling and are abundant in many areas where anglers fish for Arctic grayling. Round whitefish are occasionally taken with rod and reel, as are humpback whitefish. Least ciscoes rarely take a hook. Of the whitefish fisheries that occur in rivers other than the Chatanika River, the Chena and Tanana rivers have accounted for the largest harvests of fish (Table 20). Harvest after the late 1980s in the Chena River declined sharply, although overall effort remained similar (Appendix C). The reduction in harvest likely coincided with the prohibition of bait on small hooks in the Chena River as part of a regulatory package to protect Arctic grayling. Given their wide distribution and low catch rate, whitefish are judged to be an underutilized resource at this time.

Although it has been felt in the past that there was very little targeted hook-and-line angling for whitefish in the LTMA and that most harvests and effort involved spear fisheries, estimated catches in many cases are higher than estimated harvests (Table 20). This may indicate that a substantial portion of the catch is caught incidentally while fishing for Arctic grayling with hook-and-line and is subsequently released.

Anglers are encouraged to fish for whitefish and to look for other stocks that might provide opportunity for fall spear fishing. Because of ongoing interest, it is possible that new spear fisheries may emerge on small stocks of whitefish in some of the clearwater tributaries of the Tanana River, and reported harvest levels should be watched in future years, especially from those streams that are easily accessible. To date there has been little success at developing spear fisheries on other stocks.

Whitefish are highly migratory. In the Tanana and Yukon rivers there are subsistence and personal use fisheries. There is little information available describing the relationship between whitefish stocks available and utilized by LTMA anglers, and those utilized within other fisheries. Research projects should be developed and implemented to delineate the life history patterns of Tanana River drainage whitefish.

LAKE TROUT

HARDING LAKE

Background and Historic Perspective

Nearly all sport fishing for lake trout in the LTMA occurs in Harding Lake. Although Harding Lake is closed to pike fishing, it does continue to support stocked lake trout and Arctic char fisheries (Table 23). The first documented introduction of lake trout consisted of 12 adult fish in 1939. Although there were plans to continue stocking lake trout through the 1940s, plans were put on hold during Alaska's involvement in WWII. In 1963, lake trout stockings resumed in Harding Lake with 252 adults released that year, and 265 adults in 1965. These lake trout came from wild populations in Boulder, Two-Bit, and Monte lakes in the Alaska Range (Doxey 1991).

In mid-winter of 1965, approximately 88,000 eyed lake trout eggs were lowered through the ice on Harding Lake in wire hatching baskets. These eggs had been collected from Susitna Lake and incubated to the eyed stage at the Fire Lake Hatchery. An estimated 75,000 eggs successfully hatched (Heckart and Roguski 1966). Fingerling lake trout were stocked in 1967 (31,200 fish) and again in 1990 (72,000 fish); subcatchables (~4 inches) were also stocked in 1990 (71,500 fish; Doxey 1991). From 1999 to 2001 approximately 4,000 catchable lake trout (~8 inches) were stocked each year (A. Behr, Stocked Waters Biologist, ADF&G, Fairbanks; personal communication).

The lake trout in Harding Lake are now naturally reproducing with an unknown degree of success. A total of 16 individuals ranging in age from 2 to 11 years old were captured during surveys conducted between 1981 and 1984. This was the first solid evidence that the Harding Lake stocked lake trout were reproducing (Doxey 1982). Since 1986 large lake trout that have been captured during lake surveys were released immediately, so few age samples were collected. In 1998, artificial spawning substrate was placed in Harding Lake to enhance lake trout spawning habitat (T. Viavant, Sport Fish Biologist, ADF&G, Fairbanks; personal communication). Fish were observed to be using the substrate, although it is unclear what the success rate has been.

Prior to 2001, the lake trout bag and possession limit on Harding Lake was 2 fish/day and the fish had to be >18 inches in length. That regulation was changed in 2001 to a bag and possession limit of 1 fish/day and the fish must be $\geq$ 26 inches in length.

Recent Fishery Performance

Harvest reports from 2007 and 2008 indicate a dramatic decrease in both harvest and catch since the minimum length limit change in April 2007. The 2007-2008 average harvest was 26 fish, with a catch of 184 fish. This compares to the previous 6-yr average of 71 fish harvested and 646 fish caught. The annual lake trout yield estimate from the Lake Area model for Harding Lake is 90 fish with the "new" 30-inch minimum size limit (J. Burr, ADF&G, Sport Fish Biologist, Fairbanks; personal communication), indicating that the regulation change made in 2007 may be able to maintain a sustainable lake trout fishery in Harding Lake.

Fishery Objectives and Management

Harding Lake is managed under the special management categories of the *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065) and the *Tanana River Area Wild Lake Trout Management Plan* (5 AAC 74.040).

Current Issues and Fishery Outlook

Prior to 2007, the lake trout fishery at Harding Lake appeared to be growing in popularity. This fishery should continue to be closely monitored to ensure its long term sustainability. The recent regulation changes appeared to have the intended effect of reducing the number of fish harvested and minimizing catch-and-release mortality.

At the 2010 BOF meeting the board will deliberate over **proposal 60** which will amend the gear regulations to allow a single hook with a "trailer" hook in Harding Lake. The author of this proposal suggests that a "trailer" hook will increase catching success but not result in additional lake trout mortality due to foul-hooked or snagged fish.

Recent Board of Fisheries Actions

At the 2007 BOF meeting the board deliberated over a proposal that sought to increase the minimum length limit from 26 to 36 inches for lake trout retained from Harding Lake. The board amended the minimum length limit to 30 inches and to change the gear restrictions in Harding Lake to allow only one single hook or one single-hook, artificial lure.

At the 2007 meeting the BOF also adopted the *Tanana River Area Wild Lake Trout Management Plan* (5 AAC 74.040). This plan provides regulatory guidelines to manage lake trout populations and provides the BOF with a consistent means to address proposals regarding lake trout submitted by the public and department.

Current or Recommended Research and Management Activities

In the future, an annual survey of spawners should be undertaken in September or early October to better assess the lake trout of Harding Lake.

OTHER LTMA LAKE TROUT FISHERIES

There are consistently small numbers of lake trout reported in some lakes in the LTMA. These fish are believed to be residual fish from past stocking events. Lake trout have not been stocked in the LTMA since 2001.

STOCKED WATERS

Background and Historic Perspective

The program of stocking hatchery produced fish to augment angling opportunity in Alaska began in 1952 when lakes along the road system near Fairbanks were stocked with rainbow trout and coho salmon. The first sport fish hatchery in Alaska (then the Territory of Alaska) was constructed at Birch Lake in 1952 and remained in operation until the 1960s. Subsequently hatcheries at Fire Lake, Ft. Richardson, Elmendorf AFB, Clear Air Force Station, and other locations supplied fish to LTMA waters. Presently the Ft. Richardson and Elmendorf hatcheries, located in Anchorage, are in operation and supply most of the stocked production for Interior Alaska. The Division of Sport Fish also operates a small “experimental” hatchery which is currently being used to test new technologies that may be applied in the new full scale Fairbanks Hatchery.

Some initial stocking events were "bucket-biology" experiments where fish were simply transported from one lake to another, often without good documentation. Stocking Alaska's waterways has changed over the years and now there are restrictive policies in place which outline criteria determining where fish can be stocked, what species may be stocked, and what brood stocks can be used. In addition, all potential brood source and hatchery raised fish must undergo pathology testing to ensure they are disease-free before being used as brood stock or outstocked into any water bodies.

At present a total of 54 lakes may be stocked in the LTMA. They range in size from Harding Lake at about 2,500 acres to small urban ponds less than 1 acre in surface area. Piledriver Slough is the only stream stocked with (sterile) rainbow trout. These stocked waters offer a range of fishing opportunities, including neighborhood urban ponds, large and small roadside lakes, remote lakes that are only trail-accessible and sometimes only in winter, and a few remote lakes only accessible by airplane. They function within the spectrum of fisheries management to provide diversify angling opportunities, shift pressure from wild stocks, and provide harvest alternatives. Diversity also provides a sustainable opportunity for winter fishing.

A variety of fish may be currently stocked in the LTMA, including rainbow trout, Arctic grayling, Arctic char, king, and coho salmon. These fish are produced at the Anchorage hatcheries, transported by truck to Fairbanks, and stocked in area lakes in the early summer and late fall. Occasionally, lakes are stocked in the winter.

Fish have been stocked at four sizes: 1) fingerling (2 grams); 2) subcatchables (20-60 grams); 3) catchables (100-200 grams); and 4) surplus broodstock (rainbow trout only, up to 1,500 grams). Size at stocking depends on management needs at a particular stocking location, lake characteristics (productivity, prone to winterkill, etc.), and hatchery production capability. For example, catchables are stocked in roadside and urban ponds because frequent angler use exceeds the pond’s ability to sustain the fishery with fingerling stockings. Conversely, fingerlings are stocked into remote lakes because those lakes have the ability to meet the lower demand, plus it is too expensive to transport larger fish with aircraft.

Recent Fishery Performance

Fishing the stocked waters of the LTMA is very popular because the bag and possession limits are typically very liberal (10 fish, only 1 fish 18 inches or larger) and most of the lakes/ponds are easily accessible. Approximately 64% of the recent 5-year average annual LTMA sport harvest comes from the stocked lakes in the area, although catch of stocked species has been in a steady decline since 2002 (Table 24).

Fishery Objectives and Management

In 2004, the BOF adopted the *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065) into regulation. This plan defines how ADF&G should meet the public demand for diverse fishing opportunities. The plan defines three management approaches: regional, conservative, and special. Special management lakes are managed to produce larger fish, although anglers may have a lower probability of catching those fish. Lakes in the LTMA that are in the special management category include: Harding, Little Harding and Summit (near Cantwell) lakes. Dune Lake is managed under the conservative management approach. All remaining lakes in the LTMA fall under the regional management approach.

The Region III general stocking plan, a component of the Statewide Stocking Plan, is annually updated by stocked waters staff. The stocking plan is a comprehensive list of the species, the life stage, the stocking frequencies, and the maximum numbers of fish that can be stocked for all lakes in the stocking program. The projected numbers of fish to be stocked annually for a 5-year period are also listed in this report. The 2009 Region III stocking plan may be accessed electronically via the ADF&G website.

Current Issues and Fishery Outlook

There are many issues currently facing the stocked waters program which fuel the need to replace the aging Anchorage facilities. These include reduction in size and numbers of catchable fish, whirling disease DNA detected at the Elmendorf Hatchery (limiting where fish reared here can be stocked), increased need to stock only triploid fish in lakes that may flood or pose risk when fish are illegally moved after stocking.

A separate issue, but one of high importance, is a lack of public access to many small ponds/gravel pits in the Fairbanks area. Without guaranteed public access ADF&G is unable to stock a water body and therefore an opportunity is lost for small neighborhood fisheries to develop.

At the 2010 BOF meeting the board will deliberate over **proposal 49** which will update the Tanana River area stocked waters list. This is a housekeeping action that is performed at each AYK BOF meeting due to new lakes being added and old lakes being removed from the list. Lakes are removed from the list if they are unable to sustain fish and/or public access is no longer allowed.

Recent Board of Fisheries Actions

At the 2007 BOF meeting the board approved the updated stocked waters list.

Current or Recommended Research and Management Activities

The two Anchorage hatcheries (Ft. Richardson and Elmendorf AFB) are no longer producing as many fish as they once did due to changes to their boiler systems. These changes resulted in less hot water, which is necessary for accelerating the fish growth rates. In 2005, the Alaska Legislature approved the construction of new hatcheries in both Fairbanks and Anchorage to replace the outdated Anchorage facilities. Funding was been secured and above ground construction on the Fairbanks facility began in 2008. Once the Fairbanks hatchery becomes operational, the biomass of fish stocked in the LTMA is predicted to double.

ACKNOWLEDGMENTS

The authors would like to thank Tim Viavant and Tom Taube for editing a draft of this report and Rachael Kvapil for her assistance with formatting and preparing the final report. Yukon River Division of Commercial Fisheries staff members were helpful in providing harvest information from the commercial, personal use and subsistence fisheries. Final thanks go to all the Region III biologists and technicians who work tirelessly to pull off difficult field projects with only minimal acknowledgements of their efforts.

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TABLES AND FIGURES

Table 1.–Number of angler–days of sport fishing effort expended by recreational anglers fishing statewide freshwater and LTMA waters, 1990–2008.

	Number of Days Fished				
Year	Statewide	Region III	LTMA	LTMA % of Statewide	LTMA % of Region III
1990	2,453,284	245,629	129,910	5%	53%
1991	2,456,328	219,922	106,604	4%	48%
1992	2,540,374	181,852	81,378	3%	45%
1993	2,559,408	220,972	103,713	4%	47%
1994	2,719,911	239,626	99,906	4%	42%
1995	2,787,670	270,141	141,231	5%	52%
1996	2,006,528	201,166	159,027	8%	79%
1997	2,079,514	238,856	89,911	4%	38%
1998	1,856,976	227,841	81,789	4%	36%
1999	2,499,152	304,522	114,592	5%	38%
2000	2,627,805	241,574	87,451	3%	36%
2001	2,261,941	194,138	63,702	3%	33%
2002	2,259,091	220,276	78,499	3%	36%
2003	2,219,398	206,705	71,052	3%	34%
2004	2,473,961	217,041	90,530	4%	42%
2005	2,463,929	183,535	64,891	3%	35%
2006	2,297,961	175,274	53,406	2%	30%
2007	2,543,674	204,032	70,517	3%	35%
2008	2,315,601	183,084	52,990	2%	29%
10-Yr Average 1998–2007	2,350,389	217,494	77,643	3%	35%
5-Yr Average 2003–2007	2,399,785	197,317	70,079	3%	35%
2008 as % of 5-Yr Average	96%	93%	76%	78%	82%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

Table 2.–Total number of fish harvested by recreational anglers from LTMA waters, compared to Region III and the Statewide Freshwater Harvest, 1990–2008.

Year	Statewide F/W Harvest	Region III Harvest	LTMA Harvest	LTMA Harvest as a % of Statewide Harvest	LTMA Harvest as a % of Region III Harvest
1990	1,185,603	174,175	75,186	6%	43%
1991	1,282,541	221,164	83,237	6%	38%
1992	1,213,618	131,486	47,466	4%	36%
1993	1,087,651	151,551	63,490	6%	42%
1994	1,063,871	152,676	52,501	5%	34%
1995	852,700	118,473	59,741	7%	50%
1996	1,073,281	156,333	58,414	5%	37%
1997	942,274	161,500	45,676	5%	28%
1998	976,926	165,771	37,789	4%	23%
1999	1,078,643	169,675	45,216	4%	27%
2000	1,218,307	174,144	49,783	4%	29%
2001	1,043,036	119,797	26,587	3%	22%
2002	1,109,901	164,463	67,326	6%	41%
2003	1,052,301	129,029	39,058	4%	30%
2004	1,185,153	140,292	40,694	3%	29%
2005	994,001	109,956	27,342	3%	25%
2006	885,912	106,851	21,347	2%	20%
2007	954,028	114,366	23,844	2%	21%
2008	931,248	105,709	19,809	2%	19%
10-Yr Average 1998–2007	1,049,821	139,434	37,899	4%	27%
5-Yr Average 2003–2007	1,014,279	120,099	30,457	3%	25%
2008 as % of 5 Yr Average	92%	88%	65%	72%	75%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

Table 3.–Abundance estimates and methods of estimation for king salmon in the Chena, Salcha, and Chatanika rivers, 1986–2009.

Year	Chena		Salcha		Chatanika	
	Abundance	Method[a]	Abundance	Method[a]	Abundance	Method[a]
1986	9,065	M-R	ND	ND	ND	ND
1987	6,404	M-R	4,771	M-R	ND	ND
1988	3,346	M-R	4,562	M-R	ND	ND
1989	2,666	M-R	3,294	M-R	ND	ND
1990	5,603	M-R	10,728	M-R	ND	ND
1991	3,025	M-R	5,608	M-R	ND	ND
1992	5,230	M-R	7,862	M-R	ND	ND
1993	12,241	Tower	10,007	Tower	253	Boat Survey
1994	11,877	Tower	18,399	Tower	ND	ND
1995	9,680	M-R	13,643	Tower	444	Boat Survey
1996	7,153	M-R	7,570	M-R	198	Boat Survey
1997	13,390	Tower	18,514	Tower	3,809	M-R
1998	4,745	Tower	5,027	Tower	864	Tower
1999	6,485	Tower	9,198	Tower	503	Tower
2000	4,694	M-R	4,595	Tower	398	Tower
2001	9,696	Tower	13,328	Tower	964	Tower
2002	6,967	M-R	4,644[b]	Tower	719	Tower
2003	8,739[c]	Tower	11,758[d]	Tower	1,008	Tower
2004	9,645	Tower	15,761	Tower	2,444	Tower
2005	no estimate[e]	Tower	5,988	Tower	o estimate[e]	Tower
2006[f]	2,936	Tower	10,400	Tower	ND	ND
2007[f]	3,564	Tower	5,631[b]	Tower	ND	ND
2008[f]	3,212	Tower	5,300[b]	Tower	ND	ND
2009[f]	5,253	Tower	12,788	Tower	ND	ND
BEG Range	2,800–5,700		3,300–6,500		No escapement goal	
10-Yr Average 1999–2008	6,217		8,668			
5-Yr Average 2004–2008	4,842		8,632			
2009 as % 5 Yr Average	108%		148%			

Source: Barton (1987 and 1988); Barton and Conrad (1989); Burkholder (1991b); Evenson (1991–1993; 1995–1996); Evenson and Stuby (1997); Skaugstad (1988, 1989, 1990a, 1990b, 1992, 1993, and 1994); Stuby and Evenson (1998); Stuby (1999, 2000, 2001); Doxey (2004); Doxey et al. (2005); Brase and Doxey (2006), Brase *In prep a*, Savereide (*In prep a–c*)

[a] M–R = Mark Recapture experiment.

[b] Should be considered a minimum count due to high and/or turbid water conditions.

[c] Likely 11,100 king salmon when expanded for non–counting days.

[d] Likely 15,500 king salmon when expanded for non–counting days.

[e] No estimates were produced due to extreme high water events throughout run. Chena River king salmon escapement was likely within the BEG range of 2,800–5,700 fish.

[f] Preliminary results.

Table 4.–Sport catch and harvest of king salmon in the Chena, Salcha, and Chatanika rivers, 1990–2008.

	Chena River		Salcha River		Chatanika River	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	64	406	291	680	37	164
1991	110	258	373	515	82	181
1992	55	71	47	86	16	31
1993	733	2,545	601	1,788	192	625
1994	993	1,308	714	971	105	278
1995	662	1,095	1,448	4,091	58	134
1996	1,280	3,692	1,136	3,298	548	1,331
1997	1,039	3,186	719	2,639	175	336
1998	299	779	121	549	6	30
1999	442	2,004	445	1,237	63	63
2000	71	222	72	197	0	0
2001	536	1,579	108	707	23	55
2002	178	1,920	269	1,157	0	86
2003	976	3,012	1,127	3,752	13	13
2004	762	4,571	481	1,514	37	168
2005	57	503	351	582	0	12
2006	265	1,208	317	747	0	0
2007	78	824	471	1,575	0	0
2008	150	530	74	299	30	86
10-Yr Average 1998–2007	366	1,662	376	1,202	14	43
5-Yr Average 2003–2007	428	2,024	549	1,634	10	39
2008 as % 5–Year Average	35%	26%	13%	18%	300%	223%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

Table 5.–Number of salmon commercially harvested in the Yukon and Tanana rivers, 1995–2009.

	Total Yukon River (includes Tanana)				Tanana River Portion			
Year	King	Summer Chum	Fall Chum	Coho	King	Summer Chum	Fall Chum	Coho
1995	126,204	824,487	284,178	47,206	2,747	37,428	74,117	6,900
1996	91,890	689,542	107,347	57,710	447	46,890	17,574	7,142
1997	116,421	230,842	59,054	35,818	2,728	25,287	0	0
1998	44,625	31,817	0	1	963	570	0	0
1999	70,767	29,412	20,371	1,601	690	148	0	0
2000	9,115	7,272	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0
2002	24,880	13,785	0	0	1,066	3,218	0	0
2003	40,664	10,685	10,996	25,243	1,813	4,461	4,095	15,119
2004	56,168	26,410	3,729	19,993	2,057	6,610	3,450	18,649
2005	31,952	41,398	178,987	58,349	453	8,986	49,478	21,831
2006	46,829	92,116	174,542	64,942	84	44,621	23,353	11,137
2007	33,348	198,201	90,677	44,575	281	14,674	15,572	1,368
2008	4,641	151,786	119,386	36,460	0	1,842	5,856	3,177
2009 [a]	216	162,495	23,983	7,569	0	7,768	1,286	457

Source: JTC 2009; D. Norris, Division of Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication.

[a] Data are preliminary (as of 10/09)

Table 6.–Number of salmon harvested in subsistence and personal use fisheries in the Yukon and Tanana rivers, 1995–2008.

	Total Yukon River (includes Tanana)				Tanana River Portion			
Year	King	Summer Chum	Fall Chum	Coho	King	Summer Chum	Fall Chum	Coho
1995	48,934	119,503	131,369	28,642	2,178	12,441	50,031	19,219
1996	43,521	103,408	129,222	30,510	1,392	8,391	36,832	15,091
1997	56,291	97,500	95,425	24,295	3,025	4,215	19,834	11,945
1998	54,090	86,088	62,869	17,781	2,276	6,088	14,372	7,481
1999	52,525	70,705	89,998	20,970	1,955	3,036	15,733	9,547
2000	35,916	64,925	19,307	14,717	1,058	1,141	311	5,150
2001	53,059	58,385	35,154	21,654	2,449	558	3,536	9,000
2002	42,746	72,435	19,393	15,261	1,193	687	3,205	9,519
2003	55,313	68,452	57,178	24,129	2,349	3,062	13,380	10,912
2004	53,876	69,903	62,436	20,965	1,589	2,024	9,183	11,817
2005	53,547	93,411	91,667	27,357	1,966	2,166	23,079	19,645
2006[a]	48,682	115,355	84,320	19,985	1,318	1,272	17,258	10,850
2007[a]	55,292	93,075	99,120	21,374	1,853	2,080	30,066	7,341
2008[a]	45,312	86,652	89,538	16,905	731	1,449	16,316	8,478

Source: JTC 2009; D. Norris, Division of Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication.

[a] Data are preliminary (as of 11/09).

Table 7.–Coho salmon escapement estimates from the Nenana River drainage, 1993–2009.

Surveyed Stream	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Lost Slough	484	944	4,169	2,040	1,524	1,360	1,002	55[a]	242	0	85	220	430	194	no survey	1,342	410
Teklanika River	419	1,648	2,218	2,171	1,446	2,771	745	66[a]	855	328	658	450	325[b]	160[b]	no survey	1,539[c]	no survey
Otter Creek	581	2,909	2,972	3,666	1,996	1,413	662	879	3,741	1,910	4,535	3,370	3,890	1,916	no survey	1,652	680
Julius Creek				5	0	0	no survey	370	6	15	1	280	280	0	no survey	0	2
*Wood Creek	666	1,317	500	201	0	0	0	0[d]	699	935	3,055	840	1,030	634	no survey	578	470
*Clear Creek				2,830	2,200	30	no survey	385[e]	962	160[e]	884	140[e]	35[e]	972	no survey	292	0[d]
*Glacier Creek				2,181	1,464	345	no survey	100[e]	216	42[e]	62[e]	90[e]	70[e]	14[e]	no survey	0[d]	0[d]
Lignite Creek				282		175	no survey	95	135	130	67	91	378	168	no survey	343	113
June Creek				0	51	25	no survey	120	148	95	74[c]	85[c]	201[c]	66[d]	no survey	42[c]	18
Total	2,150	6,818	9,859	13,376	8,681	6,119	2,409	1,970	7,004	3,615	9,421	5,555	6,639	4,124	ND	5,788	1,693

Source: US/Canada Yukon River Panel Joint Technical Committee (JTC 2009), C. Stark, Biologist, BSFA, Fairbanks; personal communication.

[a] High, muddy water; poor visibility.

[b] Silty; poor visibility.

[c] Incomplete survey (access to private property issue).

[d] Beaver dam blocking stream mouth.

[e] Numerous beaver dams; stream out of bank in places; fair visibility.

*Tributaries to Julius Creek.

Table 8.–Sport catch and harvest of coho salmon in the LTMA, 1990–2008.

Year	Nenana River Drainage		Other Rivers		Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	261	664	8	24	269	688
1991	222	1,679	221	221	443	1,900
1992	89	583	109	177	198	760
1993	0	0	29	291	29	291
1994	440	720	99	226	539	946
1995	77	114	516	1,016	593	1,130
1996	149	775	199	1,186	348	1,961
1997	179	767	163	497	342	1,264
1998	119	422	6	128	125	550
1999	33	142	100	109	133	251
2000	6	124	34	323	40	447
2001	118	739	62	153	180	892
2002	24	98	0	120	24	218
2003	11	461	0	172	11	633
2004	78	1,046	106	360	184	1,406
2005	0	0	0	14	0	14
2006	37	97	0	251	37	348
2007	0	15	7	22	7	37
2008	86	298	10	800	96	1,098
10-Yr Average 1998–2007	43	314	32	165	74	480
5-Yr Average 2003–2007	25	324	23	164	48	488
2008 as % of 5-Yr Average	341%	92%	44%	488%	201%	225%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

Table 9.–Estimated abundance of Arctic grayling by size (stock size (150–269 mm FL) vs. quality and larger (≥270 mm FL)) and by river section of the Chena River, 1985–1998, 2005.

	Lower River (below RM 45)				Upper River (RM 45–90)					
Year	150–269mm	SE	≥270mm	SE	150–269mm	SE	≥270mm	SE	Total Abundance[a]	SE
1985	ND		ND		ND		ND		112,391	ND
1986	ND		ND		ND		ND		61,581	26,987
1987	ND		ND		ND		ND		31,502	3,500
1988	ND		ND		ND		ND		22,204	2,092
1989	ND		ND		ND		ND		19,028	1,542
1990	ND		ND		ND		ND		31,815	4,880
1991	5,100	561	1,426	188	14,513	2,328	5,717	846	26,756	2,547
1992	9,394	1,108	1,921	338	13,495	1,570	4,538	647	29,348	2,055
1993	10,514	1,492	1,533	311	20,694	3,627	6,877	1,486	39,618	4,289
1994	14,200	1,085	2,335	274	21,239	3,350	6,601	1,228	44,375	2,647
1995	14,150	1,450	2,059	294	21,660	3,209	7,276	1,292	45,145	3,852
1996	11,863	962	2,780	245	15,611	2,970	11,209	1,229	41,463	3,363
1997[b]	10,205	2,348	2,044	374	ND	ND	9,458	1,688	≥21,707[c]	2,916
1998[b]	7,212	1,520	1,804	427	6,028	1,161	12,519	2,051	27,563	2,459
2005	5,541	–[d]	2,190	268	14,764	–[d]	5,203	543	27,698	3,661
Management Objectives			2,200				8,500			

Source: Holmes et al. (1986); Clark and Ridder (1987, 1988a); Clark (1989, 1990, 1991, 1993, 1994, 1995, 1996); Ridder and Fleming (1997); Ridder (1998, 1999); and Wuttig and Stroka (2007).

[a] Total abundance is for fish ≥ 150 mm FL unless otherwise indicated.

[b] One boat used to fish the upper section.

[c] Abundance estimate does not include fish 150 to 239 mm FL for the upper section.

[d] In 2005 standard errors were not calculated for Arctic grayling 150 – 269mm.

Table 10.–Sport catch and harvest of Arctic grayling in the LTMA, 1990–2008.

	Chena River		Piledriver Slough		Salcha River		Chatanika River		Nenana River Drainage[a]		Total LTMA[b]	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	4,507	32,831	2,380	38,480	1,992	8,609	4,237	17,960	1,064	5,114	17,732	122,342
1991	3,719	29,548	3,987	20,815	1,688	4,697	2,642	12,830	2,079	5,419	18,503	98,562
1992	0	21,196	1,030	15,252	1,592	8,265	1,751	11,750	1,368	6,109	8,275	78,820
1993	0	44,033	759	32,036	1,768	11,254	2,001	14,283	907	7,137	11,377	127,383
1994	114	60,539	57	31,324	2,308	9,995	2,659	24,750	1,834	8,357	11,826	171,968
1995	212	39,816	0	17,431	2,685	12,173	2,108	15,859	1,170	7,288	13,217	108,325
1996	0	50,083	0	16,667	2,371	10,327	420	11,928	628	6,146	5,073	123,971
1997	0	98,628	0	24,585	2,959	27,307	1,550	24,484	1,881	7,248	8,598	204,338
1998	0	87,243	0	24,203	2,179	18,829	915	14,384	483	9,468	5,914	179,855
1999	0	86,220	0	19,571	1,524	13,932	1,462	13,851	383	1,868	6,729	157,762
2000	0	43,844	0	7,224	1,544	7,200	773	9,204	297	638	4,829	92,462
2001	0	35,881	0	4,927	602	5,831	317	3,002	142	2,146	2,692	71,227
2002	0	51,065	32	8,199	1,287	7,532	1,357	15,313	982	7,113	11,101	119,845
2003	0	36,098	0	6,037	1,225	6,756	955	13,178	697	4,425	5,416	88,242
2004	0	55,376	0	4,789	1,501	7,355	583	8,729	716	6,197	4,144	99,851
2005	0	31,026	0	3,962	806	6,525	607	9,326	1,619	4,487	5,397	74,070
2006	0	26,322	0	2,972	703	2,391	644	7,885	464	2,110	3,381	53,042
2007	0	45,673	0	3,316	1,365	11,759	461	10,394	577	3,120	2,972	80,153
2008	0	28,909	0	5,030	576	4,531	989	11,229	928	10,159	3,677	66,900
10-Yr Average 1998–2007	0	49,875	3	8,520	1,274	8,811	807	10,527	636	4,157	5,258	101,651
5-Yr Average 2003–2007	0	38,899	0	4,215	1,120	6,957	650	9,902	815	4,068	4,262	79,072
2008 as % of 5-Yr Average	-	74%	-	119%	51%	65%	152%	113%	114%	250%	86%	85%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

[a] Includes Brushkana Creek.

[b] The total LTMA Arctic grayling harvest and catch includes stocked Arctic grayling, and other waters not specifically listed.

Table 11.–Abundance estimates of Arctic grayling (N) for the 38.6 km Lower Salcha River (bridge to river kilometer 40) during mid-to-late June, 1988–1994, 2004.

Year	N (SE)	Size (mm FL)	Date	N (SE) [b]	Size (mm FL)
1988[a]	2,181 (542)	≥150	May 24–June 8	1,182	≥270
1989	6,935 (766)	≥150	June 12–20	2,081	≥270
1990	5,792 (659)	≥150	June 19–27	1,564	≥270
1991	4,182 (907)	≥200	June 18–July 2	1,756	≥270
1992	7,076 (2,555)	≥200	June 15–25	2,235	≥270
1993	15,950 (2,442)	≥150	June 7–17	3,031	≥270
1994	14,562 (1,762)	≥150	June 13–30	2,767	≥270
2004[c]	–	–	June 29–July 15	2,042 (434)	≥270

Source: Clark and Ridder (1987, 1988b, 1990); Clark et al. (1991); Ridder et al. (1993); Roach (1994, 1995); and Gryska (*In prep*).

[a] Sample section in 1988 was 16 km long.

[b] Standard Errors (SE) for fish ≥ 270mm could not be calculated for the 1988–1994 estimates (Roach 1995).

[c] Preliminary results.

Table 12.–Densities of Arctic grayling in select sections of the Chatanika River, 1972, 1981, 1984–1985, 1990–1994.

Year	Sampling Area	Grayling Density	Confidence[a]
1972	The two miles downriver of the Elliott Hwy Bridge	305 fish/ km	Low
1981	The two miles downriver of the Elliott Hwy Bridge	169 fish/ km	132–197 fish/ km
1984	The two miles downriver of the Elliott Hwy Bridge	242 fish/ km	172–352 fish/ km
1985	The two miles downriver of the Elliott Hwy Bridge	117 fish/ km	82–176 fish/ km
1990	28.8 km section from 7.5 km above the Elliott Hwy Bridge downstream to Any Creek	670 fish/ km	SE = 111 fish/ km
1991	35.2 km section from 9.6 km above the Elliott Hwy Bridge downstream to Any Creek	312 fish/ km	SE = 62 fish/ km
	73.8 km section from Any Creek to Murphy Dome Rd extension	271 fish/ km	SE = 52 fish/ km
1992	29.6 km section from 3.2 km above the Elliott Hwy Bridge downstream to Any Creek	271 fish/ km	SE = 47 fish/ km
	73.8 km section from Any Creek to Murphy Dome Rd extension	158 fish/ km	SE = 17 fish/ km
1993	29.6 km section from 3.2 km above the Elliott Hwy Bridge downstream to Any Creek	252 fish/ km	SE = 41 fish/ km
	50 km section from Any Creek to 16 km above Murphy Dome Rd extension	89 fish/ km	SE = 9 fish/ km
1994	29.6 km section from 3.2 km above the Elliott Hwy Bridge downstream to Any Creek	201 fish/ km	SE = 28 fish/ km

Source: Tack (1973), Holmes (1983, 1985), Holmes et al. (1986), Clark et al. (1991), Fleming et al. (1992), Ridder et al. (1993), Roach (1994, 1995), Fish (1996), Wuttig (2004).

[a] Confidence is provided as a crude measure of precision (i.e., "Low"), the 95% confidence interval based on a Poisson distribution of recaptures (Ricker 1975) or the standard error.

Table 13.–Abundance of select size classes of Arctic grayling in a 29.6 km section of the Chatanika River from 3.2 km above the Elliott Hwy Bridge downstream to the mouth of Any Creek, 1995, 2002, 2007.

Year	Sampling Method	>250 mm	SE	>270mm	SE	>330 mm	SE
1995	electrofish	–	–	3,027	–	267	–
2002	hook & line	–	–	205	36	124	–
2007	electrofish	–	–	2,132	526	407	172
	hook & line	1,026	190	–	–	363	82

Source: A. Gryska, Division of Sport Fish Biologist, ADF&G Fairbanks; personal communication.

Table 14.–Sport harvest and catch of northern pike in Minto Flats, the entire Minto Flats Complex (includes Minto Flats and Lower Chatanika River), and the overall LTMA, 1990–2008.

	Minto Flats		Minto Flats Complex[a]		LTMA Total	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	1,570	4,946	2,009	6,060	5,414	23,964
1991	2,155	5,427	2,586	6,111	9,426	23,037
1992	1,299	6,175	1,325	6,585	4,200	24,477
1993	2,076	19,536	3,420	24,378	7,743	41,809
1994	8,438	47,248	9,489	52,191	13,200	76,372
1995	3,126	21,823	4,480	29,193	10,581	43,578
1996	2,078	12,495	2,716	16,479	4,890	34,867
1997	1,074	9,932	1,246	11,253	2,320	19,816
1998	731	4,105	772	4,704	2,003	12,964
1999	908	3,261	1,098	3,636	2,013	10,641
2000	266	1,402	390	1,784	2,793	13,585
2001	641	2,849	654	2,916	3,296	13,117
2002	483	8,806	650	10,085	3,043	19,646
2003	1,260	8,706	1,284	12,997	2,033	20,150
2004	1,199	19,205	1,390	21,159	4,259	31,172
2005	1,880	14,839	2,052	16,768	3,319	26,171
2006	935	7,284	1,204	8,447	2,688	14,262
2007	1,712	11,346	1,809	14,077	2,619	22,146
2008	258	2,926	374	3,796	888	8,420
10-Yr Average 1998–2007	1,002	8,180	1,130	9,657	2,807	18,385
5-Yr Average 2003–2007	1,397	12,276	1,548	14,690	2,984	22,780
2008 as % of 5-Yr Average	18%	24%	24%	26%	30%	37%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

[a] Includes Minto Flats, Tolovana River and the Lower Chatanika River.

Table 15.–Estimated northern pike abundance in the Minto Lakes Study Area, 1987-1988, 1990-1991, 1996-1997, 2000, 2003, 2008.

	≥ 400mm		≥ 525 mm		≥ 600mm	
Year	Abundance	SE	Abundance	SE	Abundance	SE
1987	–	–	11,257	3,075	–	–
1988	–	–	13,233	3,143	–	–
1990	–	–	27,418	6,800	–	–
1991	–	–	17,633	5,480	–	–
1996	23,850	7,799	20,695	6,765	7,616	883
1997	16,547	1,754	14,639	1,552	3,251	174
2000	–	–	–	–	5,331	1,152
2003	25,227	4,529	13,900	2,918	7,683	2,347
2008	9,854	1,701	–	–	2,092	448

Source: Burkholder (1989, 1990); Hansen and Burkholder (1992); Roach (1997b, 1998b); Scanlon (2001, 2006), and Joy (*In prep*).

Table 16.– Numbers of subsistence permits issued, returned and reported fished and the total subsistence harvest of northern pike in the Tolovana River drainage, 1994–2009.

Year	Issued	Permits Returned	Fished	Total Harvest
1994	47	46	24	995
1995	55	52	20	1,023
1996	70	61	24	1,616
1997	86	73	40	1,333
1998	69	65	32	431
1999	54	50	24	400
2000	34	29	13	352
2001	49	43	19	214
2002	32	31	13	521
2003	119	105	57	966
2004	98	90	42	393
2005	79	69	32	374
2006	101	97	56	788
2007	118	109	54	1,837
2008	146	136	79	1,339
2009[a]	104	10	2	266
5-Yr Average (2004–2008)	108	100	52	949
2009 as % 5-Yr Average	96%	10%	4%	28%

Source: D. Norris, Division of Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication.

[a] Data are preliminary (as of 10/09).

Table 17.–Abundance of northern pike ≥ 300 mm fork length (SE in parentheses), sport harvest and catch of pike and water levels at Harding Lake, 1990–2008.

Year	Estimated Abundance	Water Level (ft ASL)[a]	Harvest	Catch
1990	2,285 (430)	717.8	591	3,629
1991	2,308 (563)	717.8	1,888	5,071
1992	2,868 (353)	717.8	341	3,400
1993	3,765 (432)	717.0	391	8,471
1994		716.5	539	5,559
1995	2,338 (411)	716.5	502	3,852
1996	3,377 (915)	717.0	363	4,070
1997	1,780 (355)	716.5	62	1,665
1998	1,376 (279)	716.0	139	1,425
1999	583 (76)	715.8	38	828
2000		715.6	24[b]	396
2001		715.8	Fishery closed	
2002		715.6	Fishery closed	
2003		715.5	Fishery closed	
2004		715.3	Fishery closed	
2005		715.0	Fishery closed	
2006		715.0	Fishery closed	
2007		ND	Fishery closed	
2008		ND	Fishery closed	
2009		ND	Fishery closed	
	Average 1990–1999 (prior to pike closure)		486	3,797

Source: Abundance data–Burkholder (1991a); Skaugstad and Burkholder (1992); Pearse (1994); Roach (1996 1997a, 1998a); Roach and McIntyre (1999); and, Scanlon and Roach (2000). Catch and harvest data –Mills (1986–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. 2003).

[a] Lake water levels were estimated from engineering surveys, photographs and anecdotal evidence.

[b] Fishery was closed in the summer, so harvest was attributed to the winter fishery.

Table 18.–Catch–age estimates of total and exploitable abundances, with coefficient of variations (CV), of Tanana River burbot, 1987–1998.

Year	Total Abundance [a]	CV	Total Exploitable Abundance [b]	CV
1987	281,255	0.155	77,877	0.168
1988	262,542	0.161	74,591	0.167
1989	242,706	0.170	73,246	0.163
1990	226,347	0.175	70,345	0.162
1991	198,666	0.178	67,714	0.164
1992	157,388	0.177	62,774	0.163
1993	153,969	0.206	56,227	0.173
1994	148,921	0.239	48,976	0.179
1995	176,044	0.308	43,420	0.194
1996	273,975	0.430	41,514	0.213
1997	402,186	0.489	52,168	0.244
1998	578,153	0.563	69,024	0.282

Source: Evenson (1988, 1994) and Stuby and Evenson (1999).

[a] Total abundance is defined as the number of fish at large prior to harvest, without consideration of the gear selectivity adjustment.

[b] Total exploitable abundance is the number of fish that are potentially vulnerable to the fishery (a portion of 5, 6, 7, and 8 year old fish plus all fish 9 years or older).

Table 19.–Sport catch and harvest of burbot in the LTMA, 1990–2008.

	Tanana River		Chena River		Other[a]		Total LTMA	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	838	961	304	338	1,065	1,402	2,207	2,701
1991	683	857	225	609	415	454	1,323	1,920
1992	981	1,323	1,032	1,235	355	406	2,368	2,964
1993	1,635	1,814	1,135	1,328	777	1,022	3,547	4,164
1994	1,626	2,063	592	685	333	406	2,551	3,154
1995	1,684	2,120	597	1,045	655	948	2,936	4,113
1996	537	818	441	540	400	577	1,378	1,935
1997	2,437	3,032	703	1,018	684	885	3,824	4,935
1998	876	1,262	854	1,144	358	426	2,088	2,832
1999	1,328	1,521	350	657	371	1,017	2,049	3,195
2000	936	1,442	702	1,236	394	634	2,032	3,312
2001	508	919	230	281	21	65	759	1,265
2002	1,283	1,632	58	83	1,446	1,656	2,787	3,371
2003	758	1,092	487	573	127	186	1,372	1,851
2004	1,228	1,616	1,433	1,977	110	150	2,771	3,743
2005	1,129	1,420	248	310	89	126	1,466	1,856
2006	592	1,162	311	539	402	402	1,305	2,103
2007	875	965	960	1,290	325	368	2,160	2,623
2008	711	883	202	227	107	120	1,020	1,230
10-Yr Average 1998–2007	951	1,303	563	809	364	503	1,879	2,615
5-Yr Average 2003–2007	916	1,251	688	938	211	246	1,815	2,435
2008 as % 5-Yr Average	78%	71%	29%	24%	51%	49%	56%	51%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

[a] Other includes: Harding Lake, Chatanika River, Piledriver Slough, Nenana River, Minto Flats, and other systems where sport anglers occasionally catch and/or harvest small numbers of burbot.

Table 20.–Sport harvest and catch of whitefish in the LTMA, 1990–2008.

Year	Chatanika River		Chena River		Tanana River		LTMA Lakes		LTMA Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	5,216	5,334	85	236	0	169	203	1,098	6,299	8,014
1991	0	23	0	0	0	0	0	0	356	551
1992	2,033	2,033	129	212	368	387	0	0	2,810	3,140
1993	558	558	96	148	0	47	0	52	722	948
1994	97	436	0	194	29	117	0	53	242	1,677
1995	9	71	155	436	18	36	147	147	578	1,187
1996	46	320	18	150	0	0	0	0	149	660
1997	24	95	325	425	68	68	14	379	773	1,404
1998	0	60	83	425	20	20	342	376	490	1,115
1999	0	14	41	311	7	7	37	174	219	976
2000	0	361	59	176	0	0	49	66	313	847
2001	0	245	91	402	95	95	0	93	221	883
2002	28	181	63	126	0	28	442	442	936	1,247
2003	152	607	15	91	0	0	0	43	167	741
2004	45	196	271	286	0	0	225	330	1,244	1,515
2005	0	16	0	59	38	38	16	46	54	227
2006	63	63	41	64	78	136	23	210	195	533
2007	38	90	55	182	92	135	0	46	185	452
2008	71	102	92	854	24	48	0	80	207	1,244
10-Yr Average 1998–2007	33	183	74	212	32	46	113	183	402	854
5-Yr Average 2003–2007	60	194	79	136	39	62	53	135	369	694
2008 as % 5-Yr Average	119%	52%	116%	626%	62%	78%	0%	59%	56%	179%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

Table 21.–Humpback whitefish and least cisco abundance estimates from the Chatanika River, 1988–1997, 2008.

Year	Humpback Whitefish	Least Cisco
1988	41,211 (SE = 5,155)	ND
1989	17,322 (SE = 1,655)	53,409 (SE = 5,110)
1990	No Survey	
1991[a]	15,313 (SE = 2,078)	135,065 (SE = 24,513)
1992	19,187 (SE = 1,617)	75,035 (SE = 8,555)
1993	13,112 (SE = 1,096)	46,562 (SE = 5,971)
1994	12,700 (SE = 1,138)	27,639 (SE = 3,211)
1995	No Survey	
1996	No Survey	
1997	16,107 (SE = 1,260)	22,811 (SE = 4,496)
1998–2007	No Survey	
2008	22,490 (SE = 2,777)	15,345 (SE = 1,350)[b]

Source: Hallberg (1989); Timmons (1990, 1991); Fleming (1993, 1994, 1996, 1997); Wuttig (2009).

[a] Estimates are for humpback whitefish > 359 mm FL, and least cisco > 289 mm FL.

[b] Estimates for least cisco ≥ 250 mm FL.

Table 22.–Chatanika River Personal Use Whitefish Spear Fishery Permit Results, 2007–2009.

Year	Permits		Number of Households that Fished	Total Fish Harvested	Average Harvest/ Permit
	Issued	Returned			
2007	100	97	52	267	5.1
2008	200	191	92	522	5.7
2009[a]	200	125	94	591	6.3

[a] Results as of 12/3/09.

Table 23.–Sport harvest and catch of lake trout in Harding Lake, 1990–2008.

Year	Lake Trout Harvest	Lake Trout Catch
1990	51	186
1991	133	148
1992	200	517
1993	132	438
1994	66	280
1995	177	258
1996	121	556
1997	90	462
1998	44	311
1999	89	807
2000	67	258
2001	44	435
2002	48	597
2003	41	518
2004	72	479
2005	48	707
2006	171	1,140
2007	28	263
2008	23	104
1993–2000 Average (18" min size reg)	98	421
2001–2006 Average (26" min size reg)	71	646
2007–2008 Average (30" min size reg)	26	184

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

Table 24.–Contribution of stocked fish to the LTMA total harvest and catch, 1990– 2008.

Year	All Stocked Species		LTMA Total		Stocked as a % of LTMA Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	43,414	113,918	75,185	269,361	58%	42%
1991	52,888	106,938	83,237	229,970	64%	47%
1992	29,374	85,757	47,467	192,594	62%	45%
1993	38,390	110,630	63,490	282,500	60%	39%
1994	24,465	87,408	52,501	325,269	47%	27%
1995	24,754	84,382	59,741	239,737	41%	35%
1996	42,036	147,958	58,414	316,837	72%	47%
1997	27,840	97,095	45,677	327,712	61%	30%
1998	27,741	101,743	37,789	287,586	73%	35%
1999	34,186	107,840	45,216	276,123	76%	39%
2000	39,778	134,650	49,783	235,455	80%	57%
2001	19,245	63,634	26,580	147,597	72%	43%
2002	53,880	124,509	67,326	259,165	80%	48%
2003	25,414	89,559	39,058	196,310	65%	46%
2004	26,873	84,661	40,696	222,205	66%	38%
2005	16,567	55,427	27,342	151,369	61%	37%
2006	13,506	54,748	21,348	118,245	63%	46%
2007	15,508	53,193	23,844	156,976	65%	34%
2008	13,631	47,406	19,810	120,486	69%	39%
10-Yr Average: 1998–2007	27,270	86,996	37,898	205,103	70%	42%
5-Yr Average: 2003–2007	19,574	67,518	30,458	169,021	64%	40%
2008 as a % of 5-Year Average	70%	70%	65%	71%	108%	98%

Source: A. Behr, Stocked Waters Biologist, ADF&G, Fairbanks; personal communication; Catch and harvest data: *Source*: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prepa–b*).

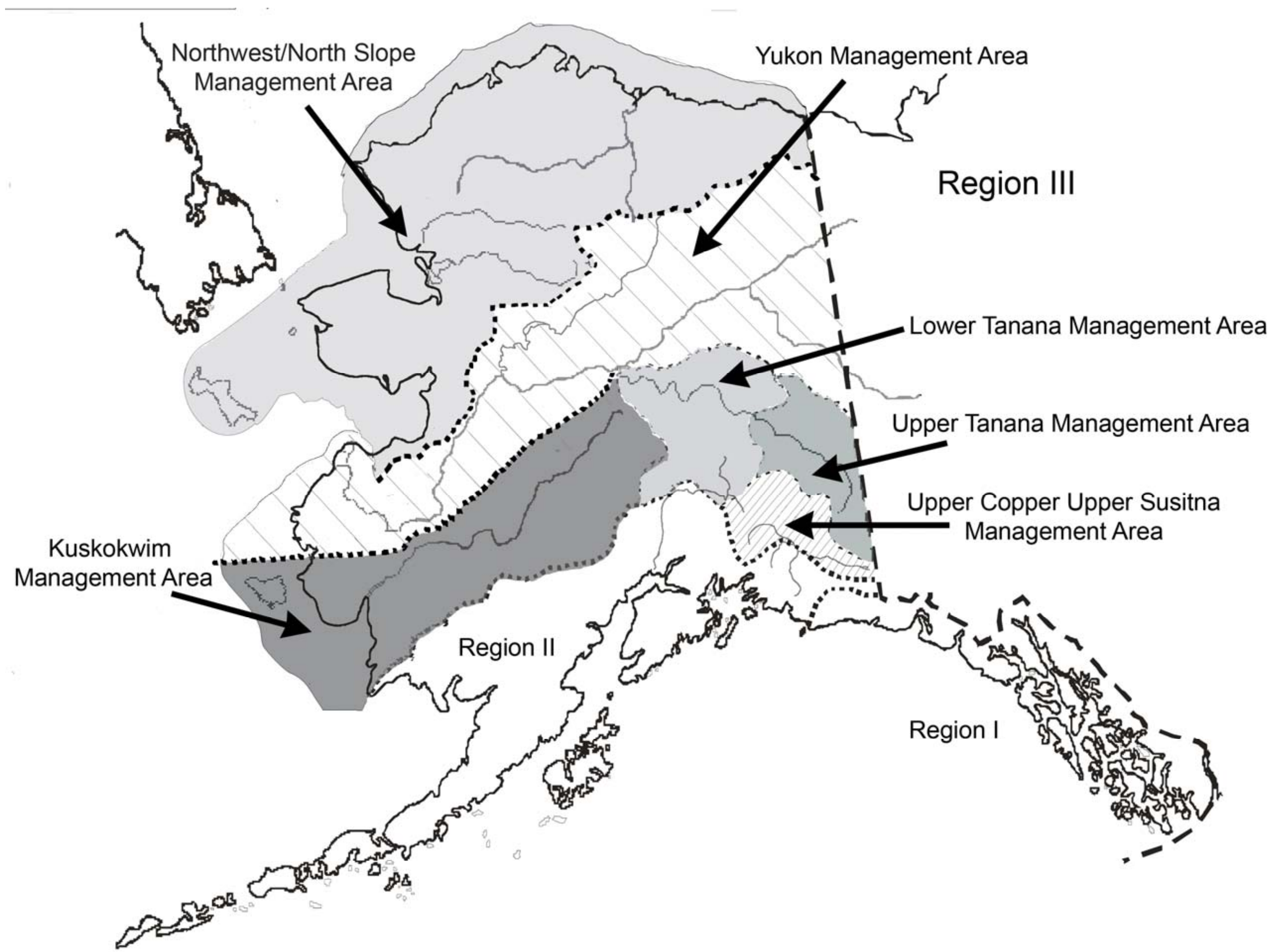

Figure 1.–Map of the sport fish regions in Alaska and the six Region III management areas.

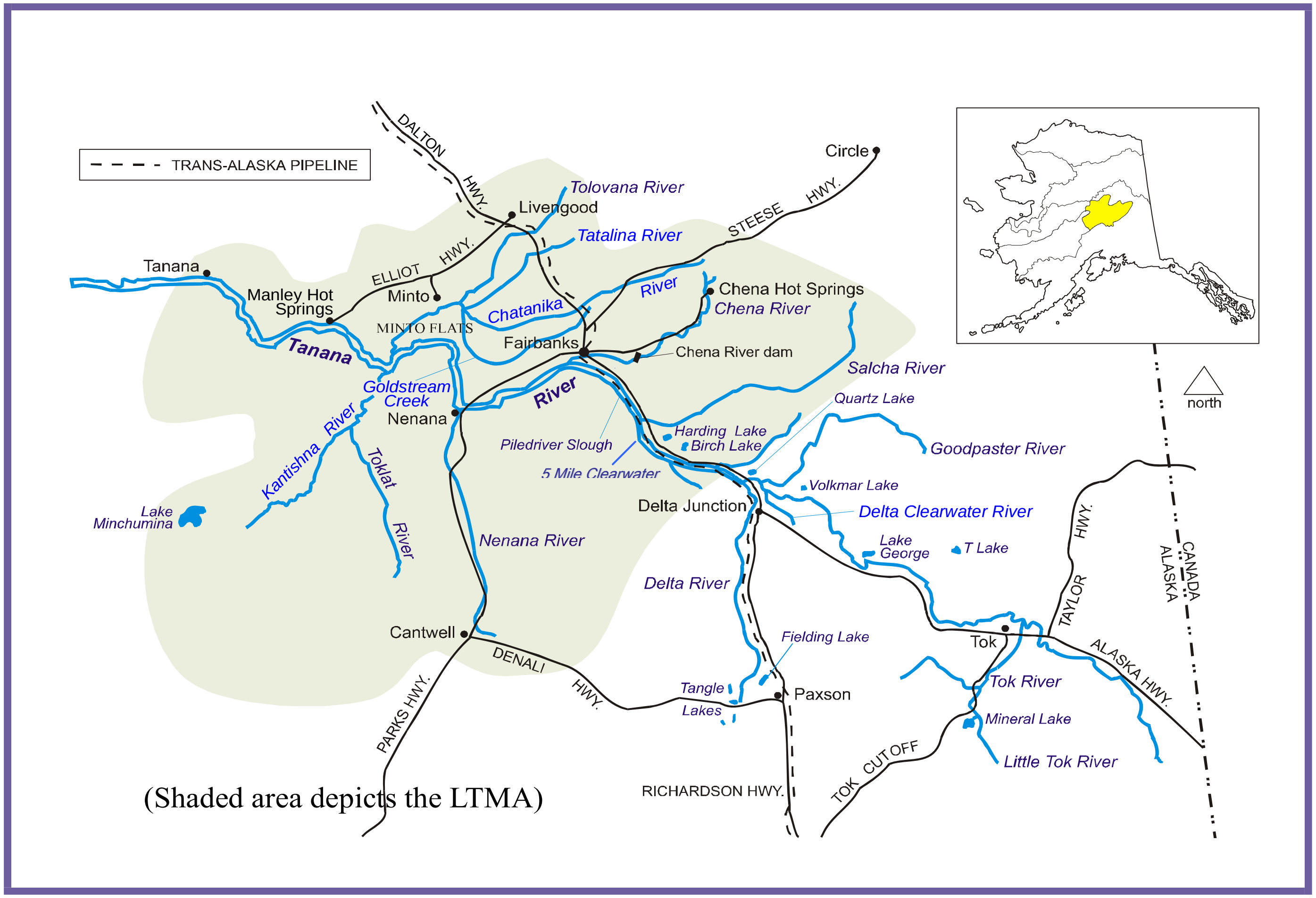

Figure 2.–Map of the Lower Tanana River Management Area (LTMA).

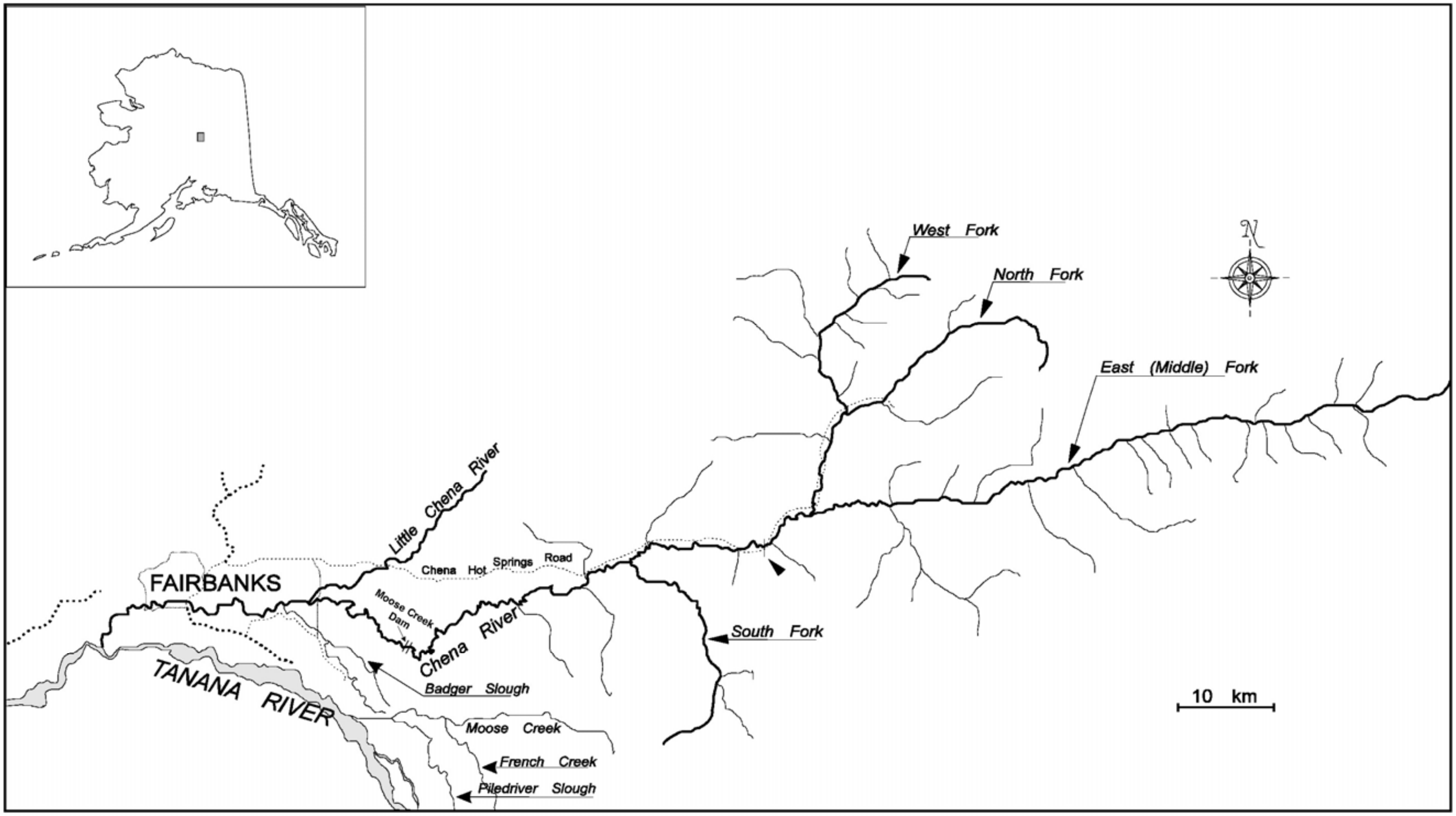

Figure 3.–The Chena River drainage.

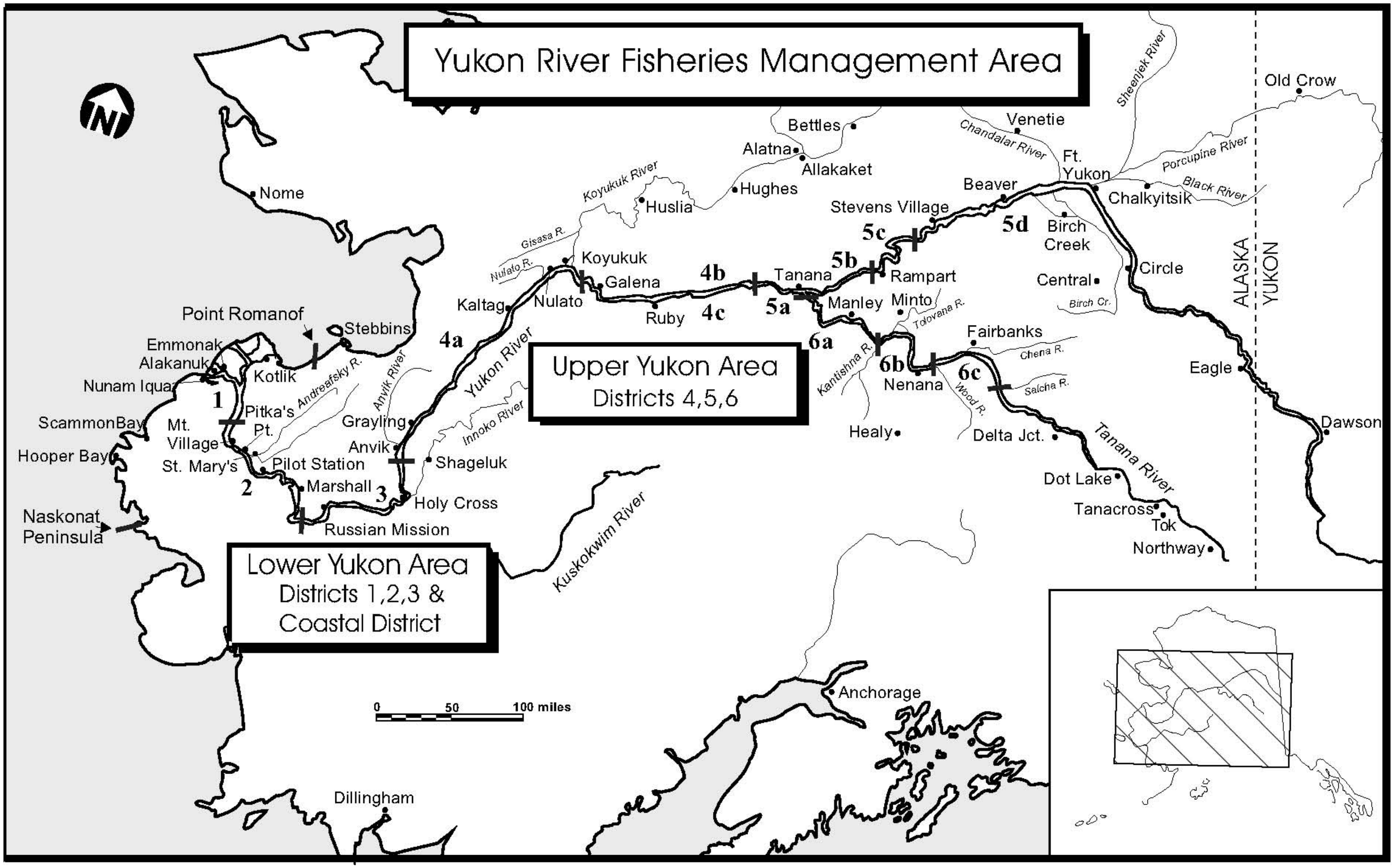

Figure 4.–Map of the Yukon River commercial fishing districts.

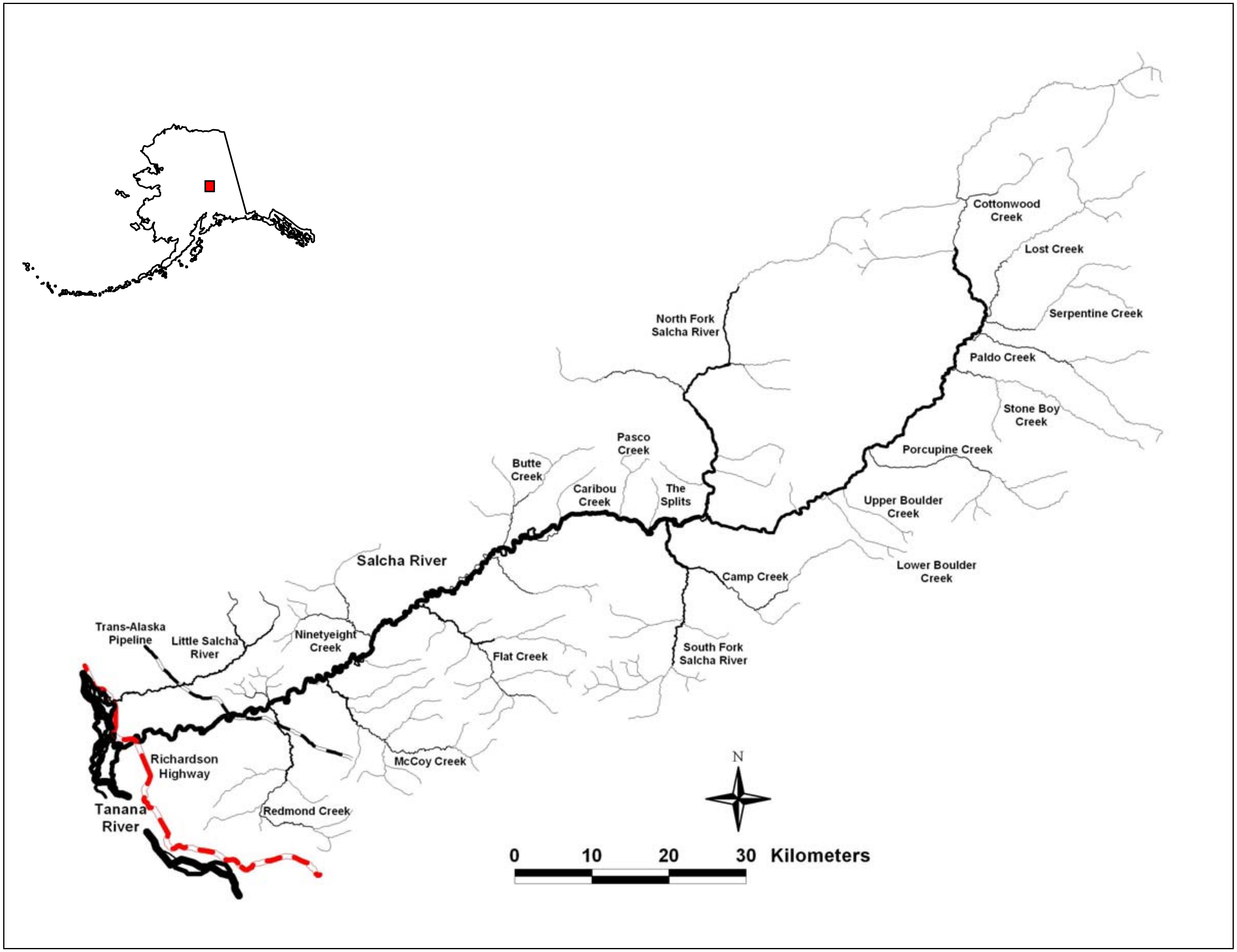

Figure 5.–The Salcha River drainage.

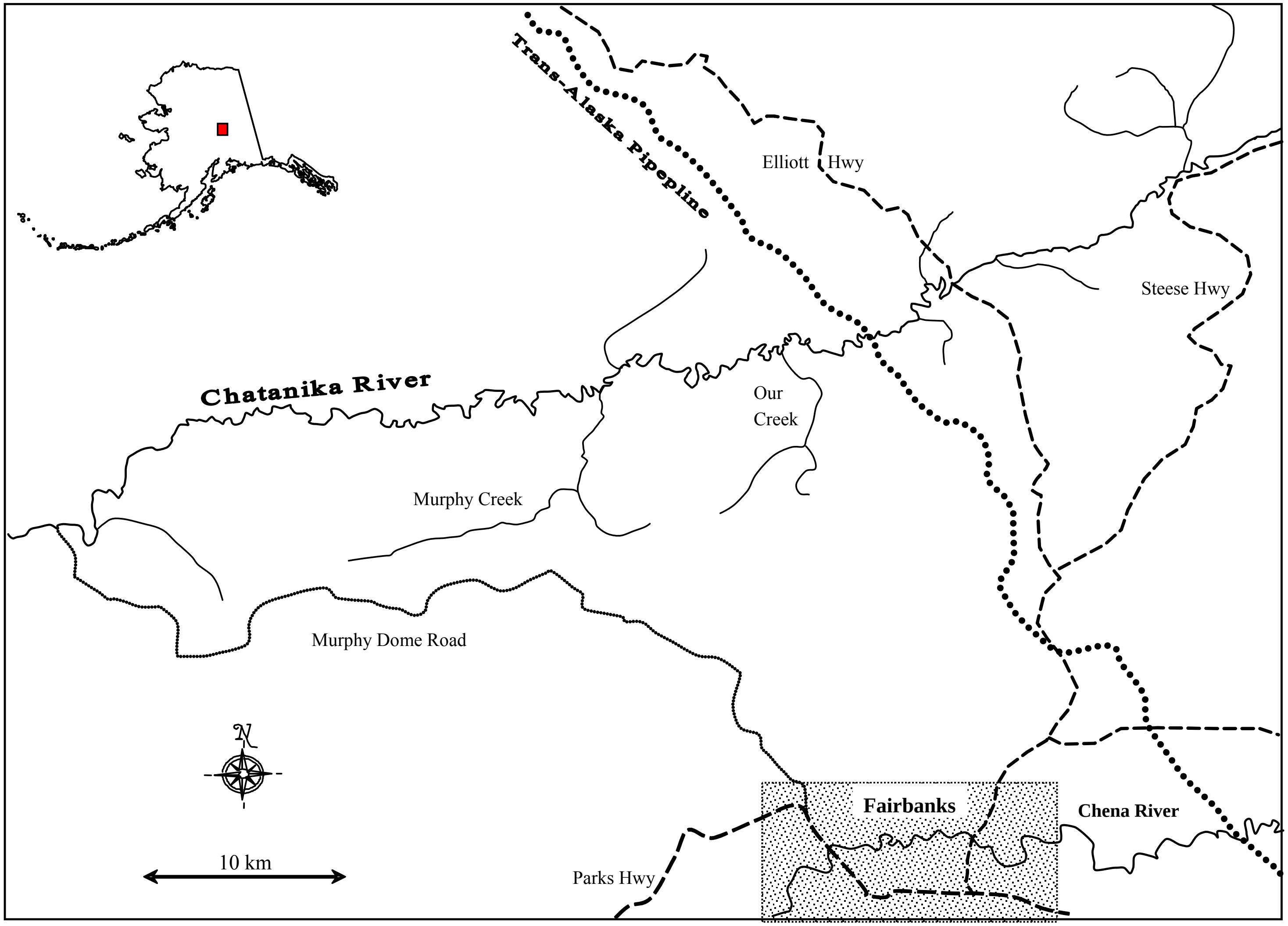

Figure 6.–Portion of the Chatanika River drainage.

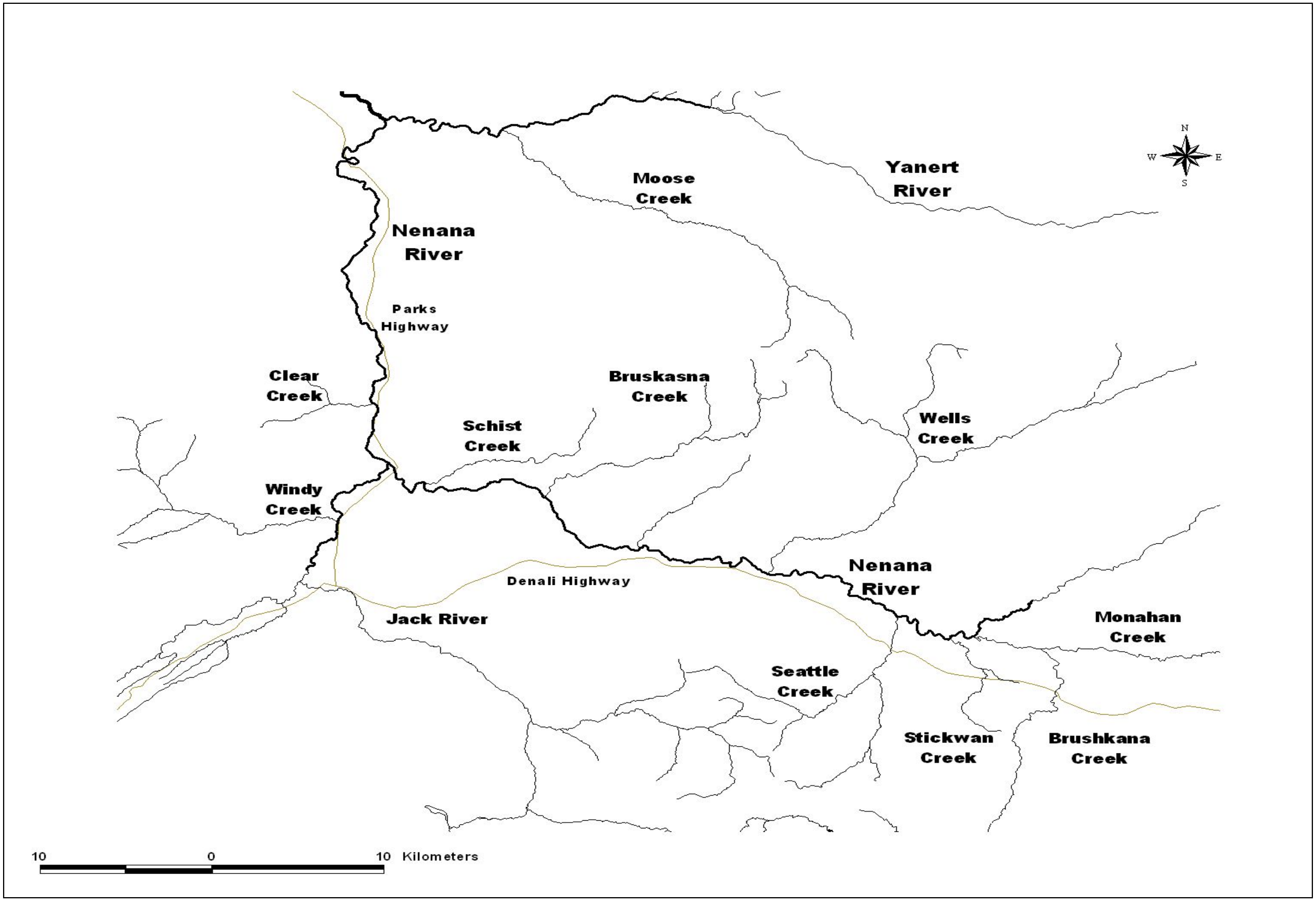

Figure 7.–Map of the Upper Nenana River drainage.

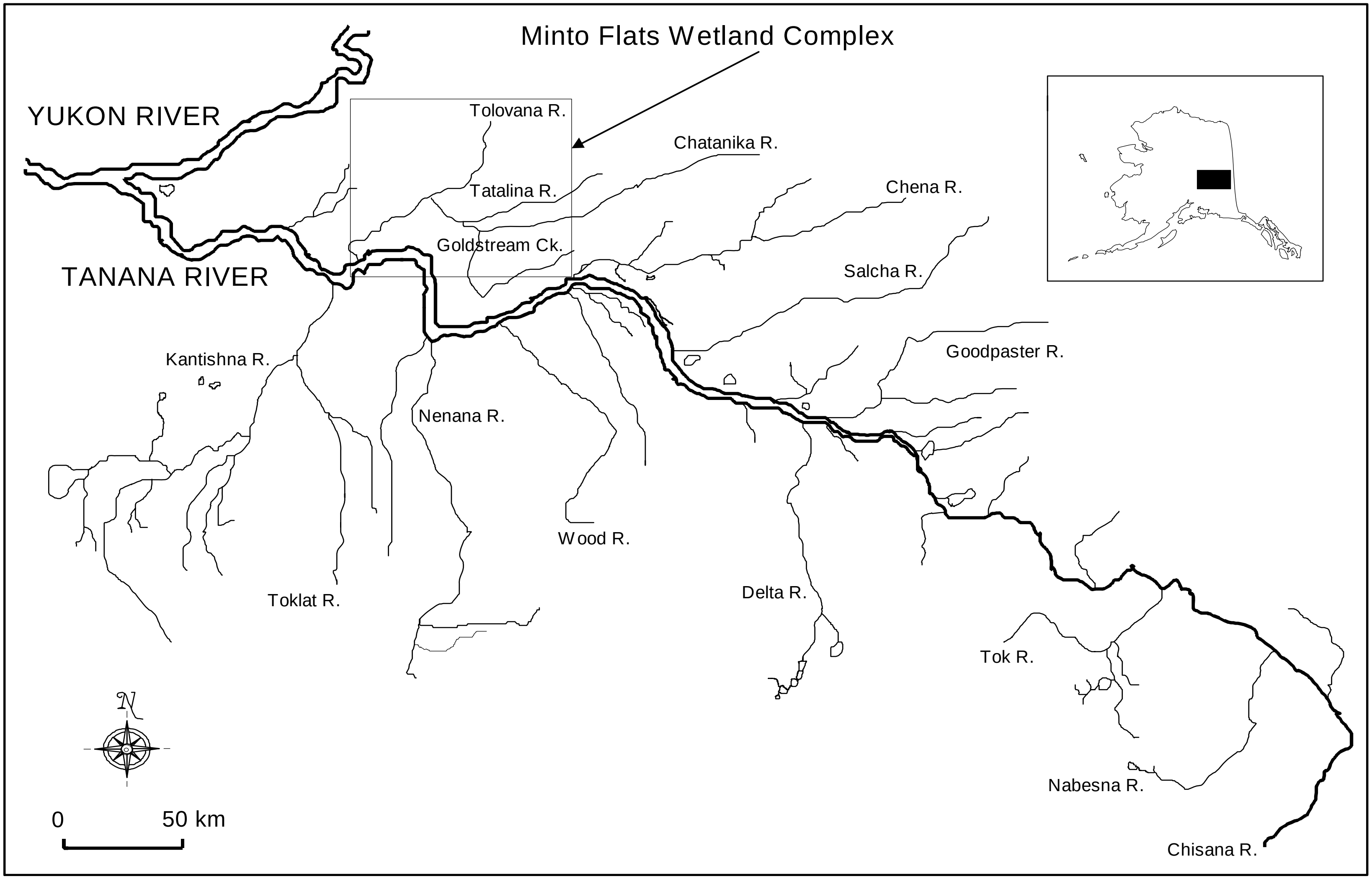

Figure 8.–Map of the Tanana River drainage and the demarcation of the Minto Flats wetland complex.

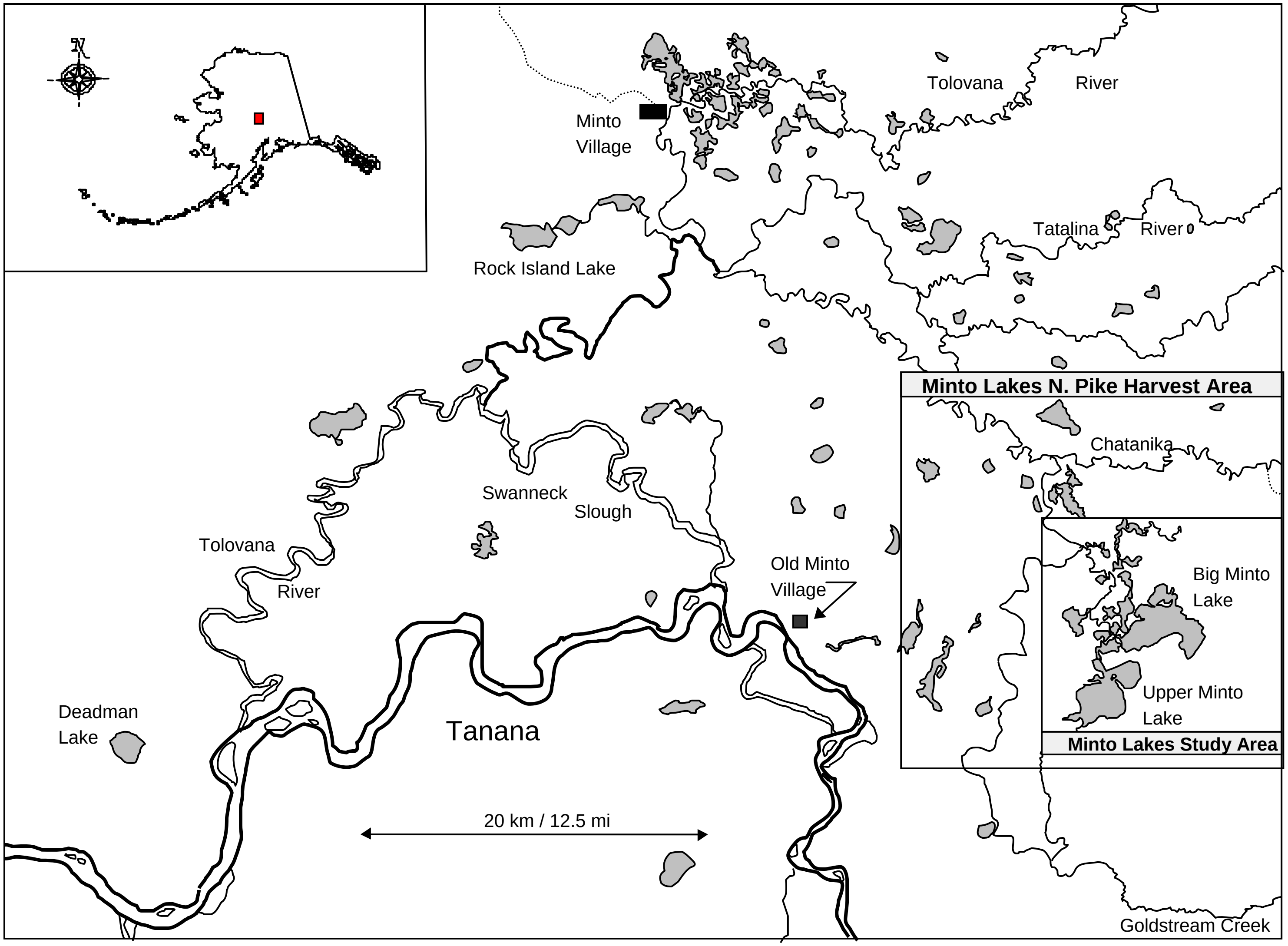

Figure 9.–Minto Flats wetland complex with demarcation of harvest reporting area and the northern pike population assessment area.

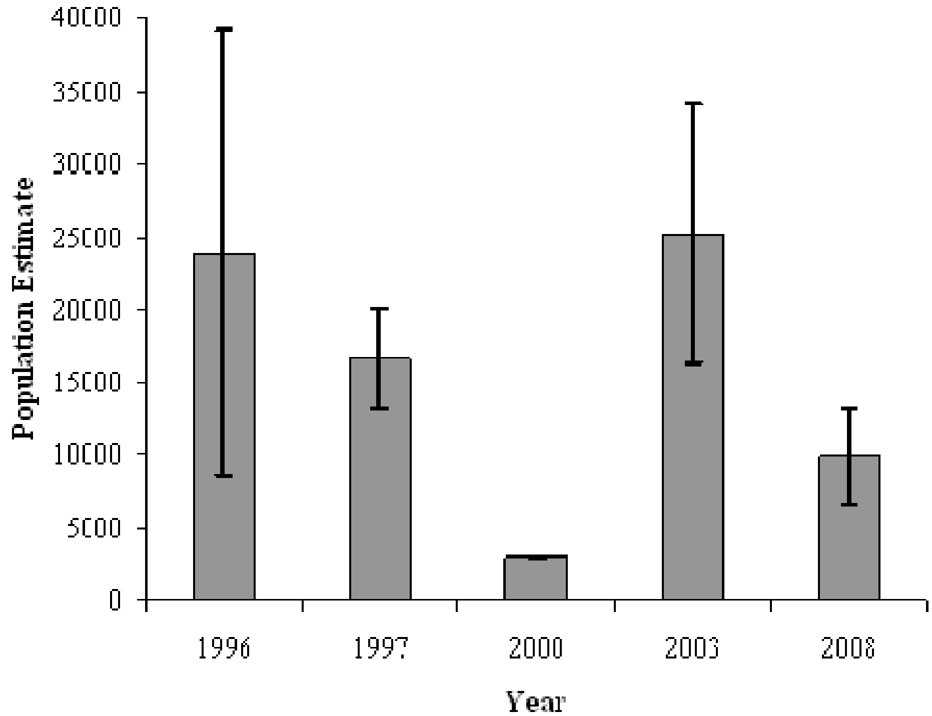

Figure 10.–The estimated abundance of northern pike ≥ 400 mm FL in the Minto Lakes study area in years during which abundance estimates were generated. Error bars represent 95% confidence intervals.

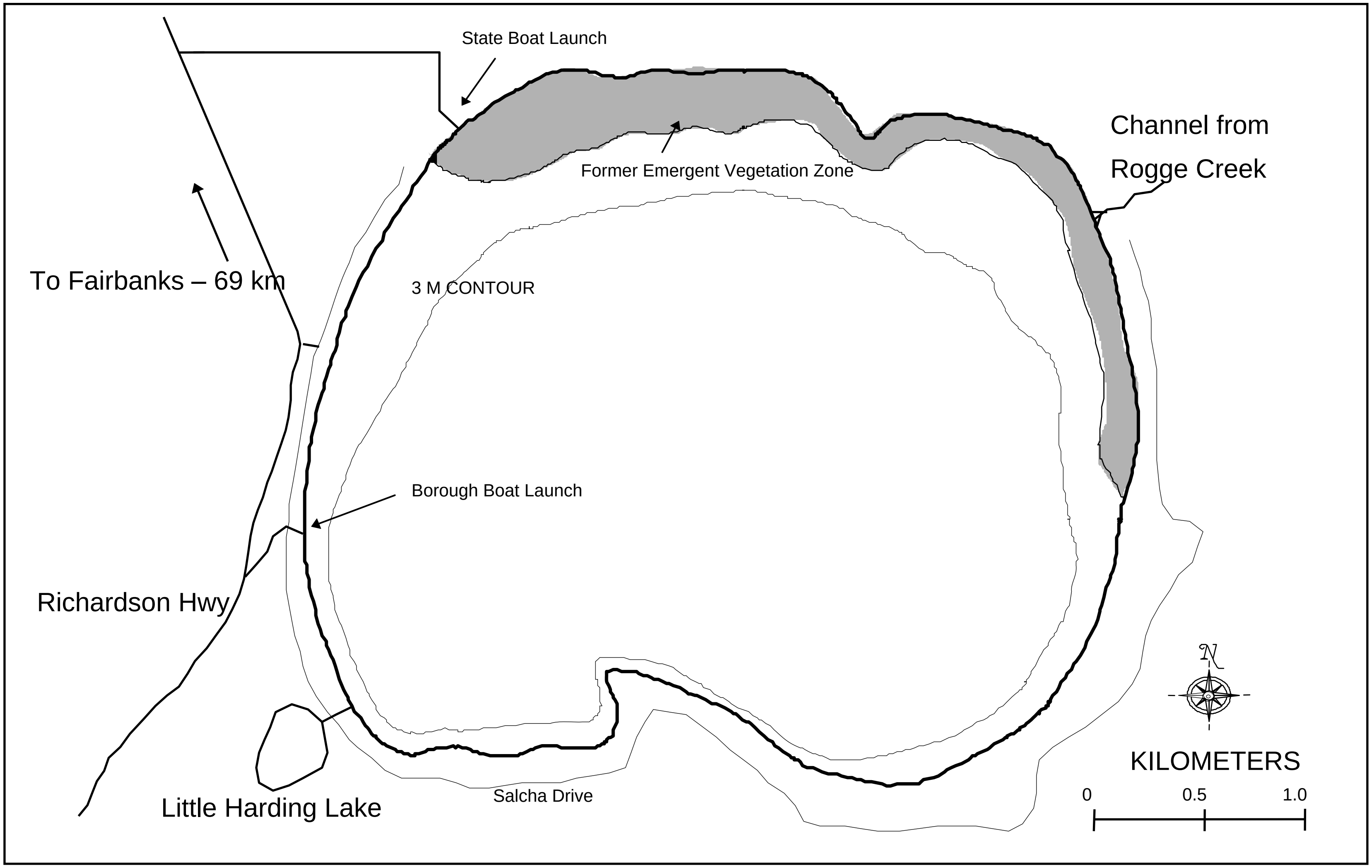

Figure 11.–Map of Harding Lake.

APPENDIX A

Appendix A.–Emergency orders issued for Lower Tanana River Management Area sport fisheries, 2005–2009.

Year	E. O. Number	Explanation
2005	**No Emergency Orders Issued**	
2006	3–KS–02–06	Increases the sport fish bag and possession limit for king salmon 20 inches or greater in length to two fish in all waters of the Salcha River open to salmon fishing and the Tanana River within a 1/2 mile radius of the mouth of the Salcha River, effective July 27, 2006.
2007	3–NP–01–07	Reduces the sport fish bag and possession limit for northern pike in all lakes and flowing waters of the Minto Flats area to two fish, only one of which may be 30 inches or greater in length, effective June 1–October 14, 2007.
2008	3–NP–01–08	Reduces the sport fish bag and possession limit for northern pike in all lakes and flowing waters of the Minto Flats area to two fish, only one of which may be 30 inches or greater in length, effective June 1–October 14, 2008.
2009	3-CS-02-09	Prohibits the retention of chum salmon in all waters of the Tanana River drainage effective 12:01 a.m. Friday September 4, 2009.

APPENDIX B

Appendix B.–Total number of fish harvested and caught by sport anglers in the LTMA, by species, 1990–2008.

	Anadromous Salmon						Stocked Species							
	King		Coho		Chum		Rainbow Trout		Landlocked Salmon		Lake Trout		Dolly Varden/ Arctic char	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	420	1,310	269	688	50	301	35,377	90,248	6,566	16,951	226	715	557	1,873
1991	630	1,197	443	1,900	385	588	40,039	82,345	10,604	16,417	461	545	909	2,705
1992	118	204	198	760	373	1,199	20,164	57,907	6,836	15,424	380	1,935	1,597	5,151
1993	1,691	5,017	29	291	317	2,135	27,976	82,695	5,976	9,952	412	955	3,536	6,962
1994	1,832	2,609	539	946	244	1,131	17,014	53,518	3,645	10,242	117	461	1,129	2,923
1995	2,419	5,675	593	1,130	1,252	2,828	18,743	59,254	3,497	10,140	258	702	2,140	5,650
1996	3,095	8,676	348	1,961	1,731	8,246	34,382	115,218	5,094	13,682	271	1,262	1,963	6,139
1997	1,943	6,566	342	1,264	456	1,697	21,516	68,025	3,701	11,967	348	1,029	1,820	6,815
1998	441	1,480	125	550	64	1,039	19,200	63,327	4,867	18,005	51	443	2,528	5,898
1999	1,006	3,435	141	331	388	1,654	27,067	79,297	2,590	10,025	384	1,118	2,507	7,516
2000	178	527	40	447	85	278	30,016	94,929	6,266	20,655	517	1,235	2,527	6,866
2001	667	2,414	180	892	29	661	11,811	37,391	5,085	12,719	209	1,299	1,632	5,688
2002	466	3,206	24	270	307	1,007	29,609	69,374	14,528	30,953	88	1,044	4,392	9,151
2003	2,136	6,851	11	633	50	1,531	16,530	54,189	4,663	12,821	56	642	3,179	8,244
2004	1,315	6,318	184	1,406	42	1,042	17,134	46,629	5,963	17,869	189	1,552	3,313	10,658
2005	483	1,633	0	14	144	686	11,493	29,292	2,054	9,000	514	1,514	2,289	6,452
2006	638	2,523	37	348	263	912	9,866	31,814	1,677	4,622	180	1,165	1,065	6,855
2007	549	2,458	7	37	41	200	10,851	34,818	2,624	7,588	35	293	1,766	6,173
2008	254	915	96	1,098	61	575	6,843	26,845	4,419	7,633	75	265	2,193	5,198
10-Yr Average (1998–2007)	788	3,084	75	493	141	901	18,358	54,106	5,032	14,426	222	1,031	2,520	7,350
5-Yr Average (2003–2007)	1,024	3,957	48	488	108	874	13,175	39,348	3,396	10,380	195	1,033	2,322	7,676
2008 as % of 5-Yr Average	25%	23%	201%	225%	56%	66%	52%	68%	130%	74%	39%	26%	94%	68%

–continued–

	Stocked Species		Resident Species											
	Arctic Grayling (lake)		Northern Pike		Whitefish		Burbot		Sheefish		Arctic Grayling (river)		Total	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	1,089	5,712	5,414	23,964	6,299	8,014	2,207	2,701	68	255	16,643	116,630	75,185	269,361
1991	1,627	6,048	9,426	23,037	356	551	1,323	1,920	158	203	16,876	92,514	83,237	229,970
1992	1,006	6,686	4,200	24,477	2,810	3,140	2,368	2,964	148	612	7,269	72,134	47,467	192,594
1993	2,598	10,523	7,743	41,809	722	948	3,547	4,164	164	190	8,779	116,860	63,490	282,500
1994	2,811	21,290	13,200	76,372	242	1,677	2,551	3,154	163	267	9,015	150,678	52,501	325,269
1995	1,927	9,081	10,834	43,325	578	1,187	2,936	4,113	200	482	14,364	96,170	59,741	239,737
1996	632	13,358	4,890	34,867	149	660	1,378	1,935	40	219	4,441	110,613	58,414	316,837
1997	846	12,863	2,320	19,186	773	1,404	3,824	4,935	35	486	7,752	191,475	45,677	327,712
1998	1,340	15,679	2,003	12,964	490	1,115	2,088	2,832	17	79	4,574	164,176	37,789	287,586
1999	2,019	13,325	2,013	10,641	219	976	2,049	3,195	121	173	4,710	144,437	45,216	276,123
2000	1,171	13,196	2,793	13,585	313	847	2,032	3,312	187	312	3,658	79,266	49,783	235,455
2001	1,175	10,112	3,296	13,117	221	883	759	1,265	ND	41	1,517	61,115	26,580	147,597
2002	5,973	15,714	3,043	19,646	936	1,247	2,787	3,371	45	50	5,128	104,131	67,326	259,165
2003	1,623	15,824	5,416	20,150	167	741	1,375	1,851	59	415	3,793	72,418	39,058	196,310
2004	308	8,705	4,259	31,172	1,244	1,515	2,771	3,743	138	450	3,836	91,146	40,696	222,205
2005	752	10,568	3,319	26,171	54	227	1,466	1,856	129	454	4,645	63,502	27,342	151,369
2006	1,121	8,915	2,688	14,262	195	533	1,305	2,103	53	66	2,260	44,127	21,348	118,245
2007	286	4,593	2,619	22,146	185	452	2,160	2,623	37	37	2,686	75,560	23,844	156,976
2008	287	3,438	888	8,420	207	1,244	1,020	1,230	77	163	3,390	63,462	19,810	120,486
10-Yr Average (1998–2007)	1,577	11,663	3,145	18,385	402	854	1,879	2,615	87	208	3,681	89,988	37,898	205,103
5-Yr Average (2003–2007)	818	9,721	3,660	22,780	369	694	1,815	2,435	83	284	3,444	69,351	30,458	169,021
2008 as % of 5-Yr Average	35%	35%	24%	37%	56%	179%	56%	51%	93%	57%	98%	92%	65%	71%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

APPENDIX C

Appendix C.–Estimates of effort (number of days fished) for select areas of the LTMA, 1990–2008.

Year	Upper Chena	Lower Chena	Total Chena River	Piledriver Slough	Upper Chatanika	Lower Chatanika	Total Chatanika River	Salcha River	Harding Lake [a]	Minto Flats	Nenana Drainage[b]	Total LTMA
1990	6,949	18,957	25,906	27,705	ND	ND	11,801	9,783	3,895	932	1,449	129,910
1991	8,591	12,547	21,138	17,703	ND	ND	8,085	11,242	5,155	1,532	2,131	106,604
1992	4,983	7,383	12,633	13,607	ND	ND	6,775	4,833	5,068	2,401	2,487	81,378
1993	6,018	15,383	21,589	17,253	ND	ND	7,671	7,313	4,885	3,911	2,138	103,713
1994	7,912	18,718	27,061	11,369	ND	ND	7,272	7,653	4,913	6,267	2,060	99,906
1995	13,319	23,219	37,220	12,613	5,709	6,988	13,145	14,516	6,743	6,260	2,645	141,231
1996	15,214	29,555	45,928	11,736	4,867	6,257	12,032	9,241	6,734	3,973	2,854	159,027
1997	11,381	16,957	28,873	6,791	2,612	4,290	7,125	8,647	3,383	3,332	2,463	89,911
1998	10,826	15,277	27,910	5,126	3,433	2,140	6,000	5,789	3,410	1,414	1,853	81,789
1999	18,909	20,834	40,435	8,955	4,102	4,477	8,747	7,539	2,973	2,431	955	114,592
2000	10,259	11,138	22,029	6,234	2,836	2,799	5,748	4,862	2,538	1,230	786	87,451
2001	6,831	12,346	19,177	5,190	1,372	1,308	2,680	5,471	1,038	1,118	1,195	63,702
2002	6,298	14,017	20,315	4,246	1,907	1,937	3,844	5,954	2,094	2,349	2,061	78,499
2003	7,374	14,454	21,828	2,317	1,834	2,849	4,683	5,032	2,246	2,023	1,834	71,052
2004	11,320	20,165	31,485	2,546	2,917	2,570	5,487	4,859	2,675	1,892	1,801	90,530
2005	8,773	8,718	17,491	1,079	2,711	1,894	4,605	4,851	1,118	3,124	2,086	64,891
2006	4,257	9,115	13,372	1,293	2,520	1,427	3,947	4,866	1,913	2,416	1,296	53,406
2007	9,507	14,519	24,026	1,519	2,352	2,960	5,312	5,656	749	2,595	979	70,517
2008	5,688	9,114	14,802	1,900	1,966	1,592	3,558	3,394	1,504	887	1,721	52,990
10-Yr Average 1998–2007	9,435	14,058	23,807	3,851	2,598	2,436	5,105	5,488	2,075	2,059	1,485	77,643
5-Yr Average 2003–2007	8,246	13,394	21,640	1,751	2,467	2,340	4,807	5,053	1,740	2,410	1,599	70,079
2008 as a % of 5-Yr Avg	69%	68%	68%	109%	80%	68%	74%	67%	86%	37%	108%	76%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a–d); Walker et al. (2003); Jennings et al. (2004, 2006a–b, 2007, 2009a-b, *In prep a–b*).

[a] Harding Lake was closed to northern pike fishing in the summer of 2000.

[b] Includes Brushkana Creek.

APPENDIX D

Appendix D.–Reference information specific to 2009 Alaska Board of Fisheries proposals.

Proposal	Proposal Subject	Text (page number)	Table #	Figure #	Appendix
49	Stocked Waters in the Tanana River Management Area	42	24	-	B
50	Tanana River Wild Arctic Grayling Management Plan – housekeeping dates	23, 24, 26	-	-	-
51	Aligning Chatanika & Salcha Rivers with Wild Arctic Grayling Management Plan	23, 24	10, 11, 12, 13	5, 6	C
52	Arctic Grayling in Chena/ Badger Slough	21		3	-
53	Single Hook Regulations in the Tanana River Drainage – Chena River, 5 Mile Clearwater Crk & Piledriver Slough	21, 26	9, 10	3	C
56	Chatanika River – Regulatory Boundary	16, 24, 38	-	6	C
57	Chatanika River – Whitefish Sport Regs	38	20, 21, 22	6	C
60	Harding Lake – Adding a Trailer Hook	40	23	11	C
63	Minto Flats Northern Pike Management Plan – housekeeping aligning language	30	14, 15, 16	8, 9, 10	A
64	Minto Flats Northern Pike Management Plan – Subsistence Bag Limits	30	14, 15, 16	8, 9, 10	A
65	Minto Flats Northern Pike Mgt Plan – Single Hook in Subsistence & Sport Fisheries	30	14, 15, 16	8, 9, 10	A, C
87	Yukon River King Salmon Management Plan	12, 15, 17, 18	3, 4, 5, 6	-	A
193	Yukon River Summer Chum Management Plan	12, 15, 17, 18	5, 6	-	A, B
194	Yukon River Fall Chum Management Plan	12, 15, 17, 18	5, 6	-	A, B