Fishery Management Report No. 08-27

Fishery Management Report for Recreational Fisheries in the Lower Tanana River Management Area, 2006

by

Audra L. J. Brase

May 2008

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

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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 2006-2007.

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

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 Dingell-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 2006, with preliminary information from the 2007 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.

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 2006, the department had direct support responsibilities for 81 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 the sport fish regulations in the LTMA. These included gear restrictions in the Chena River (to promote catch-and-release of Arctic grayling, yet still allow anglers to target salmon, burbot, and northern pike), minimum length requirements for lake trout and gear restrictions (to reduce lake trout 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 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 and adding a regulatory management plan for wild Arctic grayling 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, 2006-07) to modify time, area, and bag/possession limit regulations. Emergency orders are implemented to deal with conservation issues that are not adequately controlled by existing regulations. Once implemented, an EO deals with the situation until it is resolved or the BOF can formally take up the issue. Emergency orders are also used as a tool for "in-season" management of fisheries. In-season management is usually in accordance with a fisheries management plan approved by the BOF. Emergency orders issued under this authority for the LTMA from 1990-2007 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, 2007 in Fort Yukon. At this meeting, three federal fisheries proposals for federal waters within the Yukon River drainage were addressed and council recommendations were forwarded to the Federal Subsistence Board.

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 prep*). The survey is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. Two types of questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or non-resident). Information gathered from the survey includes participation (number of anglers, trips, and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaskan waters as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest)

on a site-by-site basis. The survey results for each year are not available until the following year; hence the results for 2006 were not available until fall 2007. 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:

estimates based on fewer than 12 responses should not be used other than to document that sport fishing occurred;

1. estimates based on 12 to 29 responses can be useful in indicating relative orders of magnitude and for assessing long-term trends; and,

estimates based on 30 or more responses are generally representative of levels of fishing effort, catch, and harvest.

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 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 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 (United States Census Bureau 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 salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, Arctic grayling *Thymallus arcticus*, burbot *Lota lota*, lake trout *Salvelinus namaycush*, and northern pike *Esox lucius*.

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 the majority of fishers 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 arose in 2007 between subsistence and sport users who were fishing for pike in the Minto Flats. Some sport fishermen felt that a relatively few subsistence fishermen were locally depleting the Northern pike population and this was going to have an adverse affect on the summer 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 the LTMA a Federal Aid-funded boat launch and parking area was completed in 2005 on the Nenana River just south of the community of Nenana. In addition, there is a new stocked lake/ river access/campground project adjacent to the Tanana River south of Fairbanks. This project, in its initial planning phase, is tentatively called the Tanana Lakes project and 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 (1996-2005) the LTMA has averaged approximately 4% 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 14% of the statewide sport harvest, but 29% 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, and the Nenana, Salcha and Chena rivers. In 2005 a new freshwater guide program was implemented on a statewide basis. All freshwater guides must now 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

LTMA MAJOR FISHERIES

Recreational angling occurs throughout the LTMA in many diverse areas, and anglers may target many different species of fish. This report will focus on the fisheries that consistently get the highest amount of effort and/or have 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 relatively slow moving, run-off, tannic-stained river that flows through the city of Fairbanks (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 7,000 fish from 2002-06 (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 and/or a counting tower located at the Moose Creek dam (Table 3; Barton 1987, 1988; Barton and Conrad 1989; Brase *in prep a*; Brase and Doxey 2006; Burkholder 1991; Doxey 2004; Doxey et al. 2005; Evenson 1991-1993, 1996-1996; Evenson and Stuby 1997; Savereide *in prep*; Skaugstad 1988-1990a-b, Skaugstad 1992-1994; Stuby and Evenson 1998; Stuby 1999-2001). The recent 5 year (2002-06) average escapement was 7,072 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 and 2007 had good counting conditions throughout the majority of the run and a good estimate of escapement was 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. This point objective was calculated based on averages of escapement data available at the time. The guideline sport harvest objective set by the BOF in 1990 was 300 - 600 Chinook salmon. 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 limits for Chinook salmon in the Tanana River drainage have 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 2006 Chinook salmon catch was 1,208 fish with a harvest of 265 fish; this was below the 5-year average (2001-05) catch of 2,317 fish and average harvest of 502 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 2007 preliminary estimate of escapement was 3,564 Chinook salmon (Table 3). This number should be considered a minimum because there were five days when the counting panels were partially to fully hidden and total fish passage could not be fully quantified (Savereide *in prep*).

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. 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 many 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). 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 catch and harvest, 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 station, by mark-recapture experiments, or both, 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 deleterious effects of exposing salmon adults and eggs, as well as all other organisms in the 25+ foot wide path of 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 prep a*). 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, creating flood danger to property downstream. When flow exceeds 8,000 cubic feet per second, 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.

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 examinations an analysis be performed to determine whether the Chena and Salcha rivers are indeed good surrogates for each other's escapement.

In 2008 a cooperative counting tower/sonar project is expected to begin on the Chena River. Commercial Fisheries Division will supply a Didson® sonar unit, which will be used to evaluate salmon passage rates during periods of high water events. Sport Fish Division will continue to perform salmon counts on the Chena River from the Moose Creek Dam, and these numbers will 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 relatively clear 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 9,700 fish from 2002-06 (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 aerial surveys, mark-recapture experiments and/or a counting tower located near the Richardson Highway Bridge (Table 3; Barton 1988; Barton and Conrad 1989; Brase *in prep a*; Brase and Doxey 2006; Burkholder 1991b; Doxey 2004; Doxey et al. 2005; Evenson 1991-1993, 1995, 1996; Evenson and Stuby 1997; Skaugstad 1988–1990a, 1992-1994; Stuby and Evenson 1998; Stuby 1999–2001). The Salcha River counting tower is currently operated by staff from 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 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). Catch and harvest 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 2006 Chinook salmon catch was 747 fish with a harvest of 317 fish; this was below the 5-year average catch (2001-05) of 1,542 fish and average harvest of 467 fish. 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 2007 preliminary escapement estimate was 5,631 Chinook salmon (Table 3), this should be considered a minimum because there were five days when the counting panels were fully or partially obscured by high water and therefore the total number of salmon passing the counting tower could not be fully estimated (Savereide *in prep*).

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 the greater water clarity, the larger run size or 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). 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 put in place.

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

examinations 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. There are currently recreational cabins 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 1 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 and then annually from a counting tower from 1998–2005 (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 therefore poor quality estimates in most years.

Recent Fishery Performance

The Chatanika River Chinook salmon run is small and attracts little effort. The 5-year (2001-05) average catch is 67 fish and harvest is 15 fish (Table 4). In 2006 there was 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 (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 very small compared to the Delta Clearwater River (DCR) in the UTMA. Coho salmon escapement to the DCR has averaged over 60,000 fish annually in the past 5 years (Parker 2006).

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. The 2006 coho salmon catch in the Nenana River Drainage was 97 fish with a harvest of 37 fish (Table 8); this was below the five year (2001-05) average coho salmon catch of 469 fish and harvest of 46 fish.

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

Fishery Objectives and Management

In-season 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 catch and harvest 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 (2001-05) average chum salmon harvest in the LTMA was 114 fish (Appendix B).

Arctic Grayling

Chena River

Background and Historic Perspective

Because of its accessibility, the Chena River grayling stock offers 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 to those able to afford guiding services or transportation enabling them to fish in the upper river away from the road system. There is road access to the river from Eielson Air Force Base and the river flows through Fort Wainwright Army Base, giving military personnel direct access to the river. The Chena River State Recreation Area is visited by residents and non-resident visitors to Alaska traveling along the road system. The Chena River grayling stock is enjoyed by anglers motivated to pursue high-quality fishing on the road system and by those who simply wish to go fishing.

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 grayling fishery in Alaska. Annual fishing effort for the period 1979 - 1986 (for all species) averaged about 33,000 angler-days (Appendix C). Between 1986 and 1987 estimates of abundance declined (Table 9; Clark and Ridder 1987a, 1988), and more restrictive regulations were implemented. 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 in 1987. As a result of a population decline of Arctic graying in the Upper Chena River beginning in the mid-1980s, harvest decreased from 27,077 fish in 1984 to 6,240 fish in 1985, a 76% reduction in harvest (Table 10). During that same period effort declined from 33,691 to 19,737 days fished (Appendix C).

Although harvest decreased for two years after the imposition of these restrictions, and abundance estimates increased, both harvest and effort increased substantially in 1989, 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 sustainable levels, and in 1991 the fishery was further restricted by EO to catch-and-release only (Appendix A). The BOF made this a permanent regulatory change in 1994. Estimates of total effort for the Chena River between 1994 and 1998 averaged about 33,400 days fished.

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).

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). The Chena River grayling population continued to be assessed with mark-recapture experiments from 1991-1998, 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 a 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 stature as the Chena Valley has been developed and access has improved. The grayling fishery is almost entirely an open water fishery, occurring from April through October. Anglers target 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 grayling. Badger (Chena) and Piledriver sloughs are important components of the Chena River grayling fishery as they provide rearing areas for lower river grayling and easily accessible fishing locations.

The SWHS divides the Chena River into the "upper river" and "lower river" at river mile 71, and provides 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 at river mile 45 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 grayling, effort has not yet been apportioned between species and the multi-species fishery confounds attempts to describe the total effort targeting grayling within the Chena River fisheries.

Since 2004 the reported catches of Arctic grayling in the Chena River have been declining. The 2006 catch was 26,322 fish; this below the five year average (2001-05) catch of 41,889 fish, and well below the ten year average (1996-2005) of 57,546 fish (Table 10).

Effort also appears to be declining on the Chena River, with anglers reporting only 13,372 days fished in 2006, compared to the five year average (2001-05) of 22,967 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 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 grayling over 12 inches (~305mm) in total length.

In the lower river (downriver from river –mile 45 (the Moose Creek dam)) maintain a minimum abundance of 2,200 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). This estimate is below the draft management objective.

Although fishing effort in the Chena River has been declining it is unclear what the impetus is for this trend.

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 single hooks when fishing for Arctic grayling throughout the Chena River drainage (previously single hooks 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.

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 $\geq$12 inches/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 the regulations imposed in 1987 instituting a 12-inch minimum length limit, restrictions on the use of bait, and the restriction to catch-and-release only during the spring spawning period (Table 10). The restrictions, along with the fact that the fishery is located mainly off of the road system are probably causing the Arctic grayling harvest rate to remain steady. Since 1990, catch peaked at about 27,000 Arctic grayling in 1997 and harvest at about 3,000 fish, and both appear to be stabilizing at a lower level (Table 10).

The Salcha River was annually assessed from 1988-1994 and the population 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) $\geq$ 270 mm is similar to the 1994 index estimate of 2,767 fish (SE =) $\geq$ 270 mm. (Table 11; Gryska *in prep*).

Recent Fishery Performance

In terms of catch, harvest and effort, the Salcha River grayling fishery has appeared to be very stable, with a recent 5-year average (2001-05) catch of 6,800 and harvest of 1,084 fish (Table 10). However in 2006 the Salcha River grayling catch was 2,391 fish, and harvest was 703 fish; both below average.

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 put in place.

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, 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 and all must be $\geq$ 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 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 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

Catch and harvest of Arctic grayling on the Chatanika River has remained relatively stable since 2004. The 2006 catch was 7,885 fish with a harvest of 644 fish. This compares to the recent 5-year average (2001-05) catch of 9,910 fish and harvest of 764 fish (Table 10).

An extensive population assessment was performed in 2007; however preliminary results are not yet available (A.Gryska, Sport Fish Biologist, ADF&G, Fairbanks; personal communication).

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 put in place.

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 2001-02 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 464 Arctic grayling was below the recent 5 year (2001-05) average harvest of 831 fish (Table 10). Effort on the Nenana River was only slightly lower in 2006 with 1,296 days fished, compared to the recent five year average of 1,535 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 put in place.

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 traveling by boat along major rivers to the mouth of the tributary containing Arctic grayling. 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 and 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.

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. The Minto Flats fisheries are accessed primarily by boat and float plane. 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 the Minto Lakes and Chatanika River northern pike stocks are commingled, the fisheries overlap, 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 pike in the Tolovana River, Minto Flats, and the Lower Chatanika River drainage.

The Tolovana drainage/Minto Flats complex sport fishery has supported a major proportion of the LTMA northern pike sport fishery for many years (Table 13). 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.

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. Estimates of the abundance of northern pike ≥ 525 mm FL has remained in the range of 11,000 – 27,000 fish every year of the survey (Table 14). The most recent estimate in 2003 was 13,900 fish ≥ 525 mm FL (Scanlon 2006).

From 1984 – 1986 the total harvest of northern pike from the Minto Flats complex doubled (Table 13) and many of the fish harvested were likely large females caught during the winter ice fishing season. It was believed and later demonstrated by radiotelemetry studies (Roach 1998b) that these fish were the spawning stock for the Minto Lakes. After 1987, regulations were implemented closing sport fishing for northern pike at Minto Flats between October 1 and May 31, and the bag limit was reduced from 10 to 5 fish per day, only 1 of which may be ≥ 30 inches long.

Estimated catch and harvest in the Minto Flats complex peaked in 1994 with a catch of 52,191 fish and a harvest of 9,489 fish. Estimated catch and harvest continued to decline until 2001, when reported catches started to increase. A significant increase in harvest was noted in 2003, when harvest went from 650 fish in the Minto Flats complex, to 1,284 fish (Table 13).

Recent Fishery Performance

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.

After four years of high catches of northern pike in the Minto Flats, the 2006 catch was 8,447 fish which was down from the recent five year average (2001-05) of 12,785 fish (Table 13).

Estimated effort in Minto Flats has not increased as dramatically as the northern pike harvests, although the 2006 estimate of 2,416 days fished was above of the recent 5-year average of 1,722 days (Appendix C). Although effort is not estimated by target species, it is felt that the majority of the effort at Minto Flats is directed toward northern pike and that estimates of catch, harvest, and effort for Minto Flats are an acceptable measure of the northern pike fishery.

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 490 fish over the past 5 years from an average number of 29 permit holders (Table 15).

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 pike from January 1 to the ice free period, the sport daily bag and possession limit will be reduced by EO to 2 fish, 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: subsistence is open year round, however a permit is required (AK residents only); there are no daily and/or annual limits; gillnets may be used only April 15 – Oct 14; 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 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 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)

Current Issues and Fishery Outlook

Currently there is inconsistent wording between and within the subsistence and sport Minto Flats northern pike management plans in terms of the number of hooks one may fish in the winter subsistence fishery and the fishing area where 20% exploitation rate is calculated. The pike subsistence permits are valid for the calendar year (rather than a winter fishing season) therefore if there is a large harvest in early winter (November & December), it will not be applied towards the winter subsistence harvest calculation that is used to for determining restrictions to the sport

and/ or subsistence fisheries. These inconsistencies will likely be addressed at the 2010 BOF meeting.

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). Although the SWHS estimates show that catch, harvest and effort are increasing, it is not clear whether that is from guided or unguided anglers. In the future more surveys should be performed, and more contacts made with fishing guides and drop-off charter operators.

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.

The next Minto Lakes northern pike population assessment survey is scheduled for June 2008.

Harding Lake

Harding Lake is currently closed to 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 10) 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 16), 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 - 1998.

Abundance estimates for northern pike were conducted at Harding Lake annually from 1990-1999 except in 1994 (Table 16). Abundance of northern pike ≥ 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 ≥ 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 catch (828) and harvest (38) 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 ≥ 300 mm (~12 inches) had declined to 583 fish and that a recruitment failure was occurring (Table 16; 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) alluded to descriptions in fisheries literature of the importance to survival of young of the year northern pike of vegetated zones like those that have disappeared in Harding Lake. 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.

On May 1, 2000 an EO was issued closing northern pike fishing in Harding Lake until further notice (Appendix A). In January 2001, the BOF adopted a proposal to close northern pike fishing in Harding Lake.

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 16), 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 in 2000 (Appendix A), 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 once again covered with sufficient water.

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 17; 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. The impact of early winter weather conditions, timing of freeze-up, etc on effort are thus combined with those in the second part of the previous winter fishery. Anglers fish for burbot all winter, and casual observations indicate that effort

increases as the ice becomes safer to travel on in November, declines in late December, and 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, 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 five year average total harvest of 1,831 burbot is 76% of the total catch of 2,417 fish (Table 18), 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 18). 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 – 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 19).

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 20; 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 (Appendix A). 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 is 10,000 spawners, and the threshold abundance level for least cisco is 40,000 spawners.

Stock assessments done in 1992 and 1993 (Table 20; 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. Permits are issued through Sport Fish Division in Fairbanks.

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 prepa*). 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 August 27;

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

Preliminary results from the 2007 fishery seem to indicate that a high proportion of permittees 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.

Recent BOF Actions

As previously alluded to, in 2007 the BOF added spears as a legal personal use gear in the Chatanika River. On August 27 the department began issuing the 100 household permits with a household limit of 10 whitefish. The 2007 fishery occurred from Sept 21 – Oct 8.

Current or Recommended Research and Management Activities

Complete stock assessment of whitefish has not been done on the Chatanika River since 1997. The most recent stock composition sample was collected during 2000. Research on whitefish stocks in the Chatanika River should be limited to estimating stock composition until there are indications that stocks may be rebuilding and an abundance estimate is needed to confirm the recovery.

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 19). Harvest after the late 1980's in the Chena River declined sharply although overall effort remained similar (Appendix C). The reduction in harvest likely coincided with the use of bait on small hooks becoming prohibited 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 19). 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 to 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

Although Harding Lake is closed to pike fishing, it does continue to support stocked lake trout and Arctic char fisheries (Table 21). The first documented introduction of lake trout consisted of 12 adult fish in 1939. Although there were plans to continue stocking lake trout through the 1940s plans were put on hold during Alaska's involvement in WWII. In 1963 lake trout stockings resumed in Harding Lake with 252 adults released that year, and 265 adults in 1965. These lake trout came from wild populations in Boulder, Two-bit and Monte lakes in the Alaska Range (Doxey 1991).

In mid-winter of 1965 approximately 88,000 eyed lake trout eggs were lowered through the ice on Harding Lake in wire hatching baskets. These eggs had been collected from Susitna Lake and incubated to the eyed stage at the Fire Lake Hatchery. An estimated 75,000 eggs successfully hatched (Heckart and Roguski 1966). Fingerling lake trout were stocked in 1967 (31,200 fish) and again in 1990 (72,000 fish), subcatchables (~4 inches) were also stocked in 1990 (71,500 fish; Doxey 1991). From 1999-2001 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 (2001-2005) average lake trout catch is 547 fish with a harvest of 51 fish. The 2006 catch of 1,140 fish was 208% of the 5-year average and the harvest of 171 fish was 338% of the 5-year average (Table 21). Catches of lake trout on Harding Lake have been steadily increasing over the past 10 years.

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

The lake trout fishery at Harding Lake appears to be growing in popularity. This fishery should continue to be closely monitored to ensure its long term sustainability. The recent regulation

changes will likely reduce the number of fish harvested and minimize 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. Region III Sport Fish also operates a small "experimental" hatchery which is currently being used to test new technologies that may be applied in the new full scale Fairbanks Hatchery.

Some initial stocking events were "bucket-biology" experiments where fish were simply transported from one lake to another, often without good documentation. Stocking Alaska's waterways has changed over the years and now there are restrictive policies in place which outline criteria determining where fish can be stocked, what species may be stocked and what brood stocks can be used. In addition, all the hatchery raised fish must undergo pathology testing to ensure they are disease-free before being stocked 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. Within the spectrum of fisheries management needs of the LTMA they function to provide additional and more diverse angling opportunity and to shift pressure from and provide harvest alternatives to wild stocks. Perhaps one of the most important aspects of the diversity provided is the major, 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: fingerling (2 grams), subcatchables (20 - 60 grams), catchables (100 - 200 grams) and surplus broodstock (rainbow trout only, up to 1500 grams). Size at stocking depends on management needs for the 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 the angler use of such places produces demand far in excess of the production capacity of the pond to sustain the fishery with fingerling stockings. Conversely, fingerlings are stocked into remote lakes because those lakes have the productivity to meet the lower demand and 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 74% of the recent 5-year average annual LTMA sport harvest comes from the stocked lakes in the area, although catch and harvest of stocked species has been in a steady decline since 2002 (Table 22).

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 2007 Region III stocking plan may be accessed via the internet at: http://www.sf.adfg.state.ak.us/statewide/hatchery/pdfs/07region3.pdf

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 has been secured and above ground construction on the Fairbanks facility should begin in 2008 (site preparation was completed in fall 2007). 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 LTMA waters, 1983-2006.

	Number of Days Fished				LTMA	
Year	Statewide	Region III	LTMA	LTMA % of Statewide	Number of Anglers	Number of Trips
1983	1,732,528	199,125	103,153	6%		
1984	1,866,837	199,041	95,942	5%	N/A	91,089
1985	1,943,068	186,883	83,942	4%	N/A	80,416
1986	2,071,412	194,713	94,436	5%	N/A	76,997
1987	2,152,866	217,109	104,861	5%	N/A	100,534
1988	2,311,291	233,559	120,205	5%	N/A	110,399
1989	2,264,079	239,626	131,992	6%	26,337	103,980
1990	2,453,284	245,629	129,910	5%	25,861	98,317
1991	2,456,328	219,922	106,604	4%	23,577	81,254
1992	2,540,374	181,852	81,378	3%	21,478	67,395
1993	2,559,408	220,972	103,713	4%	22,673	88,243
1994	2,719,911	239,626	99,906	4%	21,987	83,620
1995	2,787,670	270,141	141,231	5%	28,325	114,388
1996	2,006,528	201,166	159,027	8%	24,046	117,364
1997	2,079,514	238,856	89,911	4%	23,371	71,280
1998	1,856,976	227,841	81,789	4%	19,423	62,298
1999	2,499,152	304,522	114,592	5%	21,196	72,673
2000	2,627,805	241,574	87,451	3%	17,136	57,482
2001	2,261,941	194,138	63,702	3%	24,719	40,408
2002	2,259,091	220,276	78,499	3%	25,965	47,445
2003	2,219,398	206,705	71,052	3%	29,871	48,300
2004	2,473,961	217,041	90,530	4%	31,703	54,651
2005	2,463,929	183,535	64,891	3%	25,036	41,022
2006	2,298,092	175,274	53,406	2%	23,871	34,092
10-Yr Average 1996-2005	2,274,830	223,565	90,144	4%	24,247	61,292
5-Yr Average 2001-2005	2,335,664	204,339	73,735	3%	27,459	46,365
2006 as % of 5-Yr Average	98%	86%	72%		87%	74%

[a] Data from: Mills (1979-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007 *in prep*).

Table 2.-Total number of fish harvested by recreational anglers from LTMA waters, compared to Region III and Statewide Freshwater Harvest, 1983-2006.

Year	Statewide F/W Harvest	Region III Harvest	Region III Harvest as a % of Statewide Harvest	LTMA Harvest	LTMA Harvest as a % of Region III Harvest
1983	1,242,931	273,751	22%	109,547	40%
1984	1,310,626	245,083	19%	121,755	50%
1985	1,317,552	241,109	18%	105,453	44%
1986	1,245,380	216,826	17%	97,155	45%
1987	1,415,901	201,677	14%	90,174	45%
1988	1,457,934	264,371	18%	113,150	43%
1989	1,502,163	253,437	17%	119,605	47%
1990	1,185,603	174,175	15%	75,186	43%
1991	1,282,541	221,164	17%	83,237	38%
1992	1,213,618	131,486	11%	47,466	36%
1993	1,087,651	151,551	14%	63,490	42%
1994	1,063,871	152,676	14%	52,501	34%
1995	852,700	118,473	14%	59,741	50%
1996	1,073,281	156,333	15%	58,414	37%
1997	942,274	161,500	17%	45,676	28%
1998	976,926	165,771	17%	37,789	23%
1999	1,078,643	169,675	16%	45,216	27%
2000	1,218,307	174,144	14%	49,783	29%
2001	1,043,036	119,797	11%	26,587	22%
2002	1,109,901	164,463	15%	67,326	41%
2003	1,052,301	129,029	12%	39,058	30%
2004	1,185,153	140,292	12%	40,694	29%
2005	994,001	109,956	11%	27,342	25%
2006	887,066	106,851	12%	21,347	20%
10-year Average 1996-2005	1,067,382	149,096	14%	43,789	29%
5-Year Average 2001-2005	1,076,878	132,707	12%	40,201	29%
2006 as % of 5 Yr Average	82%	81%	98%	53%	68%

[a] Data from: Mills (1979-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007 *in prep*).

Table 3.–Abundance estimates and methods[d] of estimation for Chinook salmon in the Chena, Salcha and Chatanika rivers[e], 1986-2007.

	Chena		Salcha		Chatanika	
Year	Abundance	Method	Abundance	Method	Abundance	Method
1986	9,065	M-R	-	-	-	-
1987	6,404	M-R	4,771	M-R	-	-
1988	3,346	M-R	4,562	M-R	-	-
1989	2,666	M-R	3,294	M-R	-	-
1990	5,603	M-R	10,728	M-R	-	-
1991	3,025	M-R	5,608	M-R	-	-
1992	5,230	M-R	7,862	M-R	-	-
1993	12,241	Tower	10,007	Tower	253	Boat Survey
1994	11,877	Tower	18,399	Tower	-	-
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[g]	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[f]	2,936	Tower	10,400	Tower	-	-
2007[f]	3,564	Tower	5,631[g]	Tower	-	-
BEG Range	2,800 – 5,700		3,300 – 6,500			N/A
10-year Average 1997-2006	7,477		9,921		1,339	
5-Year Average 2002-2006	7,072		9,710		1,390	
2007 as % 5 Yr Average	51%		59%		-	

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

f Preliminary results.

g 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, 1983-2006.

	Chena River		Salcha River		Chatanika River	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest
1983	N/A	31	N/A	808	N/A	147
1984	N/A	0	N/A	260	N/A	78
1985	N/A	37	N/A	871	N/A	373
1986	N/A	212	N/A	525	N/A	0
1987	N/A	195	N/A	244	N/A	21
1988	N/A	73	N/A	236	N/A	345
1989	N/A	375	N/A	231	N/A	231
1990	406	64	680	291	164	37
1991	258	110	515	373	181	82
1992	71	55	86	47	31	16
1993	2,545	733	1,788	601	625	192
1994	1,308	993	971	714	278	105
1995	1,095	662	4,091	1,448	134	58
1996	3,692	1,280	3,298	1,136	1,331	548
1997	3,186	1,039	2,639	719	336	175
1998	779	299	549	121	30	6
1999	2,004	442	1,237	445	63	63
2000	222	71	197	72	0	0
2001	1,579	536	707	108	55	23
2002	1,920	178	1,157	269	86	0
2003	3,012	976	3,752	1,127	13	13
2004	4,571	762	1,514	481	168	37
2005	503	57	582	351	12	0
2006	1,208	265	747	317	0	0
10-Year Average 1996-2005	2,147	564	1,563	483	209	87
5-Year Average 2001-2005	2,317	502	1,542	467	67	15
2006 as % 5-Year Average	52%	53%	48%	68%	0%	0%

[a] Data from: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007 *in prep)*.

Table 5.-Number of salmon commercially harvested 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	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[a]	33,348	198,201	90,677	44,575	281	14,674	15,572	1,368

[a] Data are preliminary (as of 11/07)

[b] Data from: JTC 2006; B. Busher, Commercial Fish Biologist, ADF&G, Fairbanks; personal communication.

Table 6.-Number of salmon harvested in subsistence and personal use fisheries in the Yukon and Tanana rivers, 1995–2006.

	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

[a] Data are preliminary.

[b] Data from: JTC 2006; B. Busher, Commercial Fish Biologist, ADF&G, Fairbanks; personal communication.

Table 7.–Coho salmon escapement estimates from the Nenana River drainage 1974-2007.

Year	Lost Slough[c]	Nenana Mainstem (Teklanika)[b c]	Julius Creek[c]	Wood (Otter) Creek[c]	Clear Creek[c]	Glacier Creek[c]	Seventeen Slough[c]	Lignite Springs[a]	June Creek[a]	Total
1974	1,388						27			
1975	943						956			
1976	118						281			
1977	524			310[a]			1,167			
1978	350			300[a]			466			
1979	227						1,987			
1980	499			1,603[a]			592			
1981	274			849[f g]			1,005			
1982				1,436[f g]						
1983	766			1,042[f]			103			
1984	2,677			8,826[f]						
1985	1,584			4,470[f]			2,081			
1986	794			1,664[f]			218[e]			
1987	2,511			2,387[f]			3,802			
1988	348			2,046[f]						
1989				412[f]			824			
1990	688	1,308					15			
1991	564	447					52			
1992	372						490			
1993	484	419		666[f h]			581			2,150
1994	944	1,648		1,317[f i]			2,909	244		7,062
1995	4,169	2,218		500[f]			2,972			9,859
1996	2,040	2,171	5	201[d j]	2,830	2,181	3,668[e]	282	0	13,378

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Year	Lost Slough[c]	Nenana Mainstem (Teklanika)[b c]	Julius Creek [c]	Wood (Otter) Creek[c]	Clear Creek [c]	Glacier Creek [c]	Seventeen Slough [c]	Lignite Springs[a]	June Creek[a]	Total
1997	1,524[k]	1,446	0	d, j	2,200	1,464	1,996	50[f]	51	8,731
1998	1,360[d]	2,771[d]	0	370[l, m]	30	345	1,413[l]	175[f]	25	6,489
1999	1,002[d]	745[d]		m			662[d]			
2000	55[d]	66[d]	370	m	385	100	879[d]	95	120	2,070
2001	242	855	6	699	962	216	3,741	135	148	7,004
2002	0	328	15	935	216	42	1,910	130	95	3,671
2003	85	658	1	3,055	135	62	4,535	67	74[d]	8,672
2004	220	450	280	840	148	90	3,370	91	85[d]	5,574
2005	430	325	280	1,030	85	70	3,890	378	201[d]	6,639
2006	194	160	0	634	972	14	1,916	168	66[d]	4,124
2007[n]	63	520	-	605	-	-	1,733	-	-	2,921

a Foot survey, unless otherwise noted.

b Mainstem Nenana River between confluence's of Lost Slough and Teklanika River.

c Aerial survey, fixed winged (1974 – 1998) or helicopter (1999 – current), unless otherwise noted.

d Poor survey due to water conditions.

e Boat survey.

f Weir count.

g Coho weir was operated at the mouth of Clear Creek (Shores Landing).

h Weir project terminated on October 4, 1993. Weir normally operated until mid to late October.

I Weir project terminated September 27, 1994. Weir normally operated until mid-October.

j Beginning at confluence of Clear Creek, the survey includes counts of both Glacier and Wood creeks to their headwaters.

k Survey of western floodplain only.

l Combination foot and boat survey.

m No survey due to obstructions in creek.

n Preliminary data.

◦ Data from US/Canada Yukon River Panel Joint Technical Committee (JTC 2006, JTC 2008).

Table 8.–Sport catch and harvest of coho salmon in the LTMA, 1983-2006.

	Nenana River Drainage		Other Rivers		Total	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest
1983	N/A	N/A	N/A	0	N/A	84
1984	N/A	N/A	N/A	33	N/A	158
1985	N/A	N/A	N/A	25	N/A	25
1986	N/A	N/A	N/A	460	N/A	281
1987	N/A	0	N/A	0	N/A	0
1988	N/A	255	N/A	206	N/A	461
1989	N/A	192	N/A	288	N/A	493
1990	664	261	24	8	688	269
1991	1,679	222	221	221	1,900	443
1992	583	89	177	109	760	198
1993	0	0	291	29	291	29
1994	720	440	226	99	946	539
1995	114	77	1,016	516	1,130	593
1996	775	149	1,186	199	1,961	348
1997	767	179	497	163	1,264	342
1998	422	119	128	6	550	125
1999	142	33	109	100	251	133
2000	124	6	323	34	447	40
2001	739	118	153	62	892	180
2002	98	24	120	0	218	24
2003	461	11	172	0	633	11
2004	1,046	78	360	106	1,406	184
2005	0	0	14	0	14	0
2006	97	37	251	0	348	37
10-Year Average 1996-2005	457	72	306	67	764	139
5-Year Average 2001-2005	469	46	164	34	633	80
2006 as % of 5-Year Average	21%	80%	153%	0%	55%	46%

[a] Data from: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007 *in prep*).

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 RM45)				Upper River (RM 45-90)					
Year	150-269mm	SE	≥270mm	SE	150-269mm	SE	≥270mm	SE	Total Abundance[a]	SE
1985	-		-		-		-		112,391	N/A
1986	-		-		-		-		61,581	26,987
1987	-		-		-		-		31,502	3,500
1988	-		-		-		-		22,204	2,092
1989	-		-		-		-		19,028	1,542
1990	-		-		-		-		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	-	-	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			

[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.

[e] Data from: 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).

Table 10.–Sport catch and harvest of Arctic grayling in the LTMA, 1977 – 2006.

	Chena River		Piledriver Slough		Salcha River		Chatanika River		Nenana River Drainage[b]		Total LTMA[a]	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1977	N/A	21,723	N/A	N/A	N/A	6,387	N/A	6,737	N/A	N/A	N/A	N/A
1978	N/A	33,330	N/A	N/A	N/A	9,067	N/A	9,284	N/A	N/A	N/A	N/A
1979	N/A	27,977	N/A	N/A	N/A	5,980	N/A	6,121	N/A	N/A	N/A	N/A
1980	N/A	41,825	N/A	N/A	N/A	5,351	N/A	5,143	N/A	N/A	N/A	N/A
1981	N/A	27,548	N/A	N/A	N/A	3,983	N/A	3,808	N/A	N/A	N/A	N/A
1982	N/A	29,318	N/A	N/A	N/A	6,843	N/A	6,445	N/A	N/A	N/A	N/A
1983	N/A	18,729	N/A	5,822	N/A	9,640	N/A	9,766	N/A	N/A	N/A	60,748
1984	N/A	27,077	N/A	3,751	N/A	13,305	N/A	4,180	N/A	N/A	N/A	61,560
1985	N/A	6,240	N/A	N/A	N/A	5,826	N/A	7,404	N/A	3,676	N/A	37,611
1986	N/A	7,862	N/A	2,312	N/A	7,540	N/A	2,692	N/A	748	N/A	30,398
1987	N/A	2,681	N/A	4,907	N/A	4,762	N/A	5,619	N/A	1,003	N/A	24,723
1988	N/A	4,532	N/A	8,095	N/A	2,383	N/A	8,640	N/A	3,456	N/A	36,489
1989	N/A	12,635	N/A	4,459	N/A	5,721	N/A	6,934	N/A	1,403	N/A	39,407
1990	32,831	4,507	38,480	2,380	8,609	1,992	17,960	4,237	5,114	1,064	122,342	17,732
1991	29,548	3,719	20,815	3,987	4,697	1,688	12,830	2,642	5,419	2,079	98,562	18,503
1992	21,196	0	15,252	1,030	8,265	1,592	11,750	1,751	6,109	1,368	78,820	8,275
1993	44,033	0	32,036	759	11,254	1,768	14,283	2,001	7,137	907	127,383	11,377
1994	60,539	114	31,324	57	9,995	2,308	24,750	2,659	8,357	1,834	171,968	11,826
1995	39,816	212	17,431	0	12,173	2,685	15,859	2,108	7,288	1,170	108,325	13,217
1996	50,083	0	16,667	0	10,327	2,371	11,928	420	6,146	628	123,971	5,073

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	Chena River		Piledriver Slough		Salcha River		Chatanika River		Nenana River Drainage[b]		Total LTMA[a]	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1997	98,628	0	24,585	0	27,307	2,959	24,484	1,550	7,248	1,881	204,338	8,598
1998	87,243	0	24,203	0	18,829	2,179	14,384	915	9,468	483	179,855	5,914
1999	86,220	0	19,571	0	13,932	1,524	13,851	1,462	1,868	383	157,762	6,729
2000	43,844	0	7,224	0	7,200	1,544	9,204	773	638	297	92,462	4,829
2001	35,881	0	4,927	0	5,831	602	3,002	317	2,146	142	71,227	2,692
2002	51,065	0	8,199	32	7,532	1,287	15,313	1,357	7,113	982	119,845	11,101
2003	36,098	0	6,037	0	6,756	1,225	13,178	955	4,425	697	88,242	5,416
2004	55,376	0	4,789	0	7,355	1,501	8,729	583	6,197	716	99,851	4,144
2005	31,026	0	3,962	0	6,525	806	9,326	607	4,487	1,619	74,070	5,397
2006	26,322	0	2,972	0	2,391	703	7,885	644	2,110	464	53,042	3,381
10-year Average 1996-2005	57,546	0	12,016	3	11,159	1,600	12,340	894	4,974	783	121,162	5,989
5-Year Average 2001-2005	41,889	0	5,583	6	6,800	1,084	9,910	764	4,874	831	90,647	5,750
2006 as % of 5 Yr Average	63%	-	53%	0%	35%	65%	80%	84%	43%	56%	59%	59%

[a] Includes stocked Arctic grayling.

[b] Includes Brushkana Creek.

[c] Data from: Mills (1979-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b,2007 *in prep).*

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[b].

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[d]			June 29 – July 15	2,042 (434)	≥270

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

[b] Data from Clark and Ridder (1987b, 1988, 1990); Clark et al. (1991); Ridder et al. (1993); Roach (1994, 1995); and Gryska (*in prep*).

[c] Standard Errors (SE) for fish ≥ 270mm could not be calculated for the 1988-94 estimates (Roach 1995).

[d] Preliminary results.

Table 12.–Densities of Arctic grayling in select sections of the Chatanika River, 1972, 1981, 1984-85, 1990-95, 2002, 2007.[a]

Year	Sampling Area	Grayling Density	Confidence[b]
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
1995	37.8 km section from 3.2 km above the Elliott Hwy Bridge to 8.2 km below Any Creek	236 fish $\geq$ 150mm / km 87 fish $\geq$ 270mm / km	SE = 21 fish/ km SE = 9 fish/ km
2002	18.3 km section located between Sourdough and Perhaps creeks (Steese Hwy)	34 fish 160–249 mm/ km 13 fish $\geq$ 250mm / km	SE = 17 fish/ km SE = 3 fish/ km

[a] Data from 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).

[b] 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.–Sport catch and harvest of northern pike in Minto Flats, the entire Minto Flats Complex (includes Minto Flats and Lower Chatanika River), and the overall LTMA, 1983-2006.

	Minto Flats		Minto Flats Complex[a]		LTMA Total	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest
1983	N/A	2,748	N/A	3,461	N/A	7,898
1984	N/A	2,453	N/A	3,128	N/A	6,357
1985	N/A	4,146	N/A	5,256	N/A	8,224
1986	N/A	4,927	N/A	6,488	N/A	8,112
1987	N/A	1,781	N/A	2,401	N/A	6,105
1988	N/A	1,492	N/A	1,965	N/A	7,599
1989	N/A	1,734	N/A	2,596	N/A	8,310
1990	4,946	1,570	6,060	2,009	23,964	5,414
1991	5,427	2,155	6,111	2,586	23,037	9,426
1992	6,175	1,299	6,585	1,325	24,477	4,200
1993	19,536	2,076	24,378	3,420	41,809	7,743
1994	47,248	8,438	52,191	9,489	76,372	13,200
1995	21,823	3,126	29,193	4,480	43,578	10,581
1996	12,495	2,078	16,479	2,716	34,867	4,890
1997	9,932	1,074	11,253	1,246	19,816	2,320
1998	4,105	731	4,704	772	12,964	2,003
1999	3,261	908	3,636	1,098	10,641	2,013
2000	1,402	266	1,784	390	13,585	2,793
2001	2,849	641	2,916	654	13,117	3,296
2002	8,806	483	10,085	650	19,646	3,043
2003	8,706	1,260	12,997	1,284	20,150	2,033
2004	19,205	1,199	21,159	1,390	31,172	4,259
2005	14,839	1,880	16,768	2,052	26,171	3,319
2006	7,284	935	8,447	1,204	14,262	2,688
10-year Average 1996-2005	8,560	1,052	10,178	1,225	20,213	2,997
5-Year Average 2001-2005	10,881	1,093	12,785	1,206	22,051	3,190
2006 as % of 5 Yr Average	67%	86%	66%	100%	65%	84%

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

[b] Catch and harvest data from: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d; Walker et al. (2003); and, Jennings et al. (2004, 2006a-b, 2007 *in prep*).

Table 14.–Estimated northern pike abundance in the Minto Lakes Study Area, 1987-2003[a].

	≥ 400mm		≥ 525 mm		≥ 600mm	
Year	Abundance	SE	Abundance	SE	Abundance	SE
1987	N/A	N/A	11,257	3,075	N/A	N/A
1988	N/A	N/A	13,233	3,143	N/A	N/A
1990	N/A	N/A	27,418	6,800	N/A	N/A
1991	N/A	N/A	17,633	5,480	N/A	N/A
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	N/A	N/A	N/A	N/A	5,331	1,152
2003	25,227	4,529	13,900	2,918	7,683	2,347

[a] Data from Burkholder (1989, 1990); Hansen and Burkholder (1992); Roach (1997b, 1998b); and, Scanlon (2001, 2006).

Table 15.–Number of subsistence permits issued, returned and reported fished and the total subsistence harvest of northern pike in the Tolovana River drainage, 1994-2006.

Year	Permits			Total Harvest
	Issued	Returned	Fished	
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	102	96	55	786
5-Year Average (2002-2006)	86	78	40	608
2007 as % 5 Yr Average	137%	132%	131%	300%

Source: Data from Busher et al. (2007).

Table 16.–Abundance of northern pike ≥ 300 mm fork length (SE in parentheses), sport catch and harvests of pike and water levels at Harding Lake, 1985-2006.

Year	Estimated Abundance[c]	Water Level (ft ASL)[b]	Catch	Harvest
1985	NS	719.0	NA	503
1986	NS	718.5	NA	673
1987	NS	717.8	NA	1,886
1988	NS	717.8	NA	2,092
1989	NS	717.8	NA	1,764
1990	2,285 (430)	717.8	3,629	591
1991	2,308 (563)	717.8	5,071	1,888
1992	2,868 (353)	717.8	3,400	341
1993	3,765 (432)	717.0	8,471	391
1994	NS	716.5	5,559	539
1995	2,338 (411)	716.5	3,852	502
1996	3,377 (915)	717.0	4,070	363
1997	1,780 (355)	716.5	1,665	62
1998	1,376 (279)	716.0	1,425	139
1999	583 (76)	715.8	828	38
2000	NS	715.6	396	24a
2001	NS	715.8		Fishery closed
2002	NS	715.6		Fishery closed
2003	NS	715.5		Fishery closed
2004	NS	715.3		Fishery closed
2005	NS	715.0		Fishery closed
2006	NS	715.0		Fishery closed
		Average 1990-1999 (prior to pike closure)	3,797	486

[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.

[c] NS = No survey was performed in these years, data from: Burkholder (1991a); Skaugstad and Burkholder (1992); Pearse (1994); Roach (1996 1997a, 1998a); Roach and McIntyre (1999); and, Scanlon and Roach (2000).

[d] Catch and harvest data from: Mills (1986-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. 2003).

Table 17.–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: Data from 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 18.–Sport catch and harvest of burbot in the LTMA, 1983-2006.

	Tanana River		Chena River		Other[a]		Total LTMA	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1983	N/A	1,652	N/A	1,055	N/A	608	N/A	3,315
1984	N/A	1,210	N/A	1,233	N/A	688	N/A	3,131
1985	N/A	860	N/A	2,065	N/A	606	N/A	3,531
1986	N/A	1,236	N/A	884	N/A	957	N/A	3,077
1987	N/A	1,302	N/A	149	N/A	755	N/A	2,206
1988	N/A	1,335	N/A	386	N/A	183	N/A	1,904
1989	N/A	1,301	N/A	1,322	N/A	340	N/A	2,963
1990	961	838	338	304	1,402	1,065	2,701	2,207
1991	857	683	609	225	454	415	1,920	1,323
1992	1,323	981	1,235	1,032	406	355	2,964	2,368
1993	1,814	1,635	1,328	1,135	1,022	777	4,164	3,547
1994	2,063	1,626	685	592	406	333	3,154	2,551
1995	2,120	1,684	1,045	597	948	655	4,113	2,936
1996	818	537	540	441	577	400	1,935	1,378
1997	3,032	2,437	1,018	703	885	684	4,935	3,824
1998	1,262	876	1,144	854	426	358	2,832	2,088
1999	1,521	1,328	657	350	1,017	371	3,195	2,049
2000	1,442	936	1,236	702	634	394	3,312	2,032
2001	919	508	281	230	65	21	1,265	759
2002	1,632	1,283	83	58	1,656	1,446	3,371	2,787
2003	1,092	758	573	487	186	127	1,851	1,372
2004	1,616	1,228	1,977	1,433	150	110	3,743	2,771
2005	1,420	1,129	310	248	126	89	1,856	1,466
2006	1,162	592	539	311	402	402	2,103	1,305
10-Year Average 1996-2005	1,475	1,102	782	551	572	400	2,829	2,053
5-Year Average 2001-2005	1,336	981	645	491	437	359	2,417	1,831
2006 as % 5 Yr Average	87%	60%	84%	63%	92%	112%	87%	71%

[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.

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

Table 19.–Sport catch and harvest of whitefish in the LTMA, 1983–2006.

	Chatanika River		Chena River		Tanana River		LTMA Lakes		LTMA Total	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1983	N/A	5,895	N/A	624	N/A	21	N/A	0	N/A	7,436
1984	N/A	9,268	N/A	779	N/A	52	N/A	52	N/A	10,472
1985	N/A	14,350	N/A	1,400	N/A	0	N/A	35	N/A	18,480
1986	N/A	22,038	N/A	1,818	N/A	1,272	N/A	0	N/A	26,995
1987	N/A	25,074	N/A	56	N/A	184	N/A	0	N/A	25,937
1988	N/A	7,983	N/A	728	N/A	62	N/A	0	N/A	9,123
1989	N/A	15,542	N/A	215	N/A	34	N/A	17	N/A	16,688
1990	5,334	5,216	236	85	169	0	1,098	203	8,014	6,299
1991	23	0	0	0	0	0	0	0	551	356
1992	2,033	2,033	212	129	387	368	0	0	3,140	2,810
1993	558	558	148	96	47	0	52	0	948	722
1994	436	97	194	0	117	29	53	0	1,677	242
1995	71	9	436	155	36	18	147	147	1,187	578
1996	320	46	150	18	0	0	0	0	660	149
1997	95	24	425	325	68	68	379	14	1,404	773
1998	60	0	425	83	20	20	376	342	1,115	490
1999	14	0	311	41	7	7	174	37	976	219
2000	361	0	176	59	0	0	66	49	847	313
2001	245	0	402	91	95	95	93	0	883	221
2002	181	28	126	63	28	0	442	442	1,247	936
2003	607	152	91	15	0	0	43	0	741	167
2004	196	45	286	271	0	0	330	225	1,515	1,244
2005	16	0	59	0	38	38	46	16	227	54
2006	63	63	64	41	136	78	210	23	533	195
10-Year Average 1996-2005	210	30	245	97	26	23	195	113	962	457
5-Year Average 2001-2005	249	45	193	88	32	27	191	137	923	524
2006 as % 5 Yr Average	25%	140%	33%	47%	422%	293%	110%	17%	58%	37%

[a] Catch and harvest data from: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b,2007 *in prep*).

Table 20.-Humpback whitefish and least cisco abundance estimates from the Chatanika River, 1988–1997 .

Year	Humpback Whitefish	Least Cisco
1988	41,211 (SE = 5,155)	N/A
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)

Source: Data from 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.

Table 21.–Sport catch and harvest of lake trout and Arctic char in Harding Lake, 1984-2006.

	Lake Trout		Arctic Char	
Year	Catch	Harvest	Catch	Harvest
1984	N/A	0		
1985	N/A	0		
1986	N/A	24		
1987	N/A	0		
1988	N/A	55		First Stocked
1989	N/A	119	N/A	141
1990	186	51	996	304
1991	148	133	2,076	450
1992	517	200	1,401	508
1993	438	132	195	107
1994	280	66	108	72
1995	258	177	1,610	245
1996	556	121	1,801	405
1997	462	90	1,375	257
1998	311	44	865	331
1999	807	89	2,535	645
2000	258	67	1,460	66
2001	435	44	798	205
2002	597	48	2,543	1,341
2003	518	41	900	336
2004	479	72	2,461	354
2005	707	48	555	151
2006	1,140	171	1,416	127
10-Year Average 1996-2005	513	66	1,529	409
5-Year Average 2001-2005	547	51	1,451	477
2006 as % of 5-Year Average	208%	338%	98%	27%

Source: Catch and harvest data from: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007 *in prep*).

Table 22.–Contribution of stocked fish to the LTMA total catch and harvest, 1990 – 2006.

	All Stocked Species[a]		LTMA Total		Stocked as a % of LTMA Total	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest
1990	113,918	43,414	269,361	75,186	42%	58%
1991	106,938	52,888	229,970	83,237	47%	64%
1992	85,757	29,374	192,594	47,466	45%	62%
1993	110,630	38,390	282,500	63,490	39%	60%
1994	87,408	24,465	325,269	52,501	27%	47%
1995	84,382	24,754	239,737	59,741	35%	41%
1996	147,958	42,036	316,837	58,414	47%	72%
1997	97,095	27,840	327,712	45,676	30%	61%
1998	101,743	27,741	287,586	37,789	35%	73%
1999	107,840	34,186	276,123	45,216	39%	76%
2000	134,650	39,778	236,191	49,783	57%	80%
2001	63,634	19,245	147,597	26,587	43%	72%
2002	124,509	53,880	259,165	67,326	48%	80%
2003	89,559	25,414	196,310	39,058	46%	65%
2004	84,661	26,873	222,205	40,694	38%	66%
2005	55,427	16,567	151,367	27,342	37%	61%
2006	54,748	13,506	118,245	21,348	46%	63%
10-Yr Average: 1996-2005	100,708	31,356	242,109	43,789	42%	71%
5-Yr Average: 2001-2005	83,558	28,396	195,329	40,201	42%	69%
2006 as a % of 5-Year Average	66%	48%	61%	53%	108%	92%

[a] Data from: A. Behr, Stocked Waters Biologist, ADF&G, Fairbanks; personal communication.

[b] Catch and harvest data from: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); and, Jennings et al. (2004, 2006a-b, 2007 *in prep*).

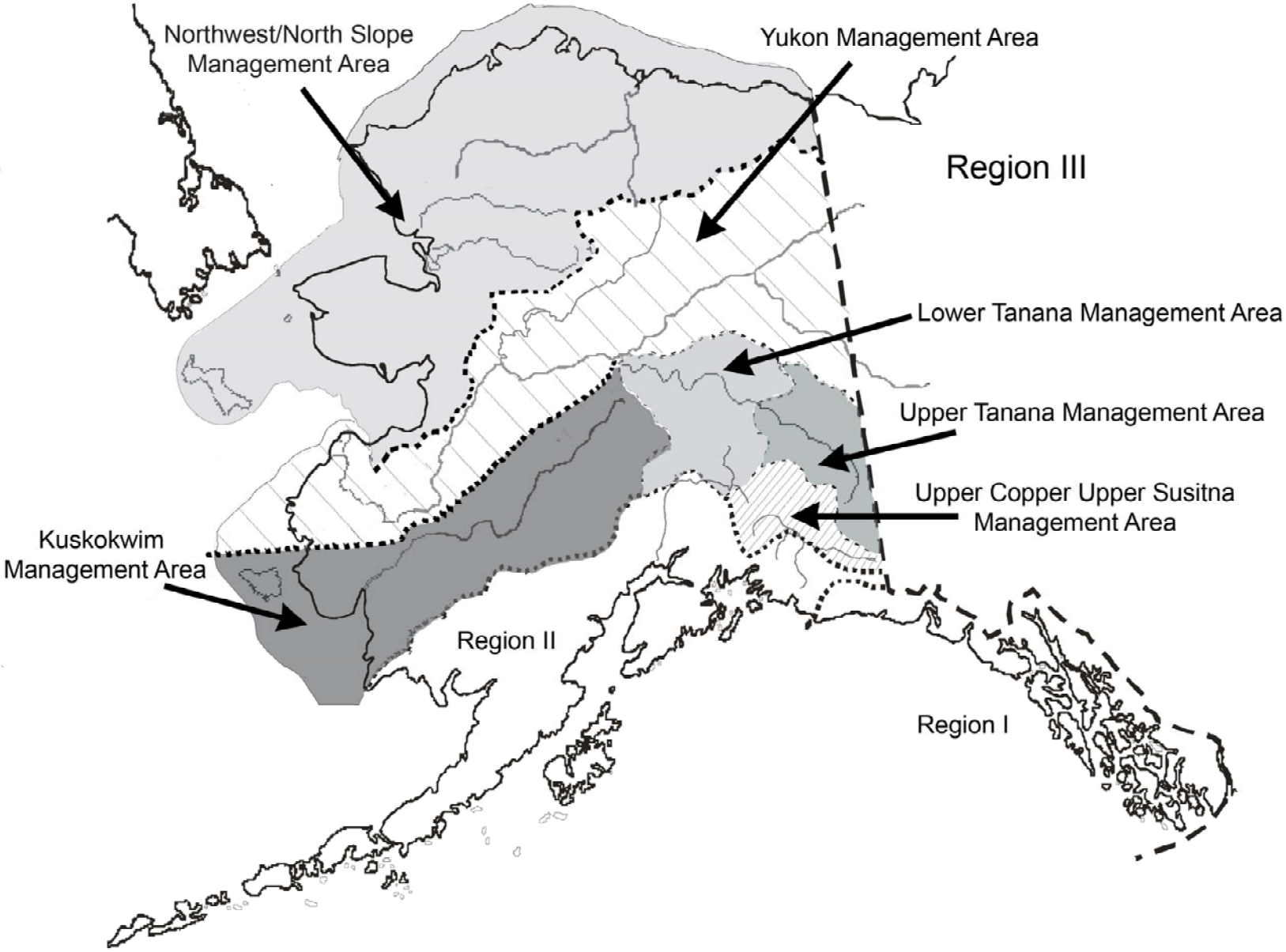

Figure 1.-Map of the sport fish regions in Alaska and the six Region III management areas.

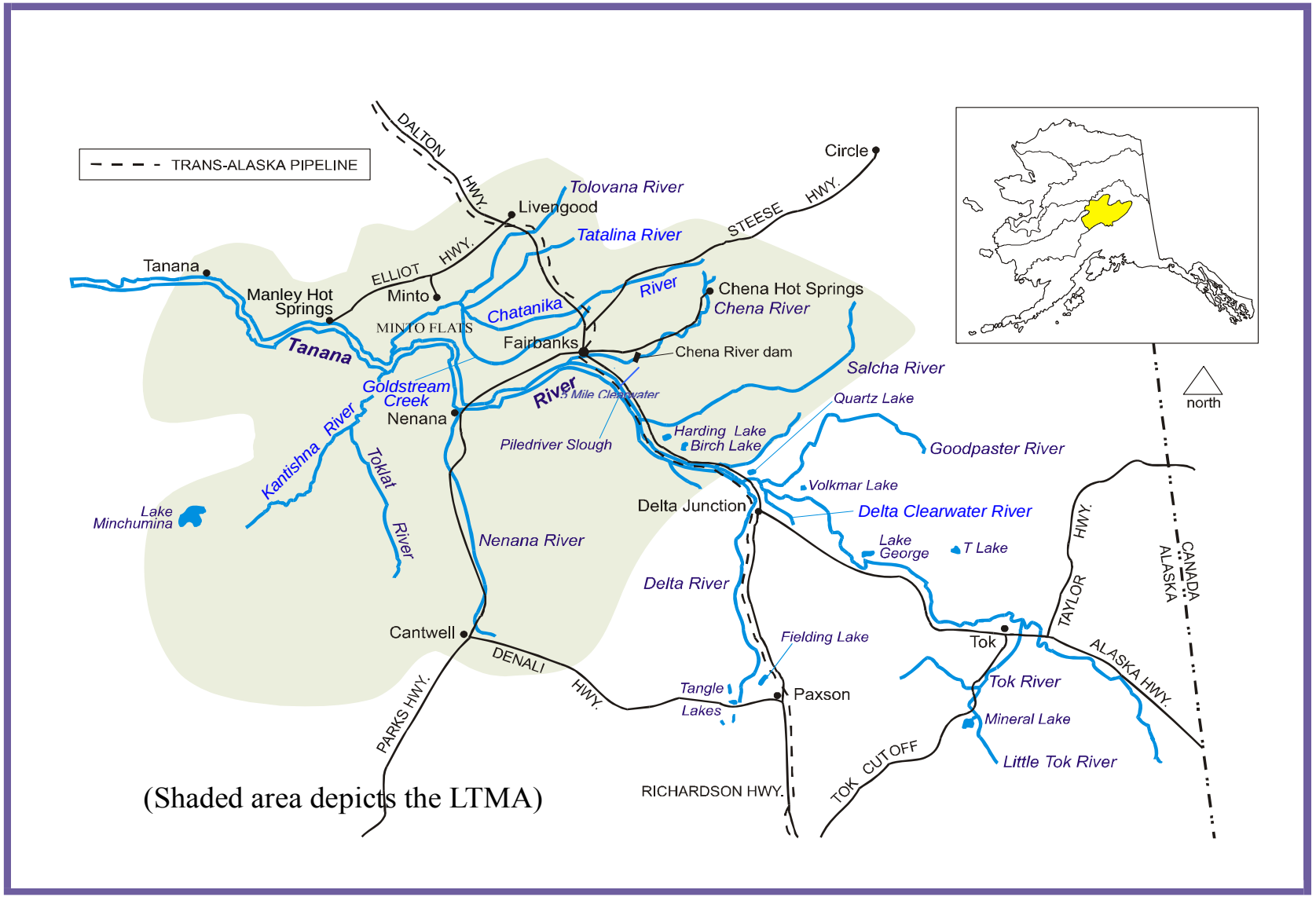

Figure 2.-Map of the Lower Tanana River Management Area (LTMA).

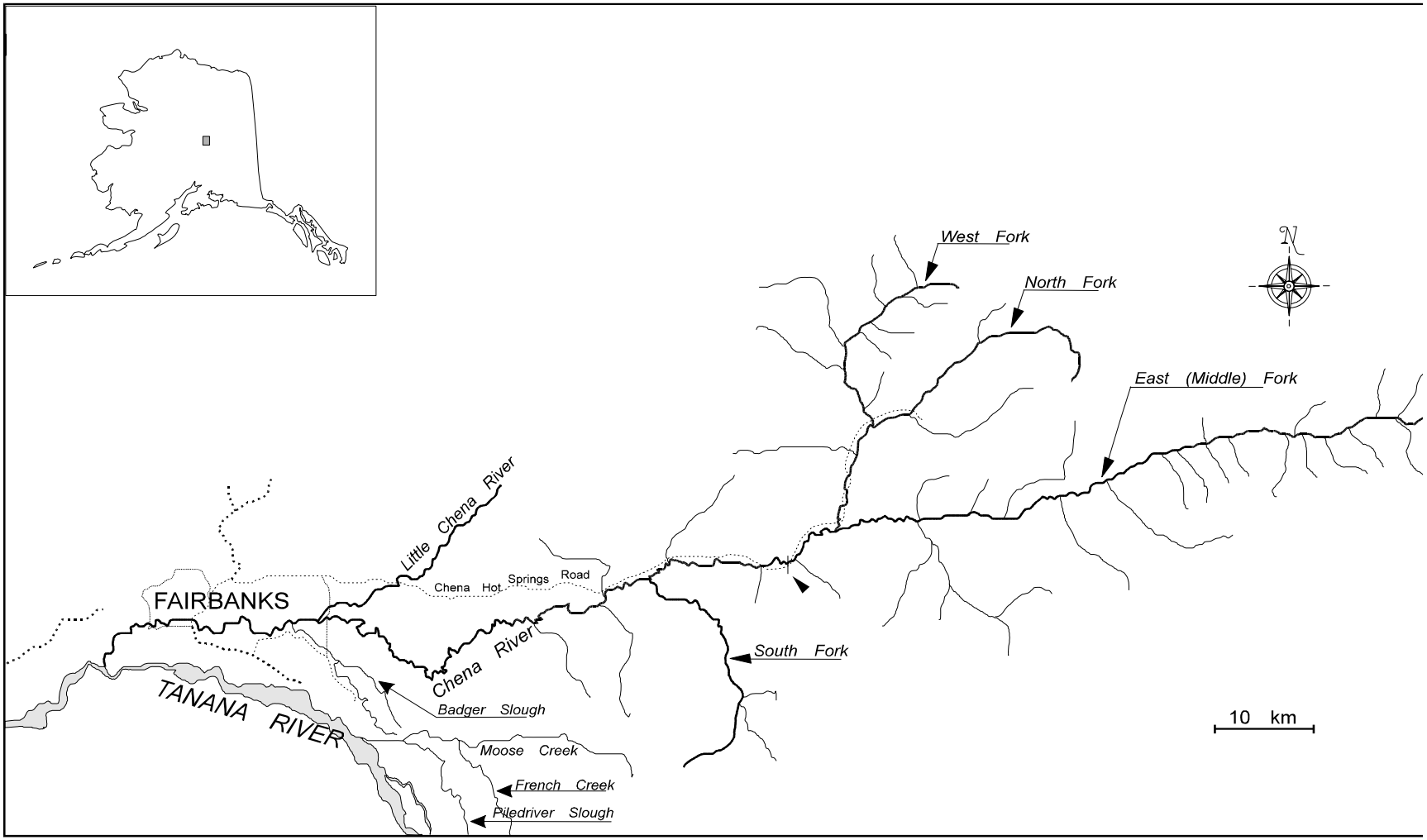

Figure 3.-The Chena River drainage.

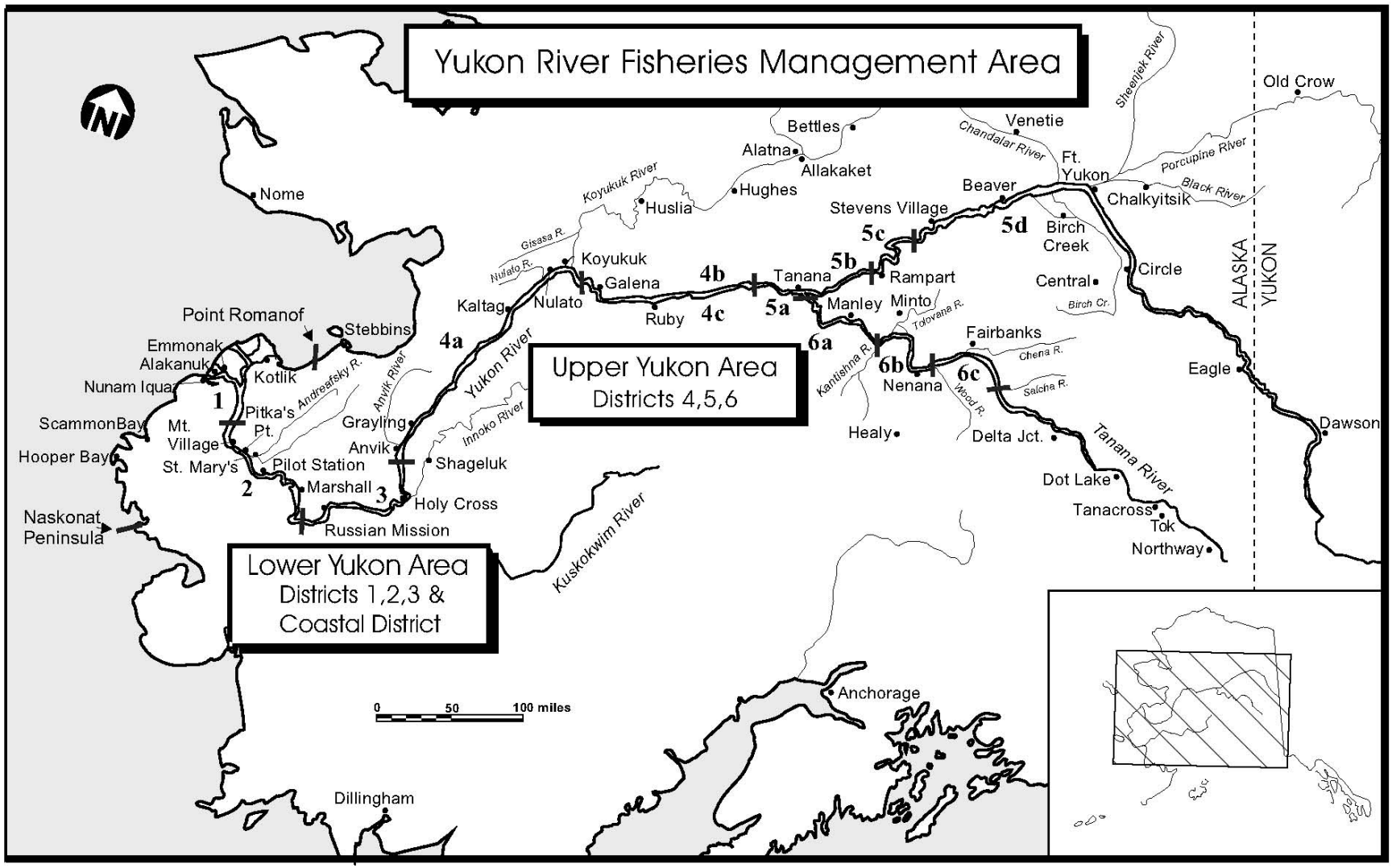

Figure 4.–Map of the Yukon River commercial fishing districts.

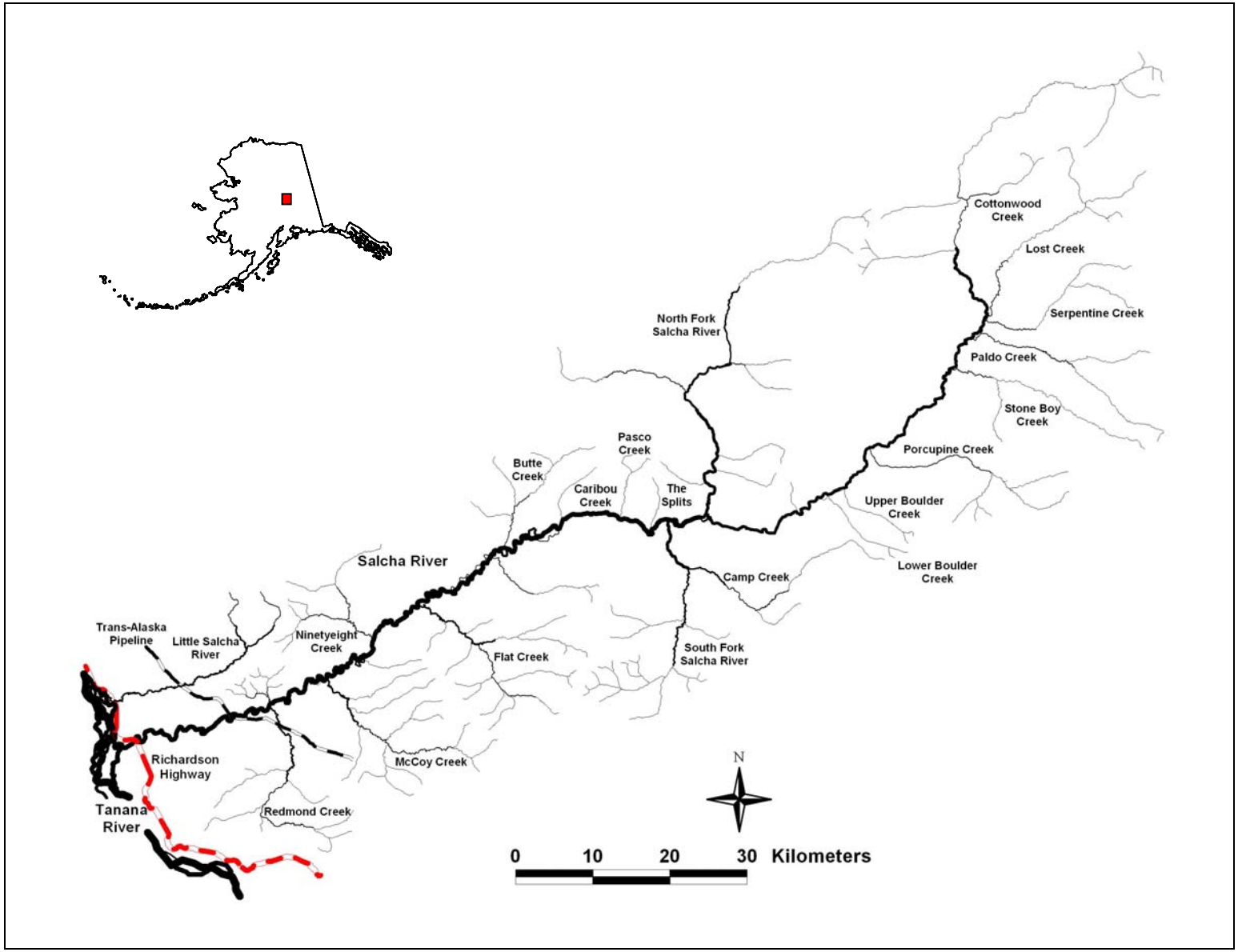

Figure 5.–Salcha River drainage.

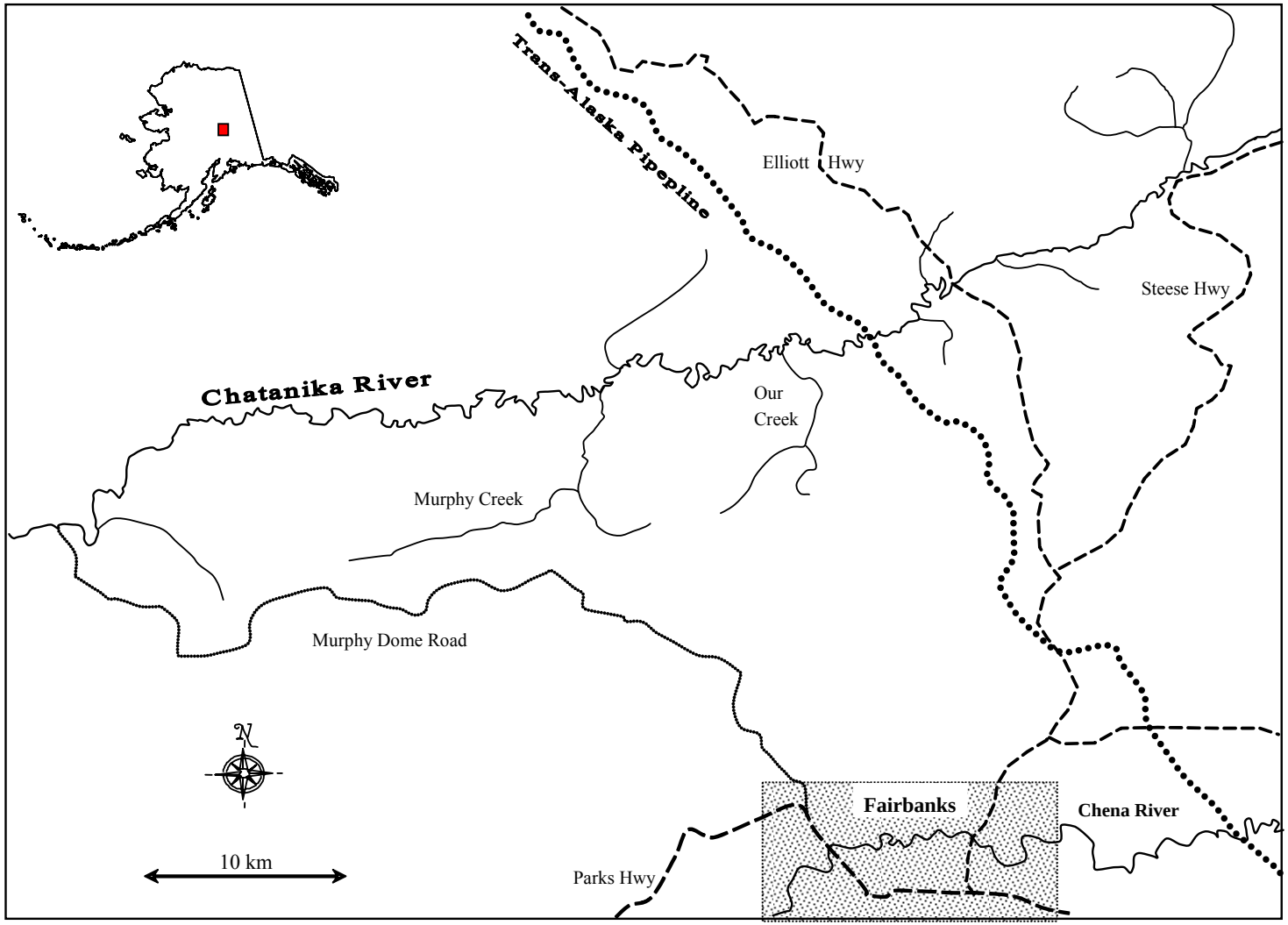

Figure 6.-Portion of the Chatanika River drainage.

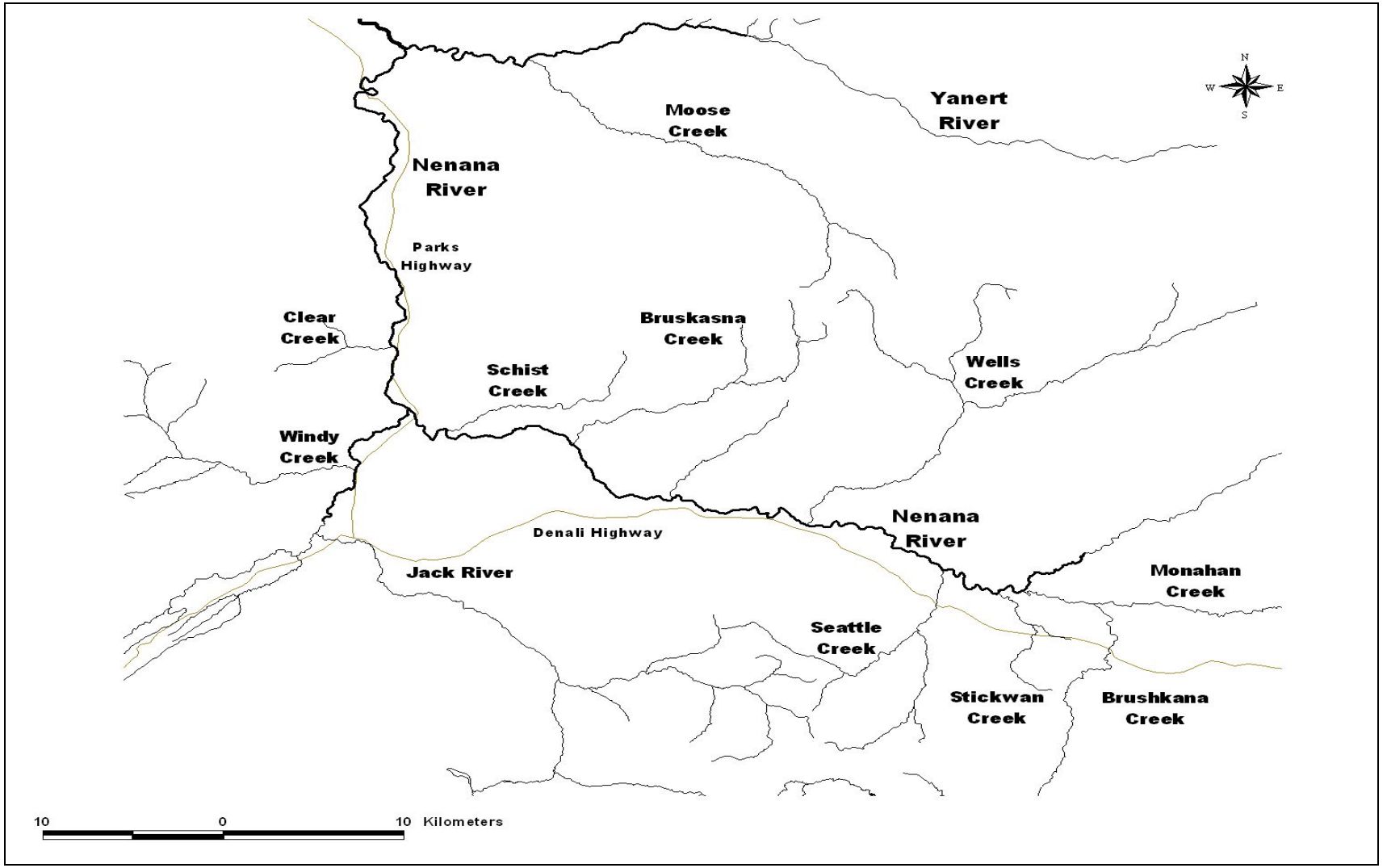

Figure 7.–Map of the Upper Nenana River drainage.

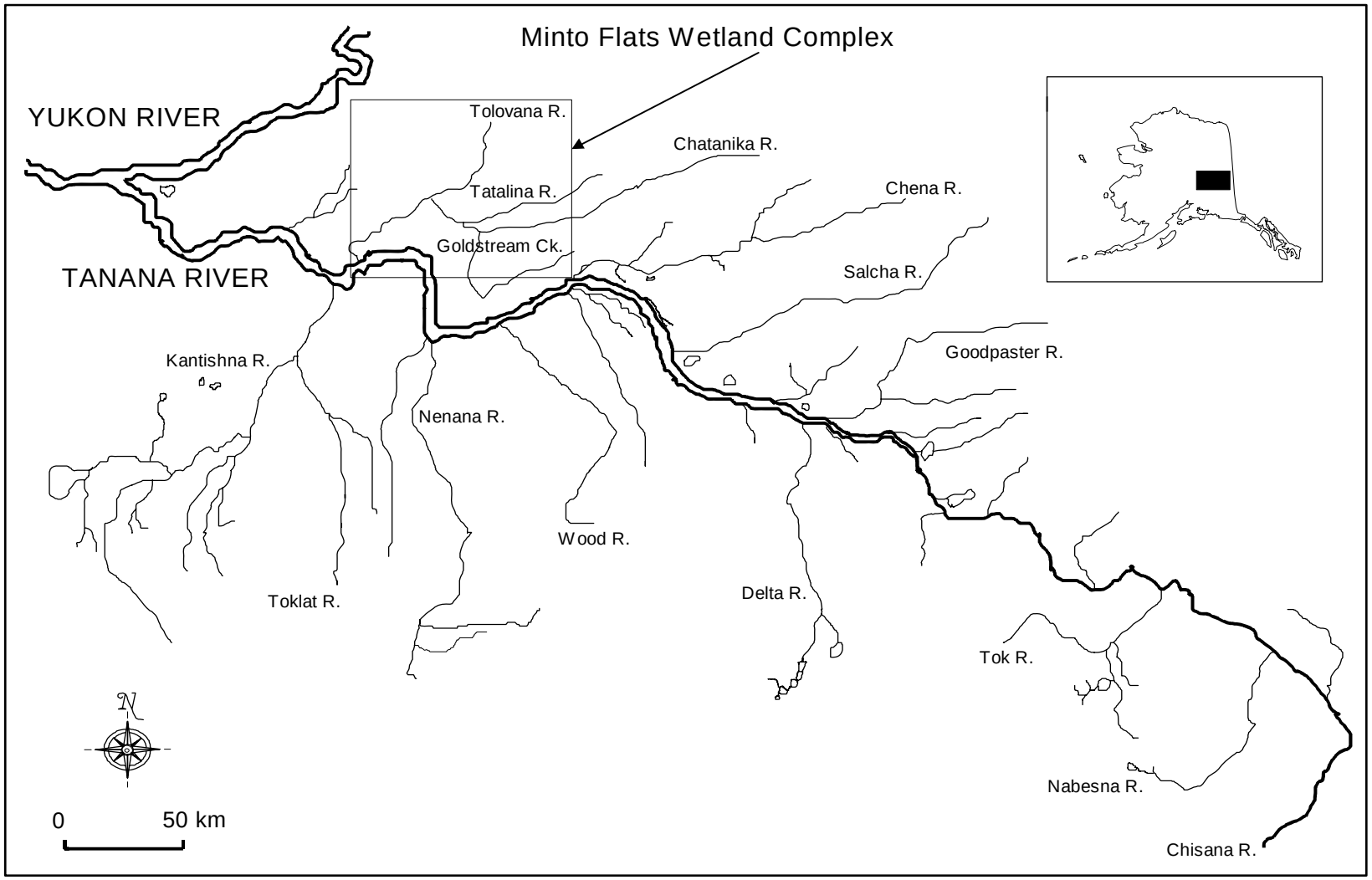

Figure 8.-Map of the Tanana River drainage and the demarcation of the Minto Flats wetland complex.

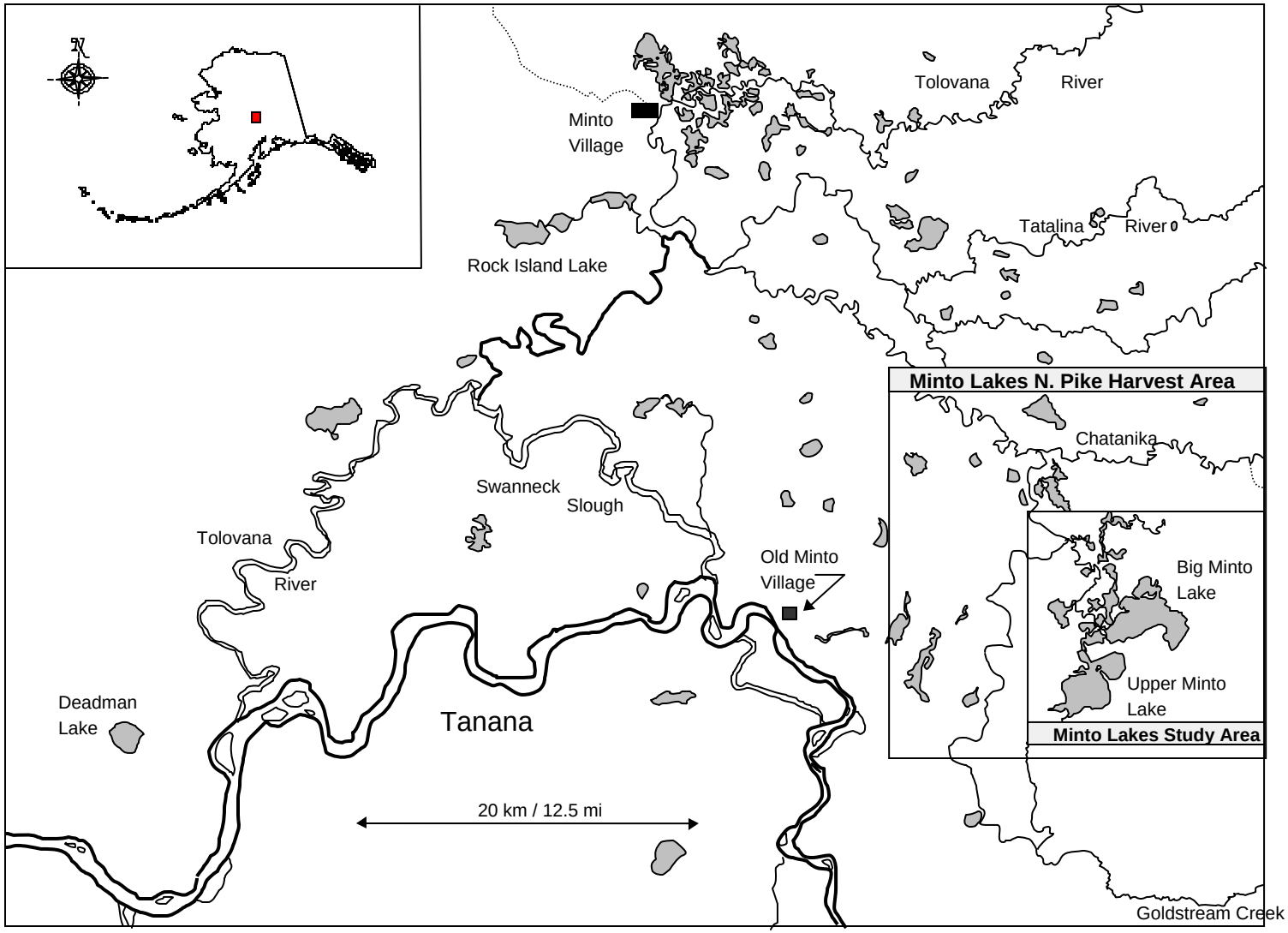

Figure 9.–Minto Flats wetland complex with demarcation of harvest reporting area and the northern pike population assessment area.

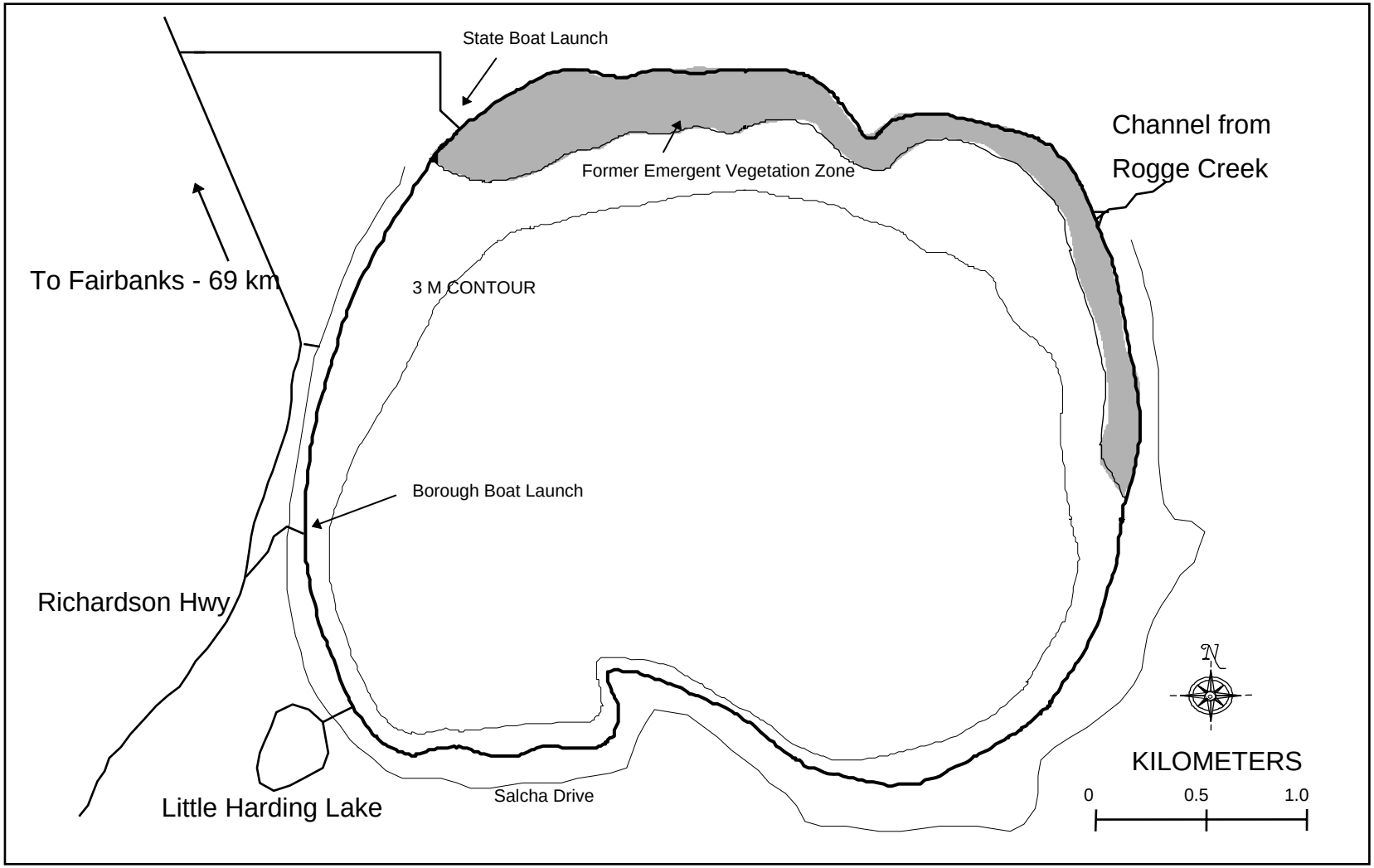

Figure 10.–Map of Harding Lake.

APPENDIX A

Appendix A.–Emergency orders issued for Lower Tanana River Management Area sport fisheries, 1990 - 2007.

Year	E. O. Number	Explanation
1990	3-WF-01-90	Closure of Chatanika River to the taking of whitefish by sport fishermen, effective October 11 – December 31, 1990.
1991	3-WF-03-91	Closure of Chatanika River and its tributaries to the taking of whitefish by sport fishermen, effective September 8 – December 31, 1991.
	3-AG-02-91	Closure of the Chena River to retention of Arctic grayling, effective July 1, 1991 until superseded by regulation or subsequent emergency order.
	3-NP-??-91	Harding Lake closed to spear and bow and arrow fishing, minimum legal size of Northern pike changed to 26 inches.
1992	3-S-06-92	Closes the Tanana River and its tributaries to sport fishing for salmon, effective July 24 – August 14, 1992.
1993	3-G-04-93	Piledriver Slough and 23 Mile Slough closed to retention of Arctic grayling, effective June 26, 1993 – December 31, 1995.
	3-KS-05-93	Increases daily bag and possession limit of Chinook salmon in the Chena River from 1 to 2 fish/ day, effective July 17 – December 31, 1993.
	3-KS-06-93	Increases daily bag and possession limit of Chinook salmon in the Salcha River from 1 to 2 fish/ day, effective July 23 – December 31, 1993.
	3-CS-07-93	Closes the Yukon River and all its tributaries to the retention of chum salmon, effective August 16 – December 31, 1993.
	3-SS-08-93	Closes the Yukon River and all its tributaries to the retention of coho salmon, effective September 3 – December 31, 1993.
1994	3-WF-06-94	Closure of Chatanika River to the taking of whitefish by sport fishermen, effective September 5 – December 31, 1994.
	3-KS-02-94	Increases daily bag and possession limit of Chinook salmon in the Chena and Salcha rivers from 1 to 2 fish/ day, effective July 22 – December 31, 1994.
	3-S-05-94	Closes the Yukon River upriver from the Koyukuk River and including the Tanana River to the retention of chum salmon, effective August 13 – December 31, 1993.
	3-S-06-94	Reopens the Yukon River upriver from the Koyukuk River and including the Tanana River to the retention of chum salmon, effective September 6 – December 31, 1993. Rescinds 3-S-05-94.
1995	3-WF-03-95	Closure of Chatanika River to whitefish sport fishing.
1996	3-AG-01-96	Closes Piledriver Slough and 23 Mile Slough to the retention of Arctic grayling.
	3-WF-03-96	Closes the Chatanika River to the taking of whitefish by sport fishermen, effective September 1, 1996 until superseded by subsequent emergency order.

-continued-

Year	E. O. Number	Explanation
1997	**No Emergency Orders Issued**	
1998	3-S-03-98	Restricts Chena, Salcha, and Chatanika rivers to catch-and-release for Chinook and chum salmon, effective July 23 – August 15, 1998.
	3-CS-04-98	Closes chum salmon sport fishing throughout Tanana drainage.
1999	**No Emergency Orders Issued**	
2000	3-NP-01-00	Closes all northern pike fishing in Harding Lake, effective June 1, 2000 until superseded by subsequent emergency order.
	3-KS-05-00	Closes the Tanana River drainage to sport fishing for Chinook and chum salmon, effective July 17 – August 20, 2000.
	3-KS-07-00	Closes the Yukon River drainage to sport fishing for Chinook and chum salmon, effective July 19 – August 14, 2000.
	3-CS-01-00	Closes fall chum salmon sport fishing in the Yukon River drainage, effective August 14 – December 31, 2000.
2001	3-NP-01-01	Rescinds E.O. closure for Harding Lake northern pike (in response to BOF action closing fishery).
	3-KS-04-01	Prohibits retention of Chinook salmon by sport anglers in the Tanana River drainage, effective July 7 – December 31, 2001.
	3-KS-06-01	Reopens Chena and Salcha rivers for Chinook salmon retention, effective July 20, 2001, the remainder of the Tanana River drainage remains closed through December 31, 2001.
	3-CS-01-01	Closes chum salmon sport fishing throughout the Tanana River drainage, effective July 7 – December 31, 2001.
2002	3-KS-03-02	Reduces sport fish bag limit to either one Chinook salmon or one chum salmon per day in the entire Yukon River drainage, effective June 19 – December 31, 2002.
	3-CS-01-02	Rescinds 3-KS-03-02 and closes the chum salmon sport fishery in all waters of the Yukon River drainage, effective August 11 – December 31, 2002.
2003	3-KS-02-03	Reduces sport fish bag limit to either one Chinook salmon or one chum salmon per day in the entire Yukon River drainage, effective May 30 – December 31, 2003.
	3-KS-04-03	Rescinds 3-KS-02-03 and restores daily bag and possession limits for Chinook and chum salmon in all waters of the Yukon River drainage, effective July 11, 2003.
	3-KS-05-03	Increases the Chinook salmon daily bag and possession limit to three fish in the Chena and Salcha rivers, and in the Tanana River within a 1/2 mile radius of the mouths of the Chena and Salcha rivers, effective July 12, 2003.
	3-CS-02-03	Closes chum salmon sport fishing in the entire Yukon River drainage, effective August 17 – December 31, 2003.
	3-CS-03-03	Rescinds 3-CS-02-03 and reopens chum salmon sport fishing in the entire Yukon River drainage, effective August 26, 2003.

-continued-

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.

APPENDIX B

Appendix B.-Total number of fish caught and harvested by sport anglers in the LTMA, by species, 1983-2006.

	Anadromous Salmon						Resident and Stocked Species					
	Chinook		Coho		Chum		Rainbow Trout		Landlocked Salmon		Lake Trout	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1983	N/A	992	N/A	84	N/A	582	N/A	18,009	N/A	10,048	N/A	31
1984	N/A	338	N/A	158	N/A	351	N/A	26,296	N/A	11,929	N/A	559
1985	N/A	1,356	N/A	25	N/A	1,023	N/A	20,150	N/A	14,278	N/A	46
1986	N/A	788	N/A	281	N/A	496	N/A	15,967	N/A	7,165	N/A	45
1987	N/A	492	N/A	0	N/A	578	N/A	19,865	N/A	9,984	N/A	109
1988	N/A	399	N/A	461	N/A	236	N/A	43,398	N/A	11,603	N/A	279
1989	N/A	460	N/A	493	N/A	969	N/A	39,685	N/A	8,490	N/A	567
1990	1,310	420	688	269	301	50	90,248	35,377	16,951	6,566	715	226
1991	1,197	630	1,900	443	588	385	82,345	40,039	16,417	10,604	545	461
1992	204	118	760	198	1,199	373	57,907	20,164	15,424	6,836	1,935	380
1993	5,017	1,691	291	29	2,135	317	82,695	27,976	9,952	5,976	955	412
1994	2,609	1,832	946	539	1,131	244	53,518	17,014	10,242	3,645	461	117
1995	5,675	2,419	1,130	593	2,828	1,252	59,254	18,743	10,140	3,497	702	258
1996	8,676	3,095	1,961	348	8,246	1,731	115,218	34,382	13,682	5,094	1,262	271
1997	6,566	1,943	1,264	342	1,697	456	68,025	21,516	11,967	3,701	1,029	348
1998	1,480	441	550	125	1,039	64	63,327	19,200	18,005	4,867	443	51
1999	3,435	1,006	331	141	1,654	388	79,297	27,067	10,025	2,590	1,118	384
2000	527	178	447	40	278	85	94,929	30,016	20,655	6,266	1,235	517
2001	2,414	667	892	180	661	29	37,391	11,811	12,719	5,085	1,299	209
2002	3,206	466	270	24	1,007	307	69,374	29,609	30,953	14,528	1,044	88
2003	6,851	2,136	633	11	1,531	50	54,189	16,530	12,821	4,663	642	56
2004	6,318	1,315	1,406	184	1,042	42	46,629	17,134	17,869	5,963	1,552	189
2005	1,633	483	14	0	686	144	29,292	11,493	9,000	2,054	1,514	514
2006	2,523	638	348	37	912	263	31,814	9,866	4,622	1,677	1,165	180
10-Year Average1996-2005	4,111	1,173	777	139	1,784	330	65,767	21,876	15,770	5,481	1,114	263
5-Year Average 2001-2005	4,084	1,013	643	80	985	114	47,375	17,315	16,672	6,459	1,210	211
2006 as % 5-Year Average	62%	63%	54%	46%	93%	230%	67%	57%	28%	26%	96%	85%

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	Resident and Stocked Species													
	Dolly Varden/ Arctic Char		Arctic Grayling		Northern Pike		Whitefish		Burbot		Sheefish		Total All Species	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1983	N/A	212	N/A	60,748	N/A	7,898	N/A	7,436	N/A	3,350	N/A	157	N/A	109,547
1984	N/A	13	N/A	61,560	N/A	6,357	N/A	10,742	N/A	3,131	N/A	320	N/A	121,754
1985	N/A	1,171	N/A	36,711	N/A	8,824	N/A	18,840	N/A	3,566	N/A	385	N/A	106,375
1986	N/A	37	N/A	30,398	N/A	8,112	N/A	26,995	N/A	6,618	N/A	53	N/A	96,955
1987	N/A	30	N/A	24,723	N/A	6,105	N/A	25,937	N/A	2,128	N/A	223	N/A	90,174
1988	N/A	418	N/A	36,489	N/A	7,599	N/A	9,123	N/A	1,922	N/A	770	N/A	112,697
1989	N/A	682	N/A	39,407	N/A	8,310	N/A	16,688	N/A	2,969	N/A	403	N/A	119,123
1990	1,873	557	122,342	17,732	23,964	5,414	8,014	6,299	2,701	2,207	255	68	269,361	75,185
1991	2,705	909	98,562	18,503	23,037	9,426	551	356	1,920	1,323	203	158	229,970	83,237
1992	5,151	1,597	78,820	8,275	24,477	4,200	3,140	2,810	2,964	2,368	612	148	192,594	47,467
1993	6,962	3,536	127,383	11,377	41,809	7,743	948	722	4,164	3,547	190	164	282,500	63,490
1994	2,923	1,129	171,968	11,826	76,372	13,200	1,677	242	3,154	2,551	267	163	325,269	52,501
1995	5,650	2,140	105,251	16,291	43,325	10,834	1,187	578	4,113	2,936	482	200	239,737	59,741
1996	6,139	1,963	123,971	5,073	34,867	4,890	660	149	1,935	1,378	219	40	316,837	58,414
1997	6,815	1,820	204,338	8,598	19,186	2,320	1,404	773	4,935	3,824	486	35	327,712	45,677
1998	5,898	2,528	179,855	5,914	12,964	2,003	1,115	490	2,832	2,088	79	17	287,586	37,789
1999	7,516	2,507	157,762	6,729	10,641	2,013	976	219	3,195	2,049	173	121	276,123	45,216
2000	6,866	2,527	92,462	4,829	13,585	2,793	847	313	3,312	2,032	312	187	235,455	49,783
2001	5,688	1,632	71,227	2,692	13,117	3,296	883	221	1,265	759	41	9	147,597	26,580
2002	9,151	4,392	119,845	11,101	19,646	3,043	1,247	936	3,371	2,787	50	45	259,165	67,326
2003	8,244	3,179	88,242	5,416	20,150	5,416	741	167	1,851	1,375	415	59	196,310	39,058
2004	10,658	3,313	99,851	4,144	31,172	4,259	1,515	1,244	3,743	2,771	450	138	222,205	40,696
2005	6,452	2,289	74,070	5,397	26,171	3,319	227	54	1,856	1,466	454	129	151,369	27,342
2006	6,855	1,065	53,042	3,381	14,262	2,688	533	195	2,103	1,305	66	53	118,245	21,348
10-Year Avg 1996-2005	7,343	2,615	121,162	5,989	20,150	3,335	961	457	2,829	2,053	268	86	242,036	43,788
5-Year Avg 2001-2005	8,039	2,961	90,647	5,750	22,051	3,867	923	524	2,417	1,832	282	93	195,329	40,200
2006 as % 5 Yr Avg	85%	36%	59%	59%	65%	70%	58%	37%	87%	71%	23%	57%	61%	53%

[a] Data from: Mills (1979–1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); and, Jennings et al. (2004, 2006a-b, 2007 *in prep*).

APPENDIX C

Appendix C.–Estimates of effort (number of days fished) for select areas of the LTMA, 1977-2006[a].

Year	Upper Chena	Lower Chena	Total Chena River [a]	Piledriver Slough[a]	Upper Chatanika	Lower Chatanika	Total Chatanika River	Salcha River	Harding Lake [b]	Minto Flats	Nenana Drainage[c]	Total LTMA
1977	N/A	N/A	30,002	N/A	N/A	N/A	9,925	8,167	N/A	3,886	N/A	-
1978	N/A	N/A	38,341	N/A	N/A	N/A	10,835	9,715	N/A	3,640	N/A	-
1979	8,016	14,122	22,138	N/A	N/A	N/A	4,853	14,788	N/A	2,709	N/A	-
1980	10,734	19,920	30,654	N/A	N/A	N/A	5,576	8,858	N/A	2,727	N/A	-
1981	10,740	16,013	26,753	N/A	N/A	N/A	4,691	8,090	N/A	2,045	N/A	-
1982	15,166	25,369	40,535	N/A	N/A	N/A	9,417	14,126	N/A	1,791	N/A	-
1983	16,725	17,568	34,293	4,148	N/A	N/A	10,757	11,802	708	1,281	N/A	-
1984	13,135	20,556	33,691	4,651	N/A	N/A	8,605	8,449	1,707	1,829	N/A	-
1985	8,568	11,169	19,737	N/A	N/A	N/A	10,231	13,109	850	2,011	329	-
1986	10,688	18,669	29,357	N/A	N/A	N/A	7,783	13,792	2,064	3,318	550	-
1987	10,667	12,605	23,272	13,257	N/A	N/A	11,065	10,576	5,125	1,539	2,249	-
1988	9,677	16,244	25,921	24,375	N/A	N/A	11,642	7,494	3,256	1,564	2,897	-
1989	10,014	20,317	30,331	22,746	N/A	N/A	12,210	9,704	4,935	699	1,586	-
1990	6,949	18,957	25,906	27,705	N/A	N/A	11,801	9,783	3,895	932	1,449	98,317
1991	8,591	12,547	21,138	17,703	N/A	N/A	8,085	11,242	5,155	1,532	2,131	81,254
1992	4,983	7,383	12,633	13,607	N/A	N/A	6,775	4,833	5,068	2,401	2,487	67,395
1993	6,018	15,383	21,589	17,253	N/A	N/A	7,671	7,313	4,885	3,911	2,138	88,243
1994	7,912	18,718	27,061	11,369	N/A	N/A	7,272	7,653	4,913	6,267	2,060	83,620
1995	13,319	23,219	37,220	12,613	5,709	6,988	13,145	14,516	6,743	6,260	2,645	114,388
1996	15,214	29,555	45,928	11,736	4,867	6,257	12,032	9,241	6,734	3,973	2,854	117,364
1997	11,381	16,957	28,873	6,791	2,612	4,290	7,125	8,647	3,383	3,332	2,463	71,280
1998	10,826	15,277	27,910	5,126	3,433	2,140	6,000	5,789	3,410	1,414	1,853	62,298
1999	18,909	20,834	40,435	8,955	4,102	4,477	8,747	7,539	2,973	2,431	955	72,673
2000	10,259	11,138	22,029	6,234	2,836	2,799	5,748	4,862	2,538	1,230	786	57,482
2001	6,831	12,346	19,177	5,190	1,372	1,308	2,680	5,471	1,038	1,118	1,195	40,408
2002	6,298	14,017	20,315	4,246	1,907	1,937	3,844	5,954	2,094	2,349	2,061	47,445
2003	7,374	14,454	21,828	2,317	1,834	2,849	4,683	5,032	2,246	2,023	1,834	48,300
2004	11,320	20,165	31,485	2,546	2,917	2,570	5,487	4,859	2,675	1,892	1,801	54,651
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

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Appendix C.–Page 2 of 2.

	Upper Chena	Lower Chena	Total Chena River [a]	Piledriver Slough[a]	Upper Chatanika	Lower Chatanika	Total Chatanika River	Salcha River	Harding Lake [b]	Minto Flats	Nenana Drainage[c]	Total LTMA
10-Yr Average 1996-2005	10,719	17,796	29,520	6,575	3,159	3,562	6,949	7,191	3,383	2,602	1,845	68,629
5-Yr Average 2001-2005	8,119	14,424	22,967	4,107	2,173	2,293	4,488	5,236	2,118	1,722	1,535	49,657
2006 as a % of 5 Yr Avg	52%	63%	58%	31%	116%	62%	88%	93%	90%	140%	84%	108%

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

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

c Includes Brushkana Creek.