Fishery Management Report No. 09-23

Fishery Management Report for Recreational Fisheries in the Lower Tanana River Management Area, 2007

by

Audra L. J. Brase

June 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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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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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 state Board of Fisheries, Fish and Game Advisory Committees, the general public, and other interested parties. It presents fisheries assessment information and the management strategies that are developed from that information. In addition, this report includes a description of the fisheries regulatory process, the geographic, administrative, and regulatory boundaries, funding sources, and other information concerning Sport Fish Division management programs within the area.

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

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

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

This area management report provides information regarding the LTMA and its fisheries for 2007, with preliminary information from the 2008 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 sport fisheries of the ADF&G Region III Lower Tanana River Management Area (LTMA) is presented in this report. Particular emphasis is placed on the LTMA fisheries' performances and management from 2007–2008.

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 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 the 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 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, Chinook, 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*

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into eighteen regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47–70. Sport Fish Division of the Alaska Department of Fish and Game (ADF&G) divides the state into three administrative regions with boundaries roughly corresponding to groups of the BOF regulatory areas. Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River drainage, Cook Inlet-Resurrection Bay Saltwater, Anchorage Bowl, Knik Arm, Susitna River drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes 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 (the Yukon, the Kuskokwim, the Colville, Noatak, Upper Copper and Upper Susitna River drainages), thousands of lakes and thousands of miles of coastline and streams. Regional coastline boundaries extend from Cape Newenham in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River Valley. Fairbanks (population about 30,000) is the largest community.

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

- The Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);
- The Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);
- The Upper Copper/Upper Susitna Management Area (the Copper River drainage upstream of Canyon Creek and Haley Creek, and the Susitna River drainage above the Oshetna River);
- The Upper Tanana River Management Area (the Tanana River drainage upstream from Banner Creek and the Little Delta River);
- The Lower Tanana River Management Area (the Tanana River drainage downstream from Banner Creek and the Little Delta River); and,
- The 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.

THE ALASKA BOARD OF FISHERIES

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

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

ADVISORY COMMITTEES

Local Fish and Game Advisory Committees have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes. Advisory committee members are nominated from the local public and voted on by all present during an advisory committee meeting. Most active committees in urban areas meet in the fall and winter on a monthly basis. Rural committees generally have only one fall and one spring meeting due to funding constraints. Advisory meetings allow opportunity for direct

public interaction with department staff 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 the BOF and Fish and Game Advisory Committees. During 2007, the department had direct support responsibilities for 82 advisory committees in the state.

Within the LTMA there are four advisory committees, Fairbanks, Minto/Nenana, Middle Nenana River and Lake Minchumina. In addition, the Delta Junction advisory committee often 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 70.040) in the AYK Region. 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 within the AYK Region (5 AAC 70.055) and adding a regulatory management plan for wild Arctic grayling (5 AAC 70.065) within the AYK Region.

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, 2007) to modify time, area, and bag/possession limit regulations. Emergency orders are implemented to deal with conservation issues that are not adequately controlled by existing regulations. Once implemented, an EO deals with the situation until it is resolved or the BOF can formally take up the issue. Emergency orders are also used as a tool for "inseason" management of fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the BOF. Emergency orders issued under this authority for the LTMA from 2004 to 2008 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 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 residents (Alaska State Constitution Article VIII, sections 3 and 15). Since the state has not amended the Alaska Constitution to conform to federal regulations, the federal government has 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 management responsibilities for subsistence fisheries on federal public lands (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 reserved water rights. Under current practice, the federal land management agencies assert management to protect the priority subsistence use by qualified rural residents in non-navigable waters within federal public lands (includes BLM lands) and in navigable waters adjacent to or within federal conservation 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 federal management occurs within the established Federal Subsistence Board (FSB) process. The public provides their input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council (RAC) 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 management 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 2008 in Nenana.

REGION III SPORT FISH DIVISION RESEARCH AND MANAGEMENT STAFFING

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

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

STATEWIDE HARVEST SURVEY

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

not designed to provide estimates of effort directed towards a single species. Species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. Two types of questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or non-resident). Information gathered from the survey includes participation (number of anglers, trips, and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaskan waters as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. The survey results for each year are not available until the following year; hence the results for 2007 were not available until fall 2008. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or in-season management.

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

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

The Tanana River drainage is divided by Sport Fish Division 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 Statewide Harvest Survey. While most sites for which effort, catch, and harvest are estimated are clearly within one of the two management areas, a few 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 Upper Tanana Management Area (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. The beginnings of timelines for estimates presented in this report vary depending on when it was possible to separate the LTMA and UTMA data. Some begin with the first reported estimates in 1977. Many begin in 1983, when increasingly detailed estimates became available covering more individual waters. In 1990 both catch and harvest estimates were produced. 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.

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. 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 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 *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, Chinook 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 were found in 5 AAC 70.015 (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 were the: Minto Flats Northern Pike Management Plans (5 AAC 70.044 for the sport fishery & 5 AAC

01.244 for the subsistence fishery), Wild Arctic Grayling Management Plan (5 AAC 70.055), Chena and Salcha River King Salmon Management Plan (5 AAC 70.060), Arctic-Yukon-Kuskokwim Region Stocked Waters Plan (5 AAC 70.065), Wild Lake Trout Management Plan (5 AAC 70.040), 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 who are conservation minded. Such a conflict has arisen in recent years between subsistence and sport users who fish for northern pike in the Minto Flats. Some sport fishermen felt that a 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" (approximately 7.5 inches) stocked fish provided by the Anchorage 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 2007 access monies were used to help improve the Harding Lake parking lot and boat launch in cooperation with the Alaska Department of Natural Resources, Parks and Recreation Division.

Work also continued towards acquiring the land that surrounds the Birch Lake weir. 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 Department of Fish and Game, Division of Sport Fish website (www.sf.adfg.state.ak.us/statewide/SF_home.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 and 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, snow machines, 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 (1997–2006) the LTMA has averaged approximately 36% 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.

CHINOOK 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 US Army Corps of Engineers.

The Chena River supports one of the largest Chinook salmon populations in the Alaskan portion of the Yukon River drainage, with average annual returns of over 6,000 fish from 2003–2007 (Table 3). Adult Chinook 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. Chum salmon *O. keta* are caught incidental to the Chinook salmon in the Chena River. Coho salmon are not present in the Chena River drainage.

Chena River Chinook 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 prepa*; Brase and Doxey 2006; Burkholder 1991b; Doxey 2004; Doxey et al. 2005; Evenson 1991–1993, 1995, 1996; Evenson and Stuby 1997; Savereide *in prepa-b*; Skaugstad 1988–1990b, 1992–1994; Stuby and Evenson 1998; Stuby 1999–2001). The recent 5-year (2003–2007) average escapement was 6,224 fish (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 Chinook salmon run therefore an estimate of escapement was not produced. In contrast, 2006 through 2008 have had counting conditions throughout the majority of the run and good estimates of escapement have been produced.

Historically, the Chena River Chinook 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 Commercial Fisheries Division in 1992. In 1993

Sport Fish Division 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 Chinook 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 Chinook salmon and for some Yukon 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 Chinook 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 Chinook escapement in the other river, and are to be used as a measure of run strength versus the BEG.

Recent Fishery Performance

A Chinook 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 Chinook 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 with multiple boat launch and walk-in sites located throughout Fairbanks and North Pole.

Estimated harvests between 1983 and 1992 ranged from 0 to 375 fish, then increased dramatically in the mid-1990s (Table 4). The 2007 Chinook salmon harvest was 78 fish with a catch of 824 fish; this was below the 5-year average (2002–2006) harvest of 448 fish and average catch of 2,243 fish.

The Chena River Chinook 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).

The 2008 preliminary estimate of escapement was 3,212 Chinook salmon which is only 52% of the 2003–2007 average (Table 3). This number should be considered a minimum count because the counting panels were obscured for eight days due to high water (Savereide *in prepb*).

Fishery Objectives and Management

In 2001 the BOF adopted policy directing ADF&G to manage harvest so that escapements fall within the BEG ranges set by ADF&G and adopted by the BOF. The BEGs will be evaluated and modified as needed on a 3-year cycle in synchrony with the BOF meeting cycle during which they address fisheries issues within the Yukon 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 70.060) which mandated that all the downriver fisheries (commercial, subsistence, personal use and sport) be managed in a manner such that the Chena River Chinook 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 2000, an EO was issued that restricted sport anglers to catch-and-release for Chinook salmon in the Tanana River drainage due to lower river indicators of poor run strength. In 2001, a similar EO was issued, however it was rescinded in mid-July when the escapement was projected to be above the upper limit of the BEG range. In 2003 and 2004, the Chinook salmon runs were stronger than anticipated and EOs were issued to liberalize the bag and possession limits from 1 to 3 Chinook salmon per day in the Chena River (Appendix A, Brase 2008). These emergency orders, in concert with management actions on the mainstem Yukon and Tanana river subsistence, commercial and personal use fisheries have enabled the Chena River Chinook salmon BEG goal to be met or exceeded every year since 1990 (Table 3).

Current Issues and Fishery Outlook

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

Recent BOF Actions

There have been no actions taken by the BOF 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

Chinook salmon escapements have been estimated annually by using the Chena River dam as a counting tower or by mark-recapture experiments since 1986 (Table 3). In previous years it was decided that if full tower counts could not be performed due to adverse river conditions for more than four consecutive days between Day 9 and Day 30 of the Chinook salmon run, then a mark-recapture experiment would be conducted (Doxey 2004). As escapement estimates and passage data have accumulated over the years and a BEG has been developed, the need for an unbroken series of escapement estimates has become less critical. This is important because electrofishing (the most effective method for capturing salmon in mark-recapture experiments) during the Chinook spawning run should be avoided if possible due to the potential harmful effects of exposing salmon adults and eggs, as well as all other organisms in the electrical field created by the electrodes and the boat, to potentially harmful levels of electricity. Therefore more rigorous statistical criteria have been developed to assess whether electrofishing is needed to obtain an escapement estimate in that particular year (Brase *in prepa*). Consequently, there may not be a complete escapement estimate each year. However, partial documented abundance from tower counts is often sufficient to determine whether escapements are within or greater than the BEG range, and to project a likely estimate of total escapement

There has been some concern raised about the effect the 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 Chinook 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 2008 the flood gates were partially lowered for 26 hours from August 1-2 to regulate flow between 8,000 and 8,100 cfs.

Historically Chinook 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. It is suggested that in future Chinook 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 Commercial Fisheries Division supplied a Didson® sonar unit, which was to be used to evaluate salmon passage rates during periods of high water events. The sonar was operated successfully for 16 days during the middle of the king salmon run. Unfortunately, there was an extreme high water (flood) in 2008 and the sonar equipment was removed to avoid equipment loss prior to the end of the run. Final review of the data has not been completed. The sonar is planned to be operated for the entire king salmon run in 2009. In conjunction with the sonar operation Sport Fish Division will continue to perform salmon counts on the Chena River from the Moose Creek Dam, and these numbers may be used for species apportionment of the sonar counts.

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 Chinook salmon escapement in the Tanana River drainage, with average annual returns of over 9,900 fish from 2003 to 2007 (Table 3). Adult Chinook 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. Chum salmon are caught incidental to the Chinook salmon in the Salcha River. Coho salmon are not present in the Salcha River drainage.

The Salcha River Chinook 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 prepa*; Brase and Doxey 2006; Burkholder 1991b; Doxey 2004; Doxey et al. 2005; Evenson 1991-1993, 1995, 1996; Evenson

and Stuby 1997; *Savereide in prepa–b;* 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 Sport Fish Division (which operated the tower from 1993 to1998) for this project, and Sport Fish Division provided some logistical support during start-up in 1999 and 2000. Contractor staff report Chinook salmon passage counts to both Sport and Commercial Fish Divisions at the end of each shift 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 Chinook salmon fishery had a higher profile and greater Chinook salmon harvests than were seen on the Chena River. Estimated harvests between 1983 and 1992 ranged from 47 to 871 fish (Table 4). Harvest and catch did not increase as dramatically in the Salcha as in the Chena, but harvests have exceeded 1,000 fish in 2 of the past 11 years.

Recent Fishery Performance

There has been a Chinook 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 at 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 Chinook salmon in the Tanana River drainage have remained unchanged since the early 1960s, at one fish ≥ 20 inches per day.

The 2007 Chinook salmon harvest was 471 fish with a catch of 1,575 fish ; this was just below the 5-year average harvest (2002–2006) of 509 fish and average catch of 1,550 fish (Table 4). The harvest potential of this fishery may be increasing due to improvements in the gear and fishing techniques used to target Chinook salmon. Using the SWHS data, it is difficult to determine if effort is increasing in the salmon fishery because the Salcha River supports a multi-species sport fishery.

The 2008 preliminary escapement estimate was 5,300 Chinook salmon (Table 3), this should be considered a minimum because the counting panels were obscured by high water during the majority of the Chinook salmon run and therefore the total number of salmon passing the counting tower could not be fully estimated (Savereide *in prepb*).

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

Current Issues and Fishery Outlook

Typically more sport anglers target Chinook 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. The EOs that were put in place for Chena River Chinook salmon in 2001, 2002, 2003 and 2004, also applied to Salcha River Chinook salmon (Appendix A, Brase 2008). In 2006, an EO was issued to liberalize Chinook salmon bag and possession limits from 1 to 2 fish on the Salcha only, as the Chena River showed insufficient strength to liberalize the sport limits.

Recent BOF Actions

There have been no actions taken by the BOF with regards to the Salcha River Chinook 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

A recommended activity for the Salcha River is to continue cooperation with BSFA contractors in order to receive daily updates of the number of salmon passing the counting tower and river conditions.

As previously mentioned in the Chena River section, historically Chinook 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. It is suggested that in future Chinook 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.

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 20th 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 Chinook and chum salmon. A fishery for Chinook 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 Chinook salmon in the Chatanika River.

Chinook 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 Chinook 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 high water conditions resulting in poor viewing conditions and poor quality estimates in most years. No further attempts to enumerate salmon on the Chatanika River have been done since.

Recent Fishery Performance

The Chatanika River Chinook salmon run is small and attracts little effort. The 5-year (2002–2006) average harvest is 10 fish and catch is 56 fish (Table 4). In 2007 there were no Chinook salmon reported as caught and/or harvested from the Chatanika River.

The daily bag and possession limits for Chinook 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 Chinook salmon population.

When an EO is implemented restricting the fishing regulations for Chinook salmon based on information from the Chena and Salcha rivers or downriver (Yukon and Tanana River) run indicators, it covers all of the Chinook 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.

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.

Recent BOF Actions

There have been no recent actions taken by the BOF 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 the Yukon River Drainage Fisheries Association (YRDFA), the U.S. Fish and Wildlife Service (USFWS), the Bureau of Land Management (BLM), the National Oceanic and Atmospheric Administration (NOAA), and ADF&G. This project restored fish passage to more than 65 miles of upstream habitat for Chinook and chum salmon. Staff from the Bering Sea Fishermen's Association (BSFA) annually monitors the watershed above the old dam site for recolonization by salmon adults and/or juveniles, no adults have been observed, but juveniles have been seen throughout this area (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 it is a popular location for fall moose hunts. There is some sport fish guide activity in the area.

Coho salmon 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 sporadically by boat and aerial survey since 1974 (Table 7). The LTMA coho population is small compared to the Delta Clearwater River (DCR) in the UTMA. Coho salmon escapement to the DCR has averaged over 45,000 fish annually in the past 5 years (Parker *in prep*).

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 "other streams". These coho fisheries are relatively small. In 2007, no coho salmon harvest was reported in the Nenana River Drainage and the reported catch was 15 fish (Table 8); this was below the 5-year (2002–2006) average coho salmon harvest of 30 fish and catch of 340 fish. The 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 down-river indicators and also by run strength in the Delta Clearwater River in the Upper Tanana River Management Area.

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 BOF Actions

There have been no recent actions taken by the BOF 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 and distribution of the coho salmon stock.

OTHER LTMA SALMON FISHERIES

Other minor sport fisheries for chum and coho salmon occur in the LTMA. Summer chum salmon are primarily available in July and August during and just after the Chinook salmon fisheries and are targeted or caught incidentally as a secondary species. There is a run of fall chum salmon that arrives

to the Tanana River drainage in September, but they are not generally targeted by anglers. While summer chums are generally more abundant than Chinook 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 Chinook. The poor quality of summer chum salmon flesh for human consumption is likely a contributing factor. The 5-year (2002–2006) average chum salmon harvest and catch in the LTMA was 161 and 1,036 fish, respectively (Appendix B), most of this harvest occurs in the Chena and Salcha rivers.

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.

Stock assessment projects began in the Chena River in the early 1970s. Electrofishing boats were the primary tool for collecting fish. The methodology evolved to entail an annual mark-recapture abundance estimate using two boats simultaneously to sample most of the width of the river. Two passes by the two boats over the lower 90 miles of the river were required.

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 1987a, 1988). Although there was no stock assessment performed on Chena River 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.

Recent Fishery Performance

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. Badger (Chena) 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 grayling. The lower river supports a multi-species fishery, including a Chinook salmon fishery which appears to be growing. So 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.

From 2004 to 2006 the reported catches of Arctic grayling in the Chena River declined. However the 2007 catch increased to 45,673 fish; this was above the 5-year average (2002–2006) catch of 39,977 fish, but below the 10-year average (1997–2006) of 55,170 fish (Table 10).

In 2007 effort appeared to be increase on the Chena River, with anglers reporting 24,026 days fished in 2007, compared to the 5-year average (2002–2006) of 20,898 days fished.

Fishery Objectives and Management

In 2004, the BOF adopted the *Wild Arctic Grayling Management Plan* (5 AAC 70.055) that stated that ADF&G would manage the Region III Arctic grayling fisheries for long-term sustained yield while providing and/or maintaining fishery qualities that angler's 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, modify other methods and means). The Chena River is in the Special Management Approach category.

In addition, the department has developed a *Fishery Management Plan for the Chena River Arctic Grayling Sport Fishery* (Doxey and Brase *in prep*). This plan is currently in draft form. After it 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 rivermile 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 grayling assessment showed that the numbers of large (≥270mm) 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.

Recent BOF 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 unbaited single-hook, artificial lures when fishing for Arctic grayling throughout 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 the management objectives.

SALCHA RIVER

Background and Historic Perspective

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 Chinook 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. Since 1990, 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 1987b, 1988, 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 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 (2002–2006) harvest of 1,104 and catch of 6,112 fish (Table 10). However in 2007, the Salcha River Arctic grayling harvest was 1,365 fish and catch was 11,759 fish; both above the 5- and 10-year averages.

Fishery Objectives and Management

In 2004 the BOF adopted the *Wild Arctic Grayling Management Plan* (5 AAC 70.055) which stated that ADF&G would manage the Region III 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, 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 to change the bag and possession limits on the Salcha River.

Recent BOF Actions

There have been no actions taken by the BOF 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 likely 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 2004. The 2007 harvest was 461 fish with a catch of 10,394 fish. This compares to the recent 5-year average (2002–2006) harvest of 829 fish and catch of 10,886 fish (Table 10).

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

Fishery Objectives and Management

In 2004 the BOF adopted the *Wild Arctic Grayling Management Plan* (5 AAC 70.055) that stated that ADF&G would manage the Region III 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, modify other methods and means). Chatanika River Arctic grayling are managed under the *Wild Arctic Grayling Management Plan* 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 in recent years to change the bag and possession limits on the Chatanika River.

Recent BOF Actions

There have been no actions taken by the BOF 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 restrictions and no spawning closure.

Recent Fishery Performance

The 2006 Nenana River harvest of 577 Arctic grayling was below the recent 5-year (2002–2006) average harvest of 896 fish (Table 10). In 2007 effort on the Nenana River was 54% lower than average, with only 979 days fished, compared to the recent 5-year average of 1,816 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 BOF Actions

There have been no actions taken by the BOF 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 *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 River is in the *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.

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 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). Gill nets 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 $\geq$ 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 2007 catch was 11,346 fish which was similar to the recent 5-year average (2002-2006) of 11,768 fish (Table 14); this was in spite of an EO that reduced the sport fish bag limit from 5 to 2 fish during the 2007 season in the Minto Flats area. The 1,712 northern pike harvest in 2007 was above the 5-year average of 1,151 fish.

Estimated effort in Minto Flats has not increased as dramatically as the northern pike harvests, although the 2007 estimate of 2,595 days fished was above of the recent 5-year average of 2,361 days (Appendix C). Effort is not estimated by target species, however, it is felt that the majority of the effort, harvest and catch at Minto Flats is directed toward northern pike.

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 they must acquire a Tolovana Subsistence Northern Pike Permit from the ADF&G-Commercial Fisheries Division in Fairbanks. Subsistence users commonly harvest northern pike near the confluence of the Chatanika River and Goldstream Creek late in the winter. The winter subsistence northern pike harvest has averaged 872 fish over the past 5 years (2003–2007) from an average number of 48 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 70.044 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.

In addition the sport plan states that the fishery is open from June 1–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 (AK residents only); 2) there are no daily and/or annual limits; 3) gillnets may be used only April 15–Oct 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 > 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 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 Commercial Fisheries Division 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 Sport Fish Division 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 were harvested in the winter subsistence fishery, therefore an EO was issued by Sport Fish Division 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 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 pike. The 2008 abundance estimate in the Minto Flats index area was 9,854 pike $\geq$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.

Recent BOF Actions

There have been no actions taken by the BOF 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 are increasing, and it appears that this is primarily among the unguided anglers.

Prior to the 2010 AYK BOF meeting, Sport Fish and Commercial Fisheries managers should work together to develop a Minto Flats northern pike management plan that has consistent and clear language.

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 emergency order (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 likely 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 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 likely 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 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 that will be 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 (Dr. John Fox, University of Alaska Fairbanks, personal communication) due to high rainfall and the contributions from the diversion structure operation.

Recent BOF Actions

There have been no actions taken by the BOF 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, maintain the Rogge Creek restoration structure, and assess 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 or 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, 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 the 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 1,940 burbot is 75% of the total catch of 2,585 fish (Table 19), which is higher than any other fishery in the Tanana drainage, indicating the consumptive value of this fishery to Interior 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 BOF Actions

There have been no recent actions taken by the BOF 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 likely 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, they established a hook-and-line fishery in the Chatanika River for whitefish, with a daily bag and possession limit of 5 fish. Least ciscoes 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 Commercial Fisheries Division 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 Sept 21 to Oct 8.

In 2008, 200 household permits were issued beginning August 18 with a household limit of 10 whitefish. The fishery occurred from September 26 to October 26.

Fishery Objectives and Management

A management plan for the Chatanika River Personal Use Whitefish Spear Fishery was drafted in the summer of 2007 and it is currently in review (Brase *in prepb*). 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

In 2007, fifty-two of the 100 permittees participated in the fishery and they 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.

Although twice as many permits were issued in 2008, it appears that 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 90 permitees fished and they harvested 512 whitefish (Table 22). The weather in 2008 was much colder than 2007, the river actually iced up in places where fishing occurs preventing some permit holders from spear fishing on the last weekend.

Recent BOF 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, two separate abundance estimates were performed for the Chatanika River populations of least cisco and humpbacked whitefish. 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 a prudent course to follow.

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 grayling and are abundant in many areas where anglers fish for 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 196, 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

The 5-year (2002–2006) average lake trout harvest is 76 fish with a catch of 688 fish. The 2007 harvest of 28 fish was 37% of the 5-year average and the catch of 263 fish was 38% of the 5-year average (Table 23). This was the lowest reported catch since 2000.

Fishery Objectives and Management

Harding Lake is managed under the Special Management categories of the AYK Stocked Waters Management Plan (5 AAC 70.065) and the AYK Region Wild Lake Trout Management Plan (5 AAC 70.040).

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.

Recent BOF 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 Board also adopted the AYK Region Wild Lake Trout Management Plan (5 AAC 70.040). This plan provides regulatory guidelines to manage lake trout populations in the Arctic-Yukon-Kuskokwim (AYK) sport fish management areas. These guidelines are the

same as adopted in 2005 for the Upper Copper Upper Susitna Management Area (UCUSMA). The plan provides the Board of Fisheries with a consistent means to address proposals regarding lake trout submitted by the public and department.

Current or Recommended Research and Management Activities

The annual lake trout yield estimate from the Lake Area model for Harding Lake is 123 fish with a 26-inch minimum size limit (pre-2007 regulations; J. Burr, ADF&G, Sport Fish Biologist, Fairbanks; personal communication). Applying a 10% hooking mortality rate to the recent 5-year average catch (after the average harvest has been subtracted) and adding this to the 5-year average harvest, a total mortality of approximately 101 lake trout could be assumed under the pre-2007 regulations. Therefore it is unlikely that the lake trout population in Harding Lake can sustain a large increase in fishing pressure.

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. Sport Fish Division 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. The 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, and 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, Chinook 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 67% 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 *AYK Region Stocked Waters Management Plan* (5 AAC 70.065) 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 2008 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 can be traced back to the need to replace the aging Anchorage facilities. These include the lack of catchable fish, the reduction in size of catchable fish, whirling disease presence at the Elmendorf Hatchery, the need to stock only triploid fish in lakes that may occasionally flood.

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.

Recent BOF Actions

At the 2007 BOF meeting the Board updated the 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.

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.

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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, 1983–2007.

	Number of Days Fished				
Year	Statewide	Region III	LTMA	LTMA % of Statewide	LTMA % of Region III
1983	1,732,528	199,125	103,153	6%	52%
1984	1,866,837	199,041	95,942	5%	48%
1985	1,943,068	186,883	83,942	4%	45%
1986	2,071,412	194,713	94,436	5%	49%
1987	2,152,866	217,109	104,861	5%	48%
1988	2,311,291	233,559	120,205	5%	51%
1989	2,264,079	239,626	131,992	6%	55%
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%
10-Yr Average 1997–2006	2,303,973	220,976	79,582	3%	36%
5-Yr Average 2002–2006	2,342,868	200,566	71,676	3%	36%
2007 as % of 5-Yr Average	109%	102%	98%	91%	97%

Source: Mills (1979-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-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, 1983–2007.

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
1983	1,242,931	273,751	109,547	9%	40%
1984	1,310,626	245,083	121,755	9%	50%
1985	1,317,552	241,109	105,453	8%	44%
1986	1,245,380	216,826	97,155	8%	45%
1987	1,415,901	201,677	90,174	6%	45%
1988	1,457,934	264,371	113,150	8%	43%
1989	1,502,163	253,437	119,605	8%	47%
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%
10-year Average 1997–2006	1,048,645	144,148	40,082	4%	27%
5-Year Average 2002–2006	1,045,454	130,118	39,153	4%	29%
2007 as % of 5 Yr Average	91%	88%	61%	68%	72%

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

Table 3.–Abundance estimates and methods of estimation for Chinook salmon in the Chena, Salcha, and Chatanika rivers, 1986–2008.

	Chena		Salcha		Chatanika	
Year	Abundance	Method[d]	Abundance	Method[d]	Abundance	Method[d]
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 [f]	Tower	719	Tower
2003	8,739[a]	Tower	11,758 [b]	Tower	1,008	Tower
2004	9,645	Tower	15,761	Tower	2,444	Tower
2005	no estimate[c]	Tower	5,988	Tower	no estimate[c]	Tower
2006[e]	2,936	Tower	10,400	Tower	ND	ND
2007[e]	3,564	Tower	5,631 [f]	Tower	ND	ND
2008	3,212	Tower	5,300 [f]	Tower	ND	ND
BEG Range	2,800–5,700		3,300–6,500		No escapement goal	
10-year Average 1998–2007	6,387		8,641		986	
5-Year Average 2003–2007	6,224		9,924		1,726	
2008 as % 5 Yr Average	52%		53%		-	

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 prepa, Savereide (in prepa-b)

[a] Likely 11,100 Chinook salmon when expanded for non-counting days.

[b] Likely 15,500 Chinook salmon when expanded for non-counting days.

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

[d] M-R = Mark Recapture experiment.

[e] Preliminary results.

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

Table 4.–Sport catch and harvest of Chinook salmon in the Chena, Salcha and Chatanika rivers, 1983–2007.

	Chena River		Salcha River		Chatanika River	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	31	ND	808	ND	147	ND
1984	0	ND	260	ND	78	ND
1985	37	ND	871	ND	373	ND
1986	212	ND	525	ND	0	ND
1987	195	ND	244	ND	21	ND
1988	73	ND	236	ND	345	ND
1989	375	ND	231	ND	231	ND
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
10-Year Average 1997–2006	463	1,898	401	1,308	32	76
5-Year Average 2002–2006	448	2,243	509	1,550	10	56
2007 as % 5-Year Average	17%	37%	93%	102%	0%	0%

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

Table 5.–Number of salmon commercially harvested in the Yukon and Tanana rivers, 1995–2008.

	Total Yukon River (includes Tanana)				Tanana River Portion			
Year	Chinook	Summer Chum	Fall Chum	Coho	Chinook	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[a]	4,641	151,786	119,386	36,460	0	1,842	5,856	3,177

Source: JTC 2006; B. Busher, Commercial Fish Biologist, ADF&G, Fairbanks; personal communication.

[a] Data are preliminary (as of 11/08)

Table 6.–Number of salmon harvested in subsistence and personal use fisheries in the Yukon and Tanana rivers, 1995–2007.

	Total Yukon River (includes Tanana)				Tanana River Portion			
Year	Chinook	Summer Chum	Fall Chum	Coho	Chinook	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

Source: JTC 2006; B. Busher, Commercial Fish Biologist, ADF&G, Fairbanks; personal communication.

[a] Data are preliminary (as of 11/08).

Table 7.–Coho salmon escapement estimates from the Nenana River drainage 1993–2008.

Surveyed Stream	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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
Teklanika River	419	1,648	2,218	2,171	1,446	2,771	745	66[a]	855	328	658	450	325[e]	160[e]	no survey	1,539[d]
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
Julius Creek				5	0	0	no survey		6	15	1	280	280	0	no survey	0
*Wood Creek	666	1,317	500	201	0	0	0	0[b]		935	3,055	840	1,030	634	no survey	578
*Clear Creek				2,830	2,200	30	no survey	385[c]		160[c]		140[c]	[c]		no survey	292
*Glacier Creek				2,181	1,464	345	no survey	100[c]		42[c]	[c]	90[c]	70[c]	[c]	no survey	0[b]
Lignite Creek				282		175	no survey	95	135	130	67	91	378	168	no survey	343
June Creek				0	51	25	no survey	120	148	95	74[d]	[d]	[d]	[d]	no survey	42[d]
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		5,788

Source: US/Canada Yukon River Panel Joint Technical Committee (JTC 2008).

a High, muddy water ; poor visibility

b Beaver dam blocking stream mouth

c Numerous beaver dams; stream out of bank in places; fair visibility

d Incomplete survey (access to private property issue)

e Silty; poor visibility

* Tributaries to Julius Creek

Table 8.–Sport catch and harvest of coho salmon in the LTMA, 1983–2007.

	Nenana River Drainage		Other Rivers		Total	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	ND	ND	0	ND	84	ND
1984	ND	ND	33	ND	158	ND
1985	ND	ND	25	ND	25	ND
1986	ND	ND	460	ND	281	ND
1987	0	ND	0	ND	0	ND
1988	255	ND	206	ND	461	ND
1989	192	ND	288	ND	493	ND
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
10-Year Average 1997–2006	61	390	47	213	108	602
5-Year Average 2002–2006	30	340	21	183	51	524
2007 as % of 5-Year Average	0%	4%	33%	12%	14%	7%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, *in prepa-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 (1987a, 1988); 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, 1983–2007.

	Chena River		Piledriver Slough		Salcha River		Chatanika River		Nenana River Drainage[b]		Total LTMA[a]	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	18,729	ND	5,822	ND	9,640	ND	9,766	ND	ND	ND	60,748	ND
1984	27,077	ND	3,751	ND	13,305	ND	4,180	ND	ND	ND	61,560	ND
1985	6,240	ND	ND	ND	5,826	ND	7,404	ND	3,676	ND	37,611	ND
1986	7,862	ND	2,312	ND	7,540	ND	2,692	ND	748	ND	30,398	ND
1987	2,681	ND	4,907	ND	4,762	ND	5,619	ND	1,003	ND	24,723	ND
1988	4,532	ND	8,095	ND	2,383	ND	8,640	ND	3,456	ND	36,489	ND
1989	12,635	ND	4,459	ND	5,721	ND	6,934	ND	1,403	ND	39,407	ND
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		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	583	10,394	577	3,120	2,972	80,153
10-year Average 1997–2006	0	55,170	3	10,647	1,433	10,366		916	11,936	766	4,570	5,820	114,069
5-Year Average 2002–2006	0	39,977	6	5,192	1,104	6,112	461	829	10,886	896	4,866	5,888	87,010
2007 as % of 5 year average	-	114%	0%	64%	124%	192%		56%	95%	64%	64%	50%	92%

Source: Mills (1979-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, in prepa-b).

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

[b] Includes Brushkana Creek.

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) [c]	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 (1987b, 1988, 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 $\geq$ 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, 2006.

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, 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, 1983–2007.

	Minto Flats		Minto Flats Complex[a]		LTMA Total	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	2,748	N/A	3,461	N/A	7,898	N/A
1984	2,453	N/A	3,128	N/A	6,357	N/A
1985	4,146	N/A	5,256	N/A	8,224	N/A
1986	4,927	N/A	6,488	N/A	8,112	N/A
1987	1,781	N/A	2,401	N/A	6,105	N/A
1988	1,492	N/A	1,965	N/A	7,599	N/A
1989	1,734	N/A	2,596	N/A	8,310	N/A
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
10-year Average 1997–2006	938	8,039	1,074	9,375	2,777	18,152
5-Year Average 2002–2006	1,151	11,768	1,316	13,891	3,068	22,280
2007 as % of 5 Yr Average	149%	96%	137%	101%	85%	99%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d; Walker et al. (2003); and, Jennings et al. (2004, 2006a-b, *in prepa-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.–Number of subsistence permits issued, returned and reported fished and the total subsistence harvest of northern pike in the Tolovana River drainage, 1994–2008.

Year	Permits 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
5-Year Average (2003–2007)	103	94	48	872
2008 as % 5 Yr Average	142%	145%	165%	154%

Source: B. Busher, Commercial Fish Biologist, ADF&G, Fairbanks; personal communication.

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, 1985–2008.

Year	Estimated Abundance	Water Level (ft ASL)[b]	Harvest	Catch
1985		719.0	503	ND
1986		718.5	673	ND
1987		717.8	1,886	ND
1988		717.8	2,092	ND
1989		717.8	1,764	ND
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[a]	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	
	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] Fishery was closed in the summer, so harvest was attributed to the winter fishery.

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

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, 1983–2007.

	Tanana River		Chena River		Other[a]		Total LTMA	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	1,652	N/A	1,055	N/A	608	N/A	3,315	N/A
1984	1,210	N/A	1,233	N/A	688	N/A	3,131	N/A
1985	860	N/A	2,065	N/A	606	N/A	3,531	N/A
1986	1,236	N/A	884	N/A	957	N/A	3,077	N/A
1987	1,302	N/A	149	N/A	755	N/A	2,206	N/A
1988	1,335	N/A	386	N/A	183	N/A	1,904	N/A
1989	1,301	N/A	1,322	N/A	340	N/A	2,963	N/A
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
10-Year Average 1997–2006	1,108	1,510	538	782	400	555	2,045	2,846
5-Year Average 2002–2006	998	1,384	507	696	435	504	1,940	2,585
2007 as % 5 Yr Average	88%	70%	189%	185%	75%	73%	111%	101%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d; Walker et al. (2003); Jennings et al. (2004, 2006a-b, *in prepa-c*).

[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, 1983–2007.

	Chatanika River		Chena River		Tanana River		LTMA Lakes		LTMA Total	
Year	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	5,895	N/A	624	N/A	21	N/A	0	N/A	7,436	N/A
1984	9,268	N/A	779	N/A	52	N/A	52	N/A	10,472	N/A
1985	14,350	N/A	1,400	N/A	0	N/A	35	N/A	18,480	N/A
1986	22,038	N/A	1,818	N/A	1,272	N/A	0	N/A	26,995	N/A
1987	25,074	N/A	56	N/A	184	N/A	0	N/A	25,937	N/A
1988	7,983	N/A	728	N/A	62	N/A	0	N/A	9,123	N/A
1989	15,542	N/A	215	N/A	34	N/A	17	N/A	16,688	N/A
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

-continued-

Table 20.–Page 2 of 2.

Year	Chatanika River Harvest	Chatanika River Catch	Chena River Harvest	Chena River Catch	Tanana River Harvest	Tanana River Catch	LTMA Lakes Harvest	LTMA Lakes Catch	LTMA Total Harvest	LTMA Total Catch
2007	38	90	55	182	92	135	0	46	185	452
10-Year Average 1997–2006	31	184	99	237	31	39	115	216	461	949
5-Year Average 2002–2006	58	213	78	125	23	40	141	214	519	853
2007 as % 5 Yr Average	66%	42%	71%	145%	397%	334%	0%	21%	36%	53%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, *in prepa-c*).

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[b]	22,490 (SE = 2,777)	15,345 (SE = 1,350)[c]

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

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

[b] Preliminary, Klaus Wuttig, ADF&G Biologist , personal communication.

[c] Estimates for least cisco $\geq$ 250 mm FL.

Table 22.–Chatanika River Personal Use Whitefish Spear Fishery Permit Results, 2007–2008.

Year	Permits Issued	Permits Returned	Number of Households that Fished	Total Fish Harvested	Average Harvest/ Permit
2007	100	97	52	267	5.1
2008[a]	200	189	91	514	5.6

[a] Results as of April 2009.

Table 23.–Sport harvest and catch of lake trout and Arctic char in Harding Lake, 1984–2007.

Year	Lake Trout		Arctic Char	
	Harvest	Catch	Harvest	Catch
1984	0	ND		
1985	0	ND		
1986	24	ND		
1987	0	ND		
1988	55	ND	First Stocked	
1989	119	ND	141	ND
1990	51	186	304	996
1991	133	148	450	2,076
1992	200	517	508	1,401
1993	132	438	107	195
1994	66	280	72	108
1995	177	258	245	1,610
1996	121	556	405	1,801
1997	90	462	257	1,375
1998	44	311	331	865
1999	89	807	645	2,535
2000	67	258	66	1,460
2001	44	435	205	798
2002	48	597	1,341	2,543
2003	41	518	336	900
2004	72	479	354	2,461
2005	48	707	151	555
2006	171	1,140	127	1,416
2007	28	263	89	342
10-Year Average 1997–2006	71	571	381	1,491
5-Year Average 2002–2006	76	688	462	1,575
2007 as % of 5-Year Average	37%	38%	19%	22%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, *in prepa-c*).

Table 24.–Contribution of stocked fish to the LTMA total harvest and catch, 1990– 2007.

Year	All Stocked Species		LTMA Total		Stocked as a % of LTMA Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch
1990	43,414	113,918	75,186	269,361	58%	42%
1991	52,888	106,938	83,237	229,970	64%	47%
1992	29,374	85,757	47,466	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	45,676	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	236,191	80%	57%
2001	19,245	63,634	26,587	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	40,694	222,205	66%	38%
2005	16,567	55,427	27,342	151,367	61%	37%
2006	13,506	54,748	21,348	118,245	63%	46%
2007	15,508	53,193	23,844	156,976	65%	34%
10-Yr Average: 1997–2006	28,503	91,387	40,082	222,250	70%	42%
5-Yr Average: 2002–2006	27,248	81,781	39,154	189,458	67%	43%
2007 as a % of 5-Year Average	57%	65%	61%	83%	97%	79%

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

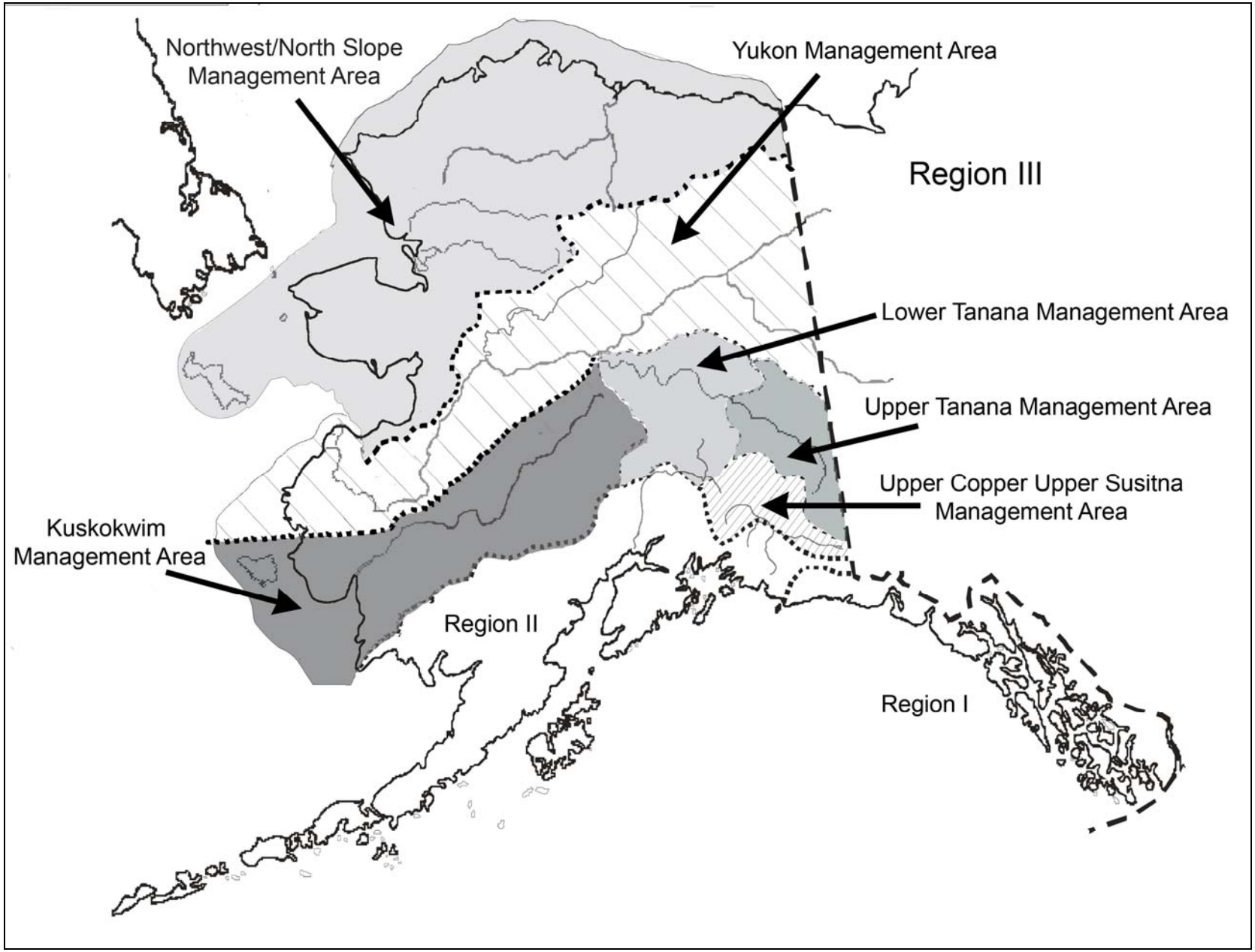

Figure 1.–Map of the sport fish regions in Alaska and the six Region III management areas.

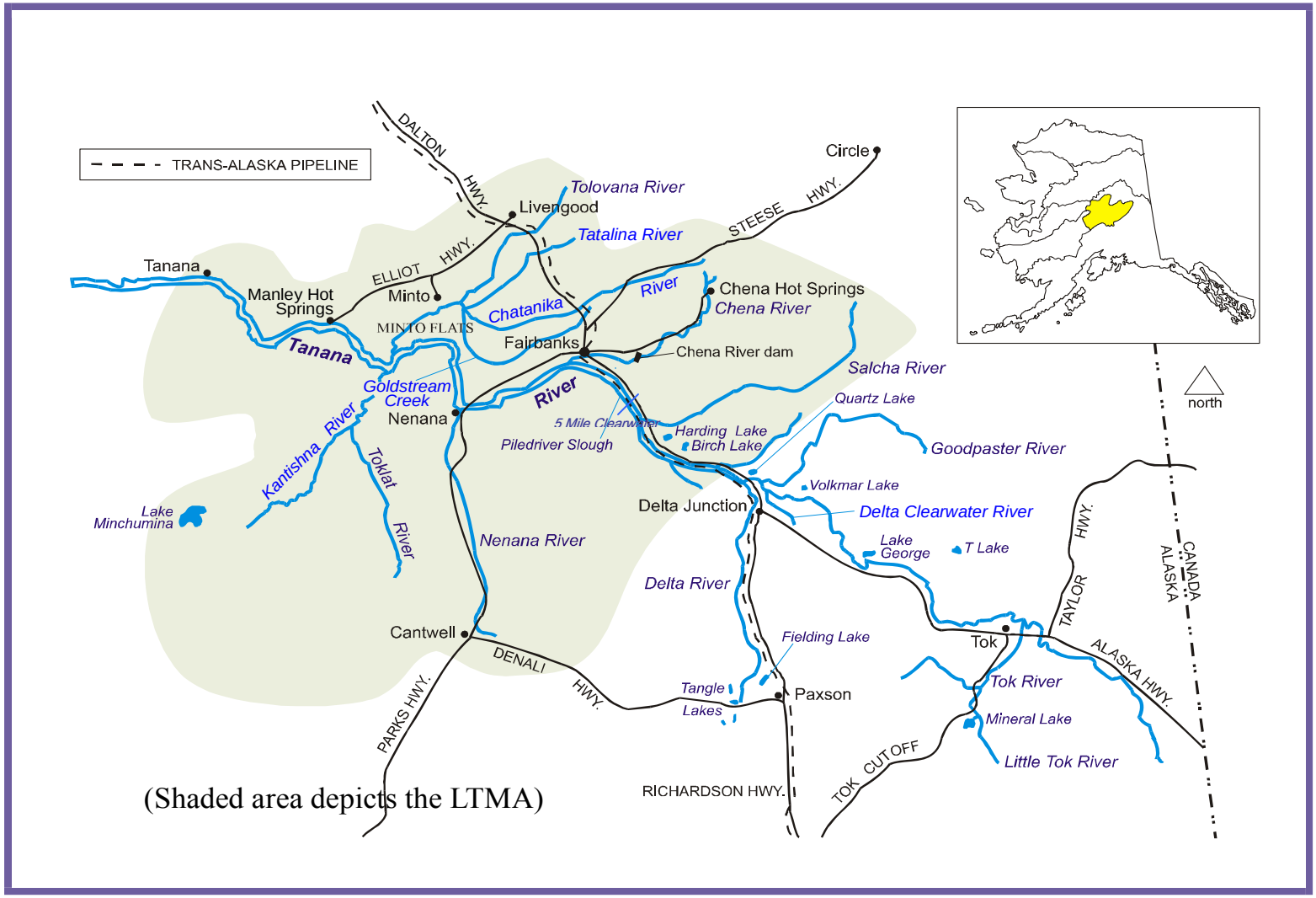

Figure 2.–Map of the Lower Tanana River Management Area (LTMA).

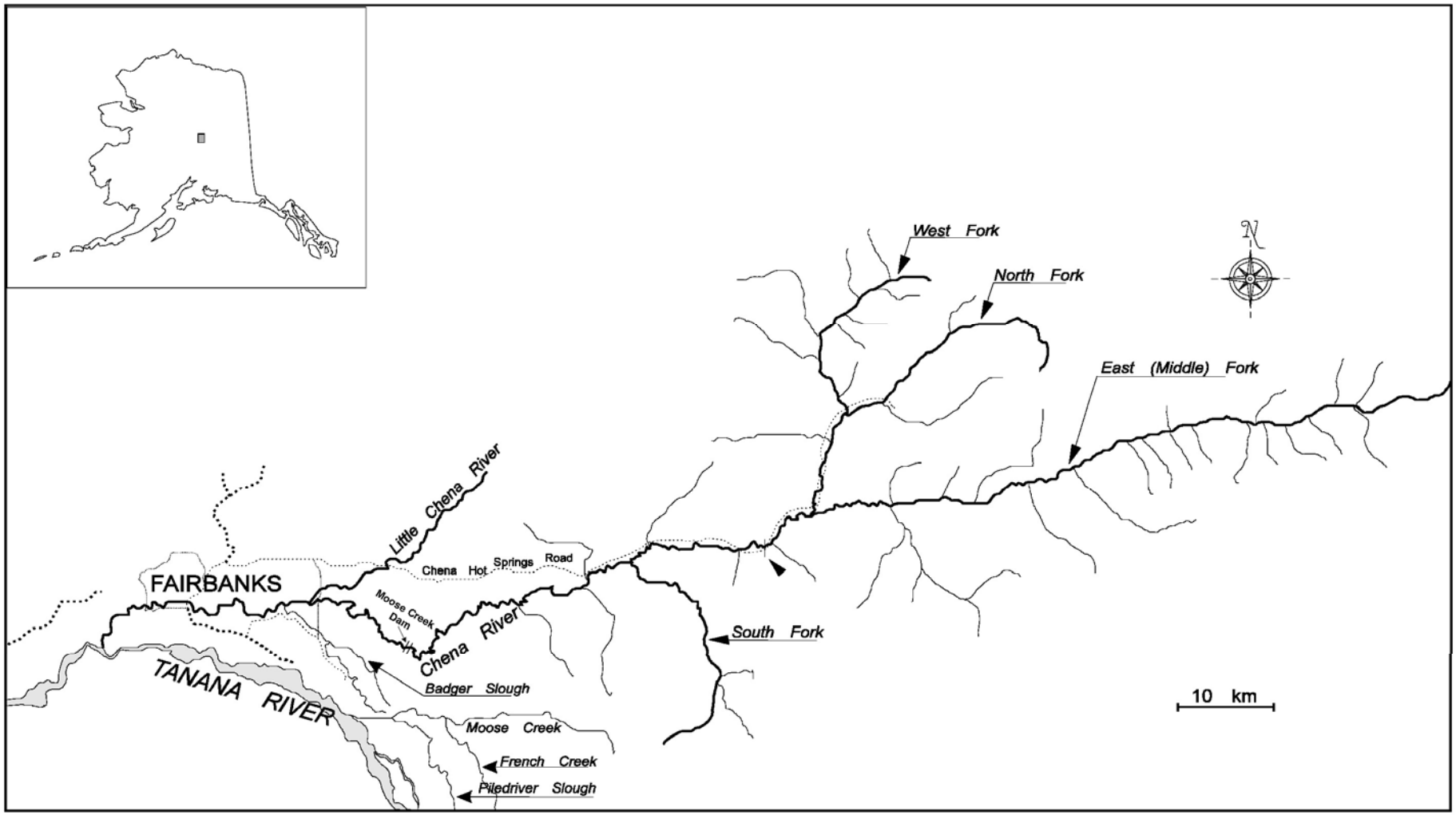

Figure 3.–The Chena River drainage.

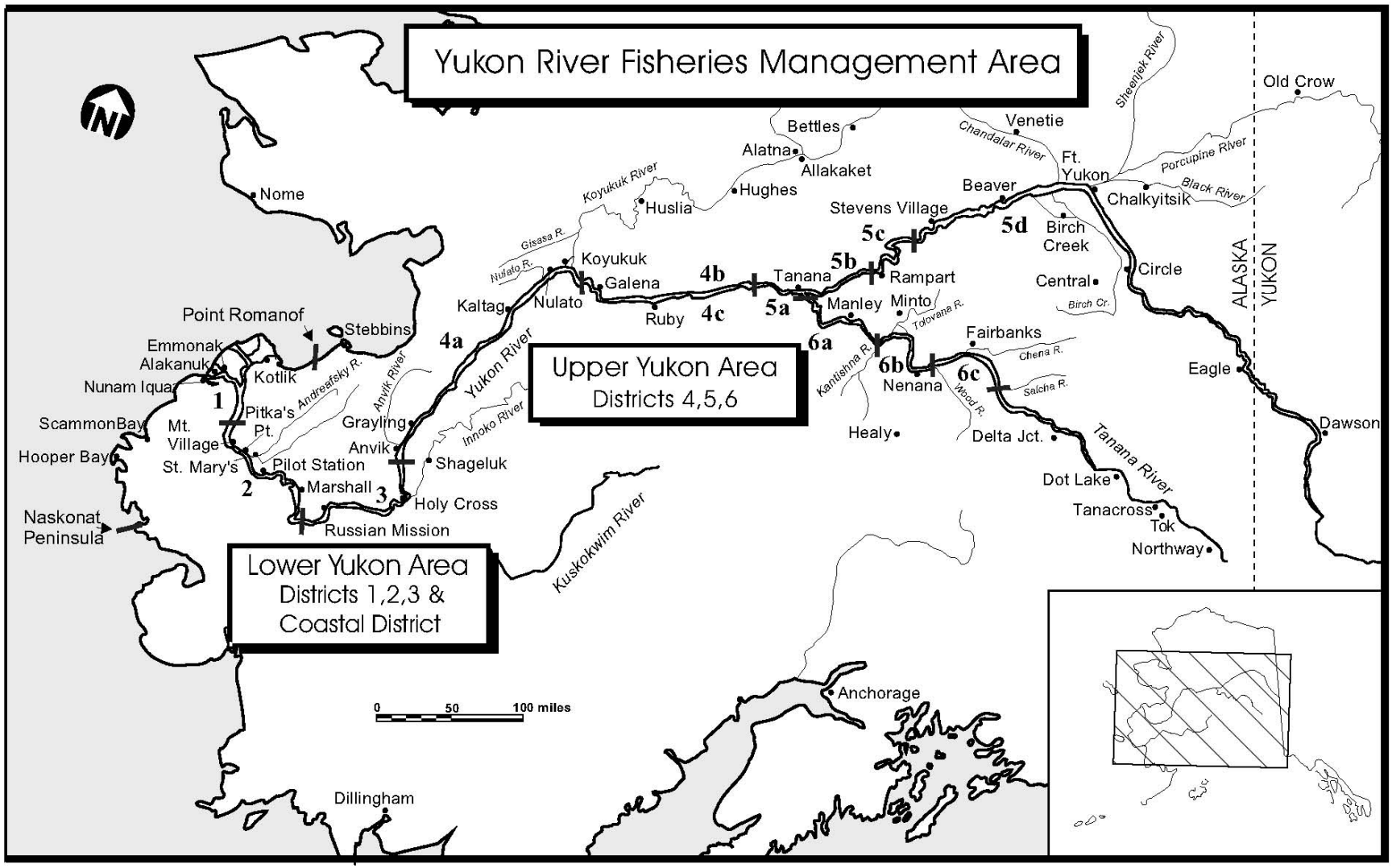

Figure 4.–Map of the Yukon River commercial fishing districts.

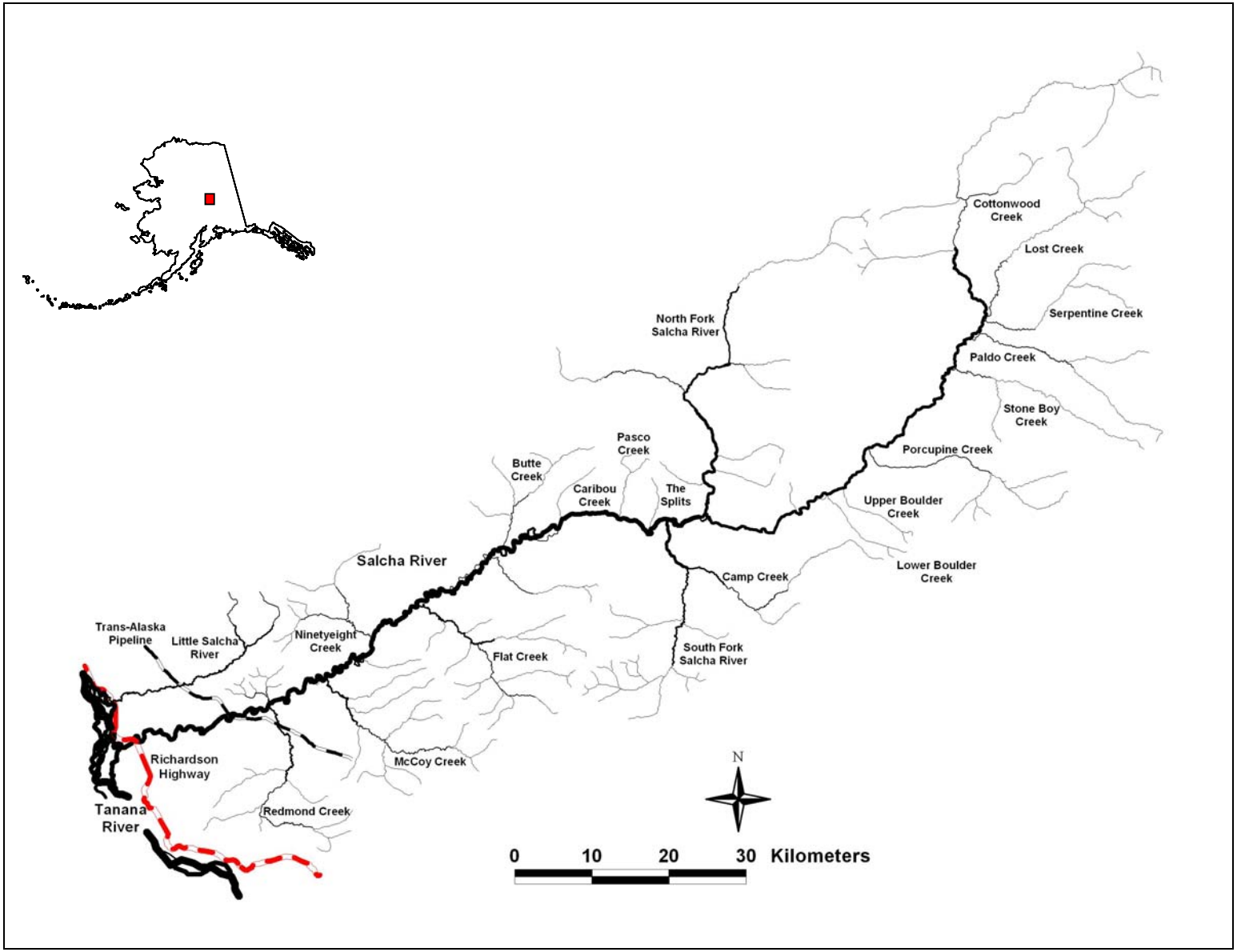

Figure 5.–Salcha River drainage.

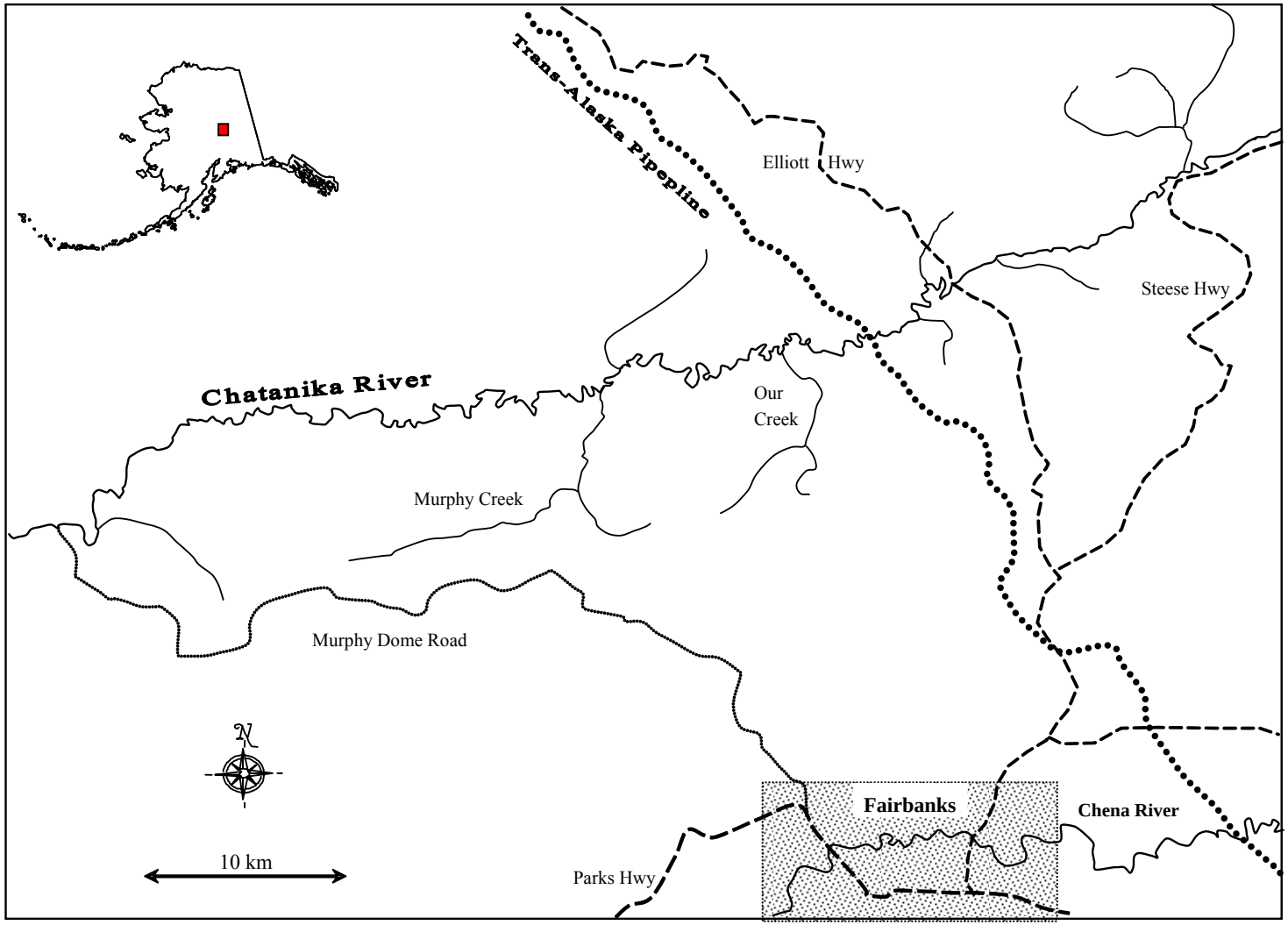

Figure 6.–Portion of the Chatanika River drainage.

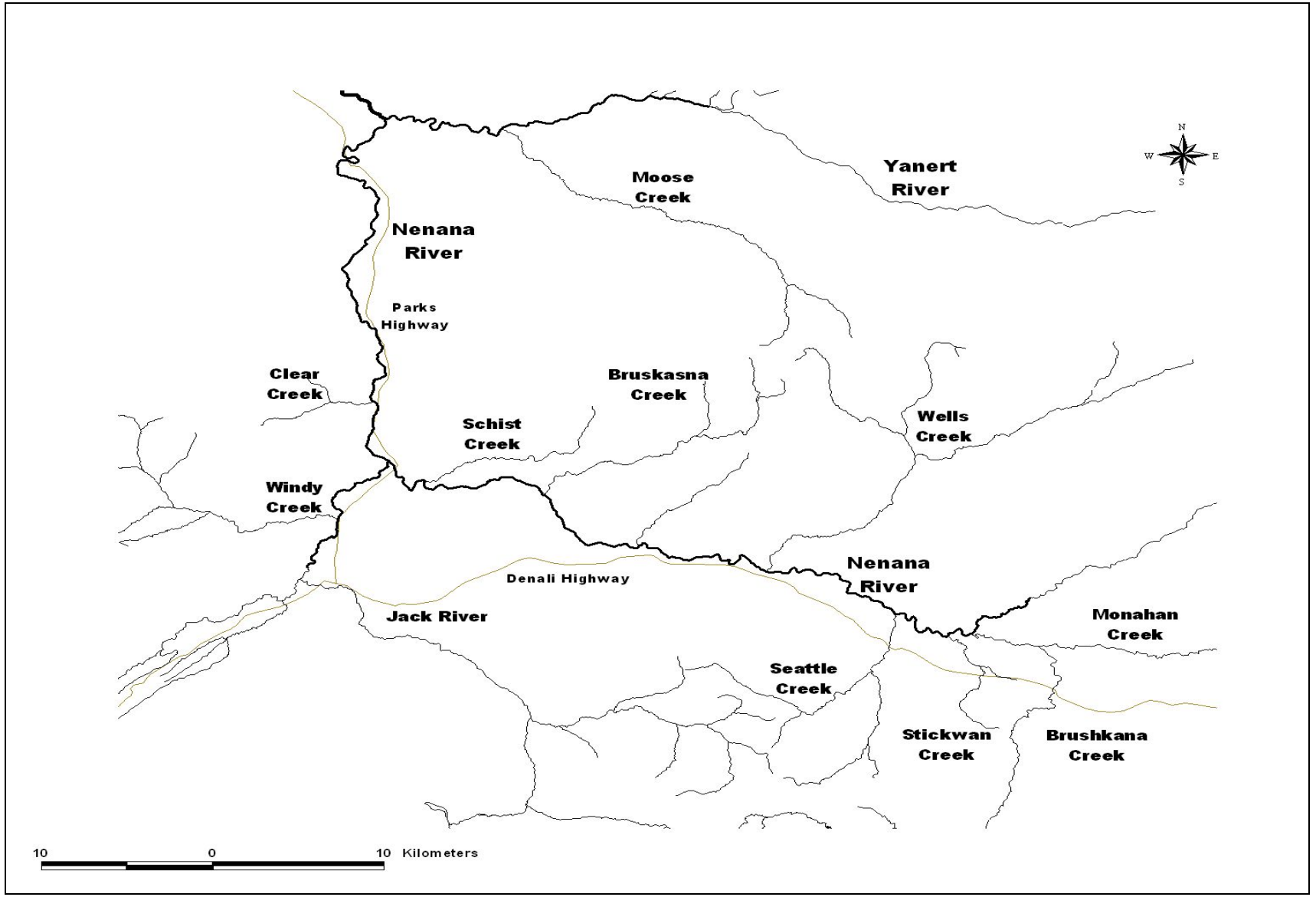

Figure 7.–Map of the Upper Nenana River drainage.

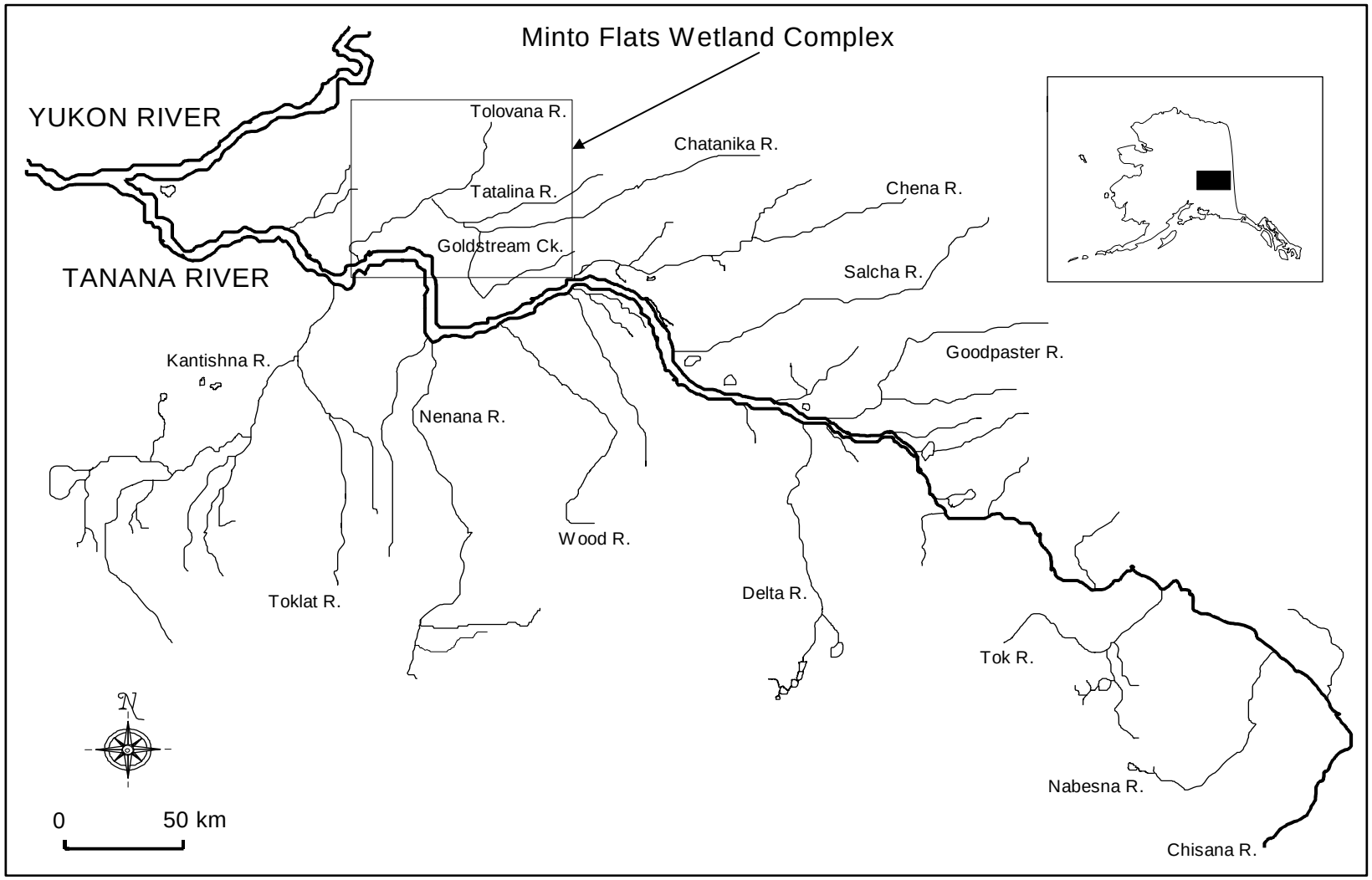

Figure 8.–Map of the Tanana River drainage and the demarcation of the Minto Flats wetland complex.

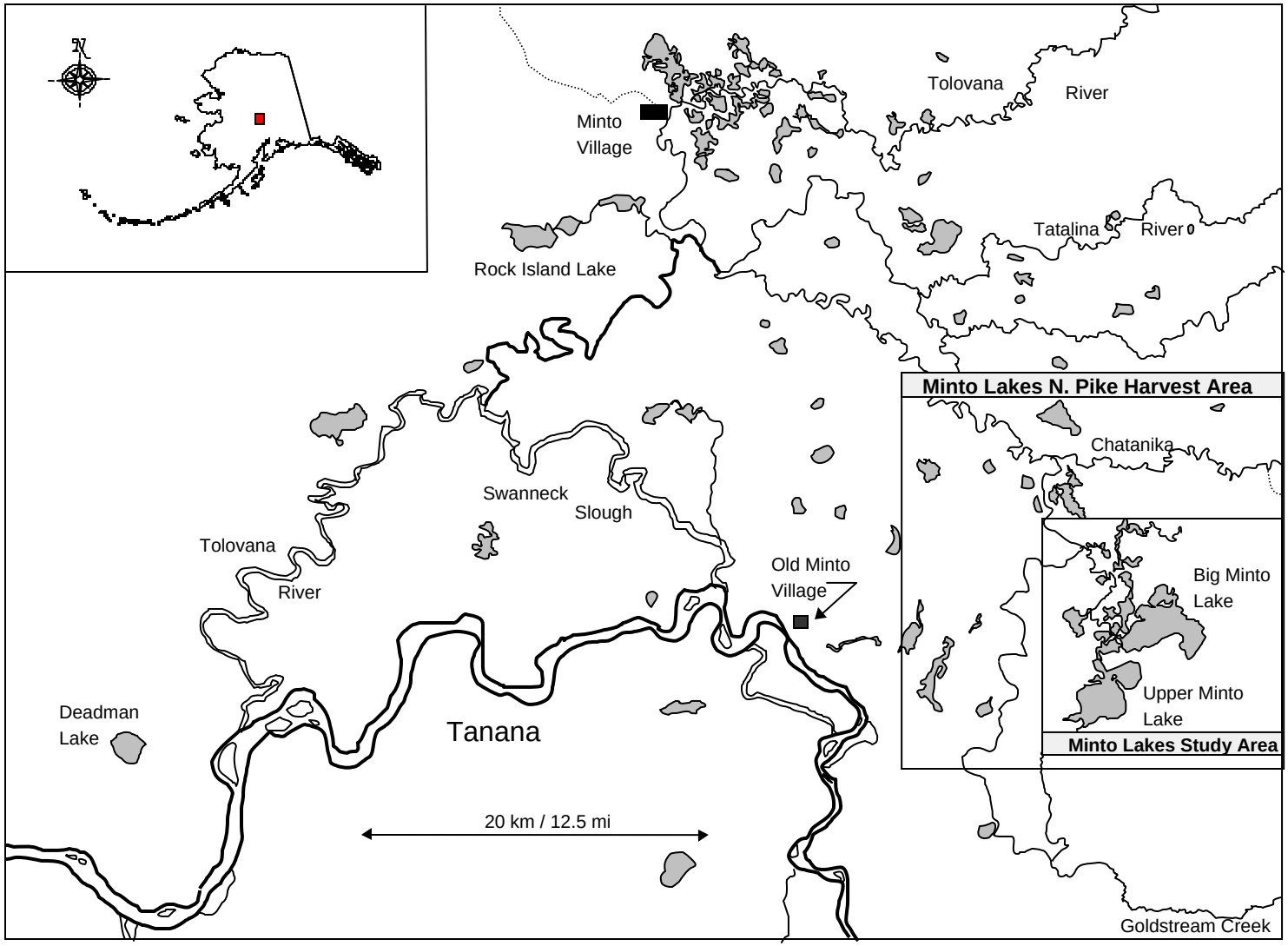

Figure 9.–Minto Flats wetland complex with demarcation of harvest reporting area and the northern pike population assessment area.

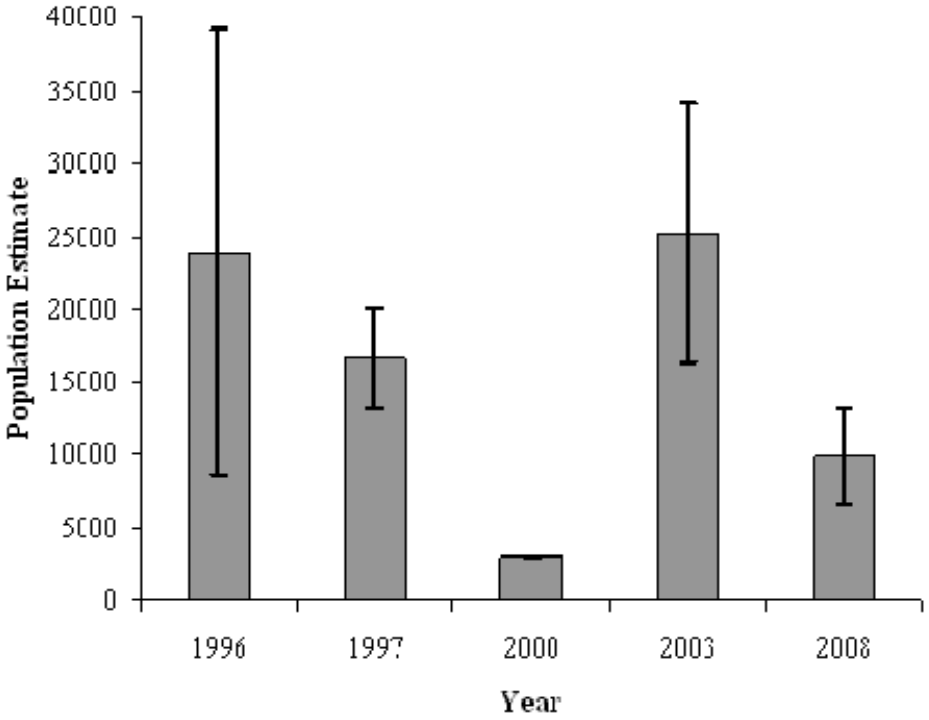

Figure 10.–The estimated abundance of northern pike ≥ 400 mm FL in the Minto Lakes study area in years during which abundance estimates were generated. Error bars represent 95% confidence intervals.

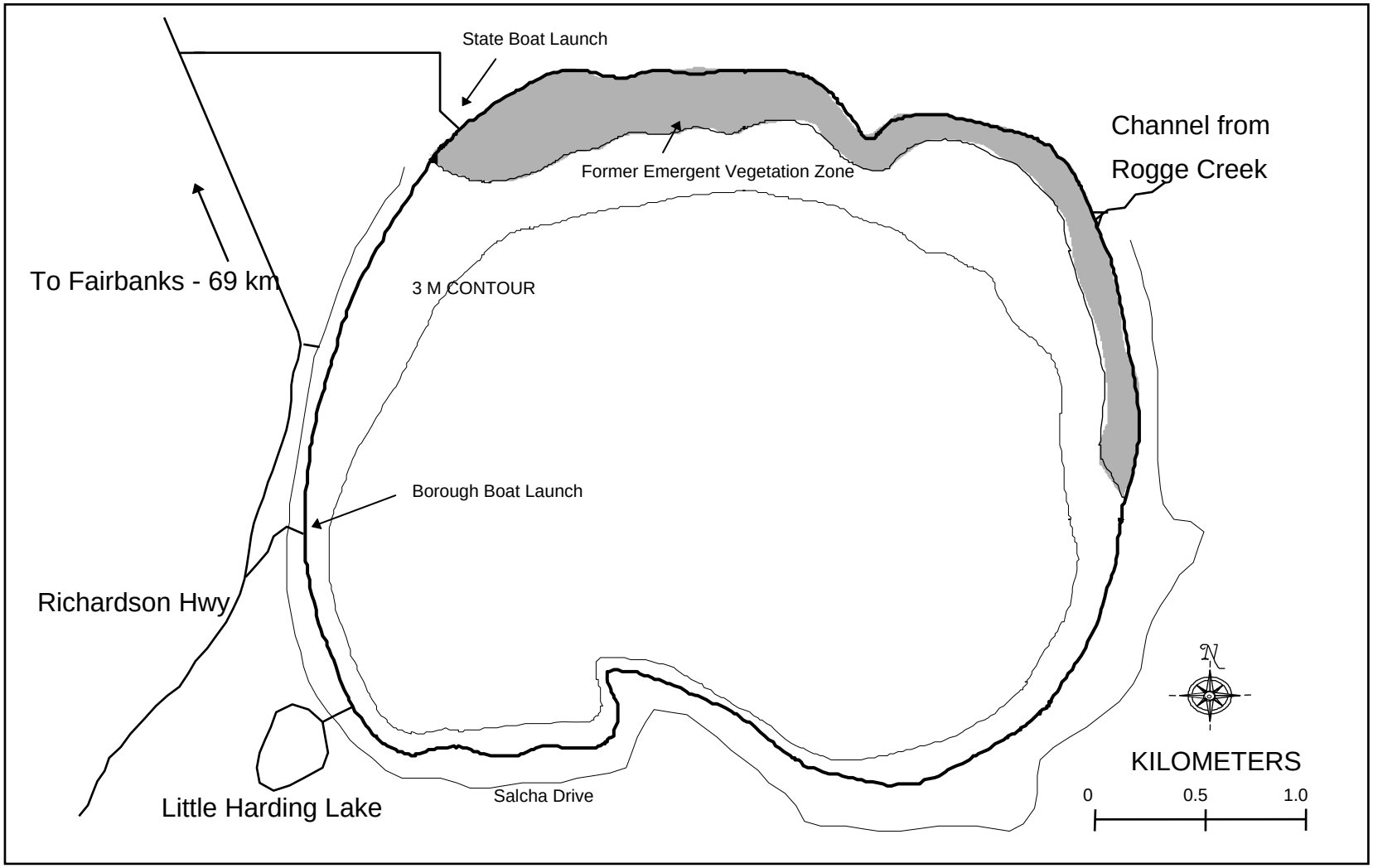

Figure 11.–Map of Harding Lake.

APPENDIX A

Appendix A.–Emergency orders issued for Lower Tanana River Management Area sport fisheries, 2004–2008.

Year	E. O. Number	Explanation
2004	3-KS-01-04	Reduces sport fish bag limit to either one Chinook salmon or one chum salmon per day in the entire Yukon River drainage, effective May 3 – December 31, 2004.
	3-KS-04-04	Rescinds 3-KS-01-04 and restores daily bag and possession limits for Chinook and chum salmon in all waters of the Yukon River drainage, effective June 28, 2004.
	3-KS-07-04	Increases the Chinook salmon sport bag and possession limit to three fish 20 inches or greater in length in all waters of the Chena and Salcha rivers open to salmon fishing, and in the Tanana River within a 1/2 mile radius of the mouths of the Chena and Salcha rivers, effective July 15, 2004.
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.

APPENDIX B

Appendix B.–Total number of fish harvested and caught by sport anglers in the LTMA, by species, 1983–2007.

	Anadromous Salmon						Stocked Species							
	Chinook		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
1983	992	ND	84	ND	582	ND	18,009	ND	10,048	ND	31	ND	212	ND
1984	338	ND	158	ND	351	ND	26,296	ND	11,929	ND	559	ND	13	ND
1985	1,356	ND	25	ND	1,023	ND	20,150	ND	14,278	ND	46	ND	1,171	ND
1986	788	ND	281	ND	496	ND	15,967	ND	7,165	ND	45	ND	37	ND
1987	492	ND	0	ND	578	ND	19,865	ND	9,984	ND	109	ND	30	ND
1988	399	ND	461	ND	236	ND	43,398	ND	11,603	ND	279	ND	418	ND
1989	460	ND	493	ND	969	ND	39,685	ND	8,490	ND	567	ND	682	ND
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
10 year Average (1997–2006)	927	3,495	108	615	183	1,051	19,424	57,427	5,139	14,864	254	1,104	2,525	7,414
5 Year Average (2002–2006)	1,008	4,106	51	534	161	1,036	16,926	46,260	5,777	15,053	205	1,183	2,848	8,272
2007 as % of 5-Year Average	54%	60%	13%	7%	25%	19%	64%	75%	45%	50%	17%	25%	62%	75%

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	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
1983	580	ND	7,898	ND	7,436	ND	3,350	ND	157	ND	60,168	ND	108,967	ND
1984	3350	ND	6,357	ND	10,742	ND	3,131	ND	320	ND	58,210	ND	118,404	ND
1985	1025	ND	8,824	ND	18,840	ND	3,566	ND	385	ND	35,686	ND	105,350	ND
1986	765	ND	8,112	ND	26,995	ND	6,618	ND	53	ND	29,633	ND	96,190	ND
1987	1230	ND	6,105	ND	25,937	ND	2,128	ND	223	ND	23,493	ND	88,944	ND
1988	2578	ND	7,599	ND	9,123	ND	1,922	ND	770	ND	33,911	ND	110,119	ND
1989	2706	ND	8,310	ND	16,688	ND	2,969	ND	403	ND	36,701	ND	116,417	ND
1990	1,089	5,712	5,414	23,964	6,299	8,014	2,207	2,701	68	255	16,643	116,630	74,096	263,649
1991	1,627	6,048	9,426	23,037	356	551	1,323	1,920	158	203	16,876	92,514	81,610	223,922
1992	1,006	6,686	4,200	24,477	2,810	3,140	2,368	2,964	148	612	7,269	72,134	46,461	185,908
1993	2,598	10,523	7,743	41,809	722	948	3,547	4,164	164	190	8,779	116,860	60,892	271,977
1994	2,811	21,290	13,200	76,372	242	1,677	2,551	3,154	163	267	9,015	150,678	49,690	303,979
1995	1,927	9,081	10,834	43,325	578	1,187	2,936	4,113	200	482	14,364	96,170	57,814	230,656
1996	632	13,358	4,890	34,867	149	660	1,378	1,935	40	219	4,441	110,613	57,782	303,479
1997	846	12,863	2,320	19,186	773	1,404	3,824	4,935	35	486	7,752	191,475	44,831	314,849
1998	1,340	15,679	2,003	12,964	490	1,115	2,088	2,832	17	79	4,574	164,176	36,449	271,907
1999	2,019	13,325	2,013	10,641	219	976	2,049	3,195	121	173	4,710	144,437	43,197	262,798
2000	1,171	13,196	2,793	13,585	313	847	2,032	3,312	187	312	3,658	79,266	48,612	222,259
2001	1,175	10,112	3,296	13,117	221	883	759	1,265	ND	41	1,517	61,115	25,405	137,485
2002	5,973	15,714	3,043	19,646	936	1,247	2,787	3,371	45	50	5,128	104,131	61,353	243,451
2003	1,623	15,824	5,416	20,150	167	741	1,375	1,851	59	415	3,793	72,418	37,435	180,486
2004	308	8,705	4,259	31,172	1,244	1,515	2,771	3,743	138	450	3,836	91,146	40,388	213,500
2005	752	10,568	3,319	26,171	54	227	1,466	1,856	129	454	4,645	63,502	26,590	140,801
2006	1,121	8,915	2,688	14,262	195	533	1,305	2,103	53	66	2,260	44,127	20,227	109,330
2007	286	4,593	2,619	22,146	185	452	2,160	2,623	37	37	2,686	75,560	23,558	152,383
10 year Average (1997–2006)	1,633	12,490	3,115	18,089	461	949	2,046	2,846	87	253	4,187	101,579	38,449	209,686
5 Year Average (2002–2006)	1,955	11,945	3,745	22,280	519	853	1,941	2,585	85	287	3,932	75,065	37,199	177,514
2007 as % of 5-Year Average	15%	38%	70%	99%	36%	53%	111%	101%	44%	13%	68%	101%	63%	86%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); and, Jennings et al. (2004, 2006a-b, *in prepa-c*).

APPENDIX C

Appendix C.–Estimates of effort (number of days fished) for select areas of the LTMA, 1983–2007.

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
1983	16,725	17,568	34,293	4,148	ND	ND	10,757	11,802	708	1,281	ND	103,153
1984	13,135	20,556	33,691	4,651	ND	ND	8,605	8,449	1,707	1,829	ND	95,942
1985	8,568	11,169	19,737	ND	ND	ND	10,231	13,109	850	2,011	329	83,942
1986	10,688	18,669	29,357	ND	ND	ND	7,783	13,792	2,064	3,318	550	94,436
1987	10,667	12,605	23,272	13,257	ND	ND	11,065	10,576	5,125	1,539	2,249	104,861
1988	9,677	16,244	25,921	24,375	ND	ND	11,642	7,494	3,256	1,564	2,897	120,205
1989	10,014	20,317	30,331	22,746	ND	ND	12,210	9,704	4,935	699	1,586	131,992
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

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Appendix C.–Page 2 of 2.

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 Drainageb	Total LTMA
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
10-Yr Average 1997–2006	9,623	14,302	24,292	4,378	2,624	2,569	5,287	5,787	2,339	2,133	1,633	79,582
5-Yr Average 2002–2006	7,604	13,294	20,898	2,296	2,378	2,135	4,513	5,112	2,009	2,361	1,816	71,676
2007 as a % of 5 Yr Avg	125%	109%	115%	66%	99%	139%	118%	111%	37%	110%	54%	98%

Source: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); and, Jennings et al. (2004, 2006a-b, *in prepa-b*).

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

b Includes Brushkana Creek.