Fishery Management Report No. 12–46

Fishery Management Report for Recreational Fisheries in the Tanana River Management Area, 2011

by

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and

Brandy Baker

December 2012

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 in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

Centimeter	cm
Deciliter	dL
Gram	g
Hectare	ha
Kilogram	kg
Kilometer	km
Liter	L
Meter	m
metric ton	mt
Milliliter	ml
Millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
Foot	ft
Gallon	gal
Inch	in
Mile	mi
Ounce	oz
Pound	lb
Quart	qt
Yard	yd

Spell out acre and ton.

Time and temperature

Day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24–hour clock)	h
Minute	min
Second	s

Spell out year, month, and week.

Physics and chemistry

all atomic symbols	
alternating current	AC
Ampere	A
Calorie	cal
direct current	DC
Hertz	Hz
Horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
Volts	V
Watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
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
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two–letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

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	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
Covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
Equals	=
expected value	E
fork length	FL
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.
mideye–to–fork	MEF
minute (angular)	'
multiplied by	x
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
standard length	SL
total length	TL
Variance	Var

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December 2012

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

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This document should be cited as:
Brase, A. L. J. and B. Baker. 2012. Fishery management report for recreational fisheries in the Tanana River management area, 2011. Alaska Department of Fish and Game, Fishery Management Report No. 12-46, Anchorage.

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ABSTRACT

Historic, current, and future performance and management of the recreational fisheries of the Alaska Department of Fish and Game (department) Region III Tanana River Management Area (TRMA) is presented in this report. Particular emphasis is placed on the performance and management of TRMA fisheries for 2011, with preliminary information for 2012.

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.

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 TRMA sport fisheries.

The majority of fishing effort in the TRMA occurs on the Chena, Salcha, Chatanika, and Delta Clearwater rivers; Minto Flats; Harding, Fielding, and Tangle Lakes, and various stocked waters. Sport anglers target many species in the TRMA; however, the most commonly targeted species are king salmon, coho salmon, Arctic grayling, burbot, northern pike, lake trout, and stocked rainbow trout.

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

EXECUTIVE SUMMARY

This document provides a wide array of information specific to recreational angling opportunities that exist within the Tanana River Management Area (TRMA). Information specific to the proposals that the Alaska Board of Fisheries (board) will address at its January 15–20, 2013 meeting is contained within this report. Appendix D (page 58) directs board members to information specific to the January meeting. This table guides the reader to specific information contained within the text, tables, and graphic format that may be useful in evaluating regulatory proposals. Information specific to recreational fisheries within the TRMA during 2011; preliminary data from 2012 are presented, along with a brief history of these fisheries and past board decisions that have affected them.

INTRODUCTION

This area management report provides information regarding the Tanana River Management Area (TRMA) and its fisheries for 2011, with preliminary information from the 2012 season. This report is organized into 2 primary sections: a management area overview, including a description of the TRMA and a summary of fishing effort, harvest and catch for the area, and a section on the significant area fisheries, including specific harvest and catch by species and drainage.

ADVISORY COMMITTEES

Local Fish and Game advisory committees (ACs) have been established throughout the state to assist the boards of Fisheries and Game in assessing fisheries and wildlife issues and proposed regulation changes. AC meetings allow opportunity for direct public interaction with Alaska Department of Fish and Game (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 department's Division of Administrative Services provides administrative and logistical support for the board and ACs. During 2011, the department had direct support responsibilities for 82 ACs in the state.

Within the TRMA there are 6 ACs: Delta Junction, Fairbanks, Minto/Nenana, Middle Nenana River, Lake Minchumina, and Upper Tanana/Forty Mile. In addition, the Paxson AC occasionally comments on proposals concerning TRMA fisheries.

ADF&G EMERGENCY ORDER AUTHORITY

The department has emergency order (EO) authority (5 AAC 75.003) to modify time, area, and bag/possession limit regulations. EOs are implemented to deal with conservation issues for resident species. EOs are also implemented as a tool for inseason management of salmon fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the board. EOs issued under this authority for the TRMA from 2010 through 2012 are summarized in Appendix A.

FEDERAL SUBSISTENCE

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

Development of regulations for subsistence fisheries under the federal subsistence program occurs within the established Federal Subsistence Board (FSB) process. The public provides input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council (RAC) meetings or by becoming council members. Ten RACs 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 RAC meets twice a year, and subsistence users and other members of the public can comment on subsistence issues at these meetings.

Within the TRMA, the subsistence fisheries for which the federal government asserts management responsibility include those within and adjacent to the: Tetlin National Wildlife Refuge, which includes much of the Nabesna and Chisana rivers; Delta River Wild and Scenic River Corridor; the Tangle Lakes Archaeological District; the headwaters of the Chisana and

Nabesna rivers within the Wrangell-St. Elias National Preserve and adjacent to the Tetlin National Wildlife Refuge; and within the boundaries of Denali National Park and Preserve. The TRMA fisheries fall under the purview of the Eastern Interior RAC (EIRAC). The most recent meeting of the EIRAC was held October 16–17, 2012 in Fairbanks. At this meeting, no federal fisheries proposals for the TRMA were addressed.

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. The Statewide Harvest Survey (SWHS) is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific catch per unit effort (CPUE) information can seldom be derived from the report. Questionnaires are mailed to a stratified random sample of households containing at least 1 individual with a valid fishing license (resident or nonresident). Information gathered from the survey includes participation (number of anglers and angler-days), 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. Survey results for each year are available the following year; hence, the results for 2011 were available fall 2012. Additionally, creel surveys have been used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or inseason management.

The utility of SWHS estimates depends on the number of responses received for a given site (Mills and Howe 1992; Clark 2009). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation. Therefore, the following guidelines were implemented for evaluating survey data:

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

For purposes of reporting and organizing statistics in the SWHS, TMRA sites are designated within survey area U.

SPORT FISH GUIDE LICENSING AND LOGBOOK PROGRAM

Since 1998, the Division of Sport Fish has operated a program to register and/or license both sport fishing guides and sport fishing guide businesses, and to collect information on sport fishing participation, effort, and harvest by saltwater and freshwater-guided clients (Sigurdsson and Powers 2009). In 1998, the board adopted statewide sport fishing guide regulations (5 AAC 75.075) which required all sport fishing guides and businesses to register annually with the department. At this time, the board also adopted statewide regulations that required logbooks for saltwater charter vessels. The logbooks collected information on charter activity (location, effort, and harvest) that was necessary for the board for allocation and management decisions specific to king salmon *Oncorhynchus tshawytscha*, rockfish *Sebastes* spp., and lingcod

Ophiodon elongatus, and for the North Pacific Fishery Management Council (NPFMC) for allocation of Pacific halibut *Hippoglossus stenolepis*.

In 2004, the Alaska Legislature adopted House Bill 452 that established licensing requirements for sport fishing guide business owners and sport fishing guides on a statewide basis (effective 2005). This legislation also required logbook reporting for all freshwater guiding businesses, in addition to the existing saltwater reporting requirements. The logbook data provides location of fishing effort, level of participation, and number of species kept and released by clients. This information is used for the regulation, development, and management of fisheries and has been published annually since 2009 (data since 2006) in a Fishery Data Series report (Sigurdsson and Powers 2009, 2010, 2011, 2012).

SECTION I: MANAGEMENT AREA OVERVIEW

TRMA DESCRIPTION

After the Porcupine River drainage, the Tanana River drainage is the second largest tributary of the Yukon River (Brabets et al. 1999). The Tanana River basin (Figures 2 and 3) drains an area of approximately 45,918 square miles (73,898 km^2). The mainstem Tanana River is a large glacial-fed drainage 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.

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 and part of the Denali Borough lie within the TRMA. Approximately 99,000 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 (U.S. Census Data 2010). Other communities and municipalities located within the TRMA include Anderson, Big Delta, Cantwell, Chatanika, Delta Junction, Dot Lake, Ester, Fort Greely, Fox, Healy, Livengood, Manley, Mansfield, Minto, Northway, Nabesna, Tanacross, Tetlin, Tok, and Two Rivers.

The TRMA affords highly varied fishing opportunities ranging from lake trout *Salvelinus namaycush* and Dolly Varden *S. malma* in the high elevation lakes along the Denali Highway to some of the highest quality Arctic grayling *Thymallus arcticus* and coho salmon *O. kisutch* fisheries in Interior Alaska.

FISHERY RESOURCES

Throughout the TRMA, 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. They include king and coho salmon, Arctic grayling, burbot *Lota lota*, lake trout, and northern pike *Esox lucius*. Chum salmon *O. keta*, Dolly Varden, 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 *O. mykiss* are not native to the drainage, but have been stocked in many lakes. Arctic char *S. alpinus*, coho salmon, king salmon, and Arctic grayling are also stocked in selected lakes of the Tanana River drainage.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

The regulations governing fisheries in the TRMA in 2011 are found in 5 AAC 74.001 through 5 AAC 74.030 (sport fishing), in 5 AAC 77.171 through 5 AAC 77.190 (personal use), and in 5 AAC 01.200 through 5 AAC 01.249 (subsistence fishing). The specific management plans that affect TRMA sport fisheries are the: *Minto Flats Northern Pike Management Plans* (5 AAC 74.044 for the sport fishery and 5 AAC 01.244 for the subsistence fishery), *Tanana River Wild Arctic Grayling Management Plan* (5 AAC 74.055), *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060), *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065), *Tanana River Area Wild Lake Trout Management Plan* (5 AAC 74.040), *Yukon River Drainage Fall Chum Management Plan* (5 AAC 01.249), *Yukon River King Salmon Management Plan* (5 AAC 05.360), and *Yukon River Summer Chum Salmon Management Plan* (5 AAC 05.362).

MAJOR ISSUES

Salmon fisheries are often the most controversial fisheries in Alaska and the TRMA 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 subsistence users in the upper portion of the drainage have seen any salmon in their fish wheels and nets. In recent years, Division of Commercial Fisheries has implemented emergency regulations to reduce harvest of salmon (particularly king salmon) in the Yukon River drainage commercial and subsistence fisheries (JTC 2009, 2010).

Subsistence vs. Sport Fisheries

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

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

Habitat Degradation

In 1999, the National Resource Conservation Service (NRCS) implemented a watershed project designed to prevent sediment-bearing waters from the Granite Mountains from entering the Delta Clearwater River (DCR; Salcha/Big Delta Soil and Water Conservation District 1987). In the

summer of 2000, the first portion of construction was completed. During 2002 to 2003, construction modifications continued on the project. In 2007, NRCS determined that the Watershed Project was a failure and began looking into future alternatives.

In 2011, NRCS received funding for phase one of a 3-part project that would restore the site to preproject conditions. In October 2011, phase one was completed, which involved restoration of the drill line and installation of 20 water bars upstream of the infiltration channel. Further funding for the remaining 2 phases has been requested. Unfortunately, once restored, it offers the watershed little protection from future flooding events affecting the DCR. NRCS maintains that if the remedial project is not completed then the DCR will be subject to conditions much worse than if the original project had not been done in the first place.

Public Access through Military Lands

There are many stocked lakes located on military lands in the TRMA. In order to access these areas, the public have to acquire a Recreation Access Permit (RAP) for getting on to the military base (Ft Wainwright, Ft Greely, or Eielson Air Force Base) and they may have to phone in before entering an area to ensure training exercises are not occurring (Meadows Rd and Donnelly Training Area). These inconveniences may discourage casual anglers from fishing the lakes in these areas.

Invasive Species

In late fall 2010, large mats of an invasive aquatic plant *Elodea sp.* were identified in Badger Slough (Amy Larsen, NPS Biologist, personal communication). Prior to this discovery, *Elodea* had not been documented in Interior Alaska, although when archival video footage was examined, it was determined that the plant had been in the slough for at least 3 years. This plant has the potential to spread throughout the Chena River drainage and possibly, further into the Tanana River drainage, possibly degrading fish habitat. In 2011, the U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS), and the Tanana River Watershed Association began surveying and collecting samples of aquatic plants to determine the spread of *Elodea* throughout the area.

ACCESS PROGRAMS

The Wallop-Breaux amendment to the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson or 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 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 2012, construction of a new public use cabin was completed at Coal Mine Lake #5. No other major access projects were constructed in the TRMA. Planning continues on development of the Tanana Lakes Recreation Area in which stocked lakes, river access, and campgrounds are planned adjacent to the Tanana River south of Fairbanks. This project is modeled after the existing Chena Lakes project developed when the Moose Creek Dam was built. Access funds were also used to construct public use ice houses for Chena and Birch lakes. Pending

Department of Natural Resources (DNR) approval, a new public use cabin may be built at Glacier Lake, off the Denali Highway.

INFORMATION AND EDUCATION

Information regarding regulations, publications, fishing reports, news releases, and EOs for the TRMA can be found from the *Fishing* and *Sport* links at the department's website (http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main). From the *Fishing Information*, *Publications/Reports*, and *Interior* links on this website, anglers interested in fishing the TRMA can read the area descriptions and download several Division of Sport Fish publications, including: *Stocked Lakes of the Tanana Valley*, *Fishing the Stocked Lakes of Donnelly Training Area, Fishing Quartz Lake, Coal Mine Road Lakes*, and *Roadside Salmon Fishing in Interior Alaska*.

There are 3 regional information and education (I&E) staff located in the Fairbanks office. An Information Officer II and a seasonal Fisheries Technician III respond to questions from the public at the office and via phone and e-mail. In addition, I&E staff distribute and update fishery brochures, fishing regulations, the regional webpage, coordinate the Fairbanks Outdoor Show booth, Kid's Fish and 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.

A unique I&E feature of the TRMA is that DCR River coho salmon provide eggs for schools from Fairbanks to Tok that participate in the statewide "Salmon in the Classroom" aquatic education program. School children rear the eggs in classroom incubators throughout the winter to learn about the life cycle of salmon.

SPORT FISHING EFFORT, HARVEST, AND CATCH

Effort, harvest, and catch statistics for TRMA sport fisheries have been estimated from responses to the SWHS since 1977 and reported under the headings of the "Tanana River drainages" (Area U) (Mills 1979–1980, 1981a-b, 1982–1994; Howe et al. 1995–1996, 2001a-d, Walker et al. 2003, Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, *In prep*). Estimates of angling effort in the TRMA averaged approximately 90,000 angler-days during the last 5- (2006–2010) and 10-year (2001–2010) periods. Angling effort in the region and statewide has also, on average, remained relatively stable during this period (Table 1).

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

Opportunities for sport angling are available year-round in the TRMA. During 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, lake trout, and northern pike. From 2005–2009, the TRMA has averaged

approximately 47% of the Region III total sport fishing effort (number of angler-days, Table 1). The majority of fishing effort in the TRMA occurs in the Chena River (Appendix B).

In terms of fish harvested, the TRMA has averaged 34% of the Region III sport harvest over the past 5 years (Table 1) and has been in a downward trend since 2002. The majority of species caught and harvested in the TRMA are Arctic grayling, northern pike, burbot, and stocked species (Table 2).

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 TRMA, guides are known to operate in Minto Flats, Chena Lakes Recreation Area, George Lake, and the Nenana, Salcha, Chena, and Delta Clearwater rivers. However, the guide logbook data reported in Appendix C have been summed for the entire Tanana River drainage as there are too few guides to separate out the fish released and harvest numbers by individual fishery (department confidentiality policy). Note that the SWHS reports catch (fish harvested and released) and harvest, while the guide logbook reports list fish released and fish kept.

SECTION II: FISHERIES

This section provides a summary of significant sport fisheries by species in the TRMA in 2011 and 2012 that have direct connection to proposals being addressed by the board in January 2013. Discussion of each fishery will address: 1) historical perspective; 2) recent fishery performance (stock status); 3) fishery objectives and management; 4) current issues; 5) recent actions by the board; and, 6) ongoing and recommended management and research activities. Recent fishery performance will focus on data from 2011. Information regarding the 2012 season will be included as available, but estimates of sport effort and harvest are not yet available for the 2012 season.

KING AND CHUM SALMON

Chena River

Background and historic perspective

The Chena River is a rapid runoff, tannic-stained river that flows slowly through the city of Fairbanks near its mouth with the Tanana River (Figure 3). It is approximately 160 miles long and in the summer of 1967, caused severe flooding in downtown Fairbanks. The flood was the impetus to begin construction in 1973 on the Moose Creek Dam at river mile 45 (~72 km; near the city of North Pole) to divert any future high water events away from populated areas. The dam was completed in 1979, and is operated and maintained by the U.S. Army Corps of Engineers.

The Chena River supports one of the largest king salmon populations in the Alaskan portion of the Yukon River drainage, with average annual returns of over 3,600 fish from 2007 to 2011 (Table 3). Adult king salmon enter the Yukon River during or shortly after breakup and migrate up the Tanana River to enter 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 where the fishery occurs (fishing for king salmon is closed above the dam). The run ends in late July or early August.

Chum salmon are primarily available in July and August during and just after the king salmon fisheries, and are targeted or caught incidentally while fishing for king salmon. While chum salmon are generally more abundant than king salmon, and are subject to a more liberal bag and possession limit (3 fish/day), average harvest and catch is lower than that for king salmon (Table 4). The poor quality of chum salmon flesh for human consumption by the time the fish reach the Chena River is likely a contributing factor. Coho salmon are not present in the Chena River drainage.

Chena River king and chum salmon escapements have been annually assessed since 1986 using either mark-recapture experiments or a counting tower located at the Moose Creek dam (Table 3; Barton 1987, 1988; Barton and Conrad 1989; Brase 2012; Brase and Doxey 2006; Doxey 2004; Doxey et al. 2005; Evenson 1991a, 1992–1993, 1995, 1996; Evenson and Stuby 1997; Savereide 2012a-b; Skaugstad 1990b, 1994; Stuby and Evenson 1998; Stuby 1999–2001). Counting conditions at the dam can be highly variable depending on water height and river turbidity. In 2005 and 2011, the Chena River was extremely high and turbid for most of the king salmon run; therefore, escapement was not estimated. In contrast, 2006 through 2010 had good counting conditions throughout the majority of the run and estimates of escapement were produced.

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

In 2000, the department formed an escapement goal (EG) committee to evaluate and calculate EGs for Chena and Salcha rivers king salmon and for some Yukon River drainage chum salmon stocks. The EG process was designed to set escapement ranges which maximize potential yield. The EG committee recommended a biological escapement goal (BEG) range of 2,800–5,700 king salmon, measured by the counting tower, for the Chena River based on an analysis of run reconstruction data related to brood year returns. There is no escapement goal set for chum salmon in the Chena River.

Annual escapements of king salmon into 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 are available from only 1 of the rivers (Table 3). If high water disrupts the counts in 1 of the rivers, but not the other, the escapement projections and estimates for the river in which an accurate estimate can still be made are considered an index of the king escapement in the other river, and are to be used as a measure of run strength rather than the BEG.

A king salmon sport fishery has occurred at the Chena River since before statehood, and the bag and possession limit for king salmon in the Tanana River drainage has remained unchanged since the early 1960s, at one fish $\geq$ 20 inches (~510 mm). The fishery is easily accessible in the lower portion of the Chena River, with multiple boat launch and walk-in sites located throughout Fairbanks and North Pole. The fishery is closed above the Moose Creek Dam.

The Chena River king salmon sport fishery continues to be relatively small, especially when compared with fisheries in Southcentral and Southeast Alaska; however, it remains very popular as it is one of the few opportunities to catch large fish near Fairbanks. Most sport anglers release their catch as the salmon flesh is quite deteriorated by the time the fish have traveled the 1000+ miles from the Bering Sea (Tables 4 and 5).

Recent Fishery Performance

Estimated harvests of king salmon between 1983 and 1992 ranged from 0 to 375 fish, and then increased in the mid-1990s (Brase 2009b). The 2011 king salmon harvest was 84 fish, which was well below the 5-year average (2006–2010) harvest of 188 fish (Table 4). The 2011 catch of 599 fish was also below the 5-year average catch of 917 fish (Table 5). The 2011 harvest and catch numbers were likely below average due to low escapement and the king salmon retention prohibition that went into effect on July 23.

The 5-year (2006–2010) average total chum salmon harvest and catch in the TRMA was 110 and 614 fish, respectively (Tables 4 and 5). The Chena River chum salmon harvest and catch has represented less than half of area total harvests during this period.

The Chena River experienced very high and turbid water conditions during a portion of the 2012 king salmon run. During this portion of the salmon run, the counting tower was unusable; however, the Dual Identification Sonar (DIDSON) sonar remained operational and an estimate of king salmon abundance was produced (Savereide *In prep*). A preliminary estimate of approximately 2,220 king salmon comprised the 2012 Chena River escapement; this was below the lower end of the BEG range (2,800 fish). It is anticipated that the final estimate, including the DIDSON estimates during high water, will still be below the lower end of the BEG range.

Fishery Objectives and Management

In 2001, the board adopted policy directing the department to manage salmon harvests so that escapements fall within the BEG ranges set by the department. The BEGs are evaluated on a 3-year cycle in synchrony with the board meeting cycle for the Yukon River drainage.

Commercial and subsistence salmon harvests occur along almost the entire length of the mainstem Yukon and Tanana rivers (Tables 6 and 7; JTC 2010). In 2001, the board adopted the *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060), which mandated that all the Tanana River fisheries (commercial, subsistence, personal use, and sport) be managed in a manner such that the Chena River king salmon BEG range of 2,800–5,700 fish is achieved at the counting tower. In order to get that number of fish past the counting tower, restrictions may be placed on any or all Tanana River fisheries.

In 2009, an in-house *Sport Fish Management Plan for Chinook Salmon in the Chena and Salcha Rivers* (Brase 2009a) was developed to guide sport fish management of the king salmon sport fishery. The plan provides a prescription for fishery management actions based on projections of final escapement from counting tower data, on or after Day 20 of the run, relative to the BEG range for each river. The first day king salmon are seen at the counting tower is considered Day 1 of the run and the run typically lasts around 40 days, with the midpoint on Day 20. Historical run-time data suggest that by Day 20, projections accurately predict escapements relative to meeting or not meeting the lower end of the BEG and allows a sufficient number of days in the run to provide additional harvest opportunity or reduce harvest. Potential management actions include: closing the fishery if the lower end of the BEG range will not be met; restricting the

fishery to catch-and-release only if there is a small chance of not achieving the lower end of the BEG range; maintaining status quo regulations if projections indicate escapements will fall within the BEG range; liberalizing regulations to allow a bag limit of 2 large king salmon if it is likely escapement will exceed the upper end of the BEG range; and liberalizing regulations to allow a bag limit of 3 large king salmon if it is likely escapement will exceed the upper end of the BEG range by 30% or greater.

In 2010 and 2012, the plan indicated that the Chena River king salmon sport fishery be closed because the run was not projected to meet minimum escapement. The fishery was closed by EO in both years. These proved to be appropriate management actions, as the run did not meet minimum escapement in either year (Table 3).

In 2011, the Chena River king salmon fishery was restricted to catch-and-release only by EO on July 23 (Appendix A). This action was taken because the Chena River counting tower was inoperable due to high and turbid water conditions, and lower river indicators suggested that the king salmon run was weak. Restrictions had been placed on subsistence, commercial, and sport users in the Yukon River, and closing the Chena (and all other Tanana River tributaries) to retention of king salmon seemed prudent based on recent years' production and the lack of data from the current year.

The closure in 2010 was the first EO issued to restrict the Chena River king salmon fishery since 2000 (Brase 2008). Prior to 2010, management actions on the mainstem Yukon and Tanana rivers subsistence, commercial, and personal use fisheries had, in part, enabled the Chena River king salmon BEG goal to be met or exceeded every year since 1990. In 4 of the last 5 years, the mainstem Yukon River commercial and subsistence fisheries have been restricted in order to meet Canadian border passage obligations.

In 2010, downriver salmon assessment projects indicated that the fall chum salmon run was very weak. Therefore, on August 20, in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 AAC 01.249), the chum salmon sport fisheries were closed throughout the Yukon River drainage, including the Chena River and remainder of the Tanana River drainage (Appendix A).

Current Issues and Fishery Outlook

While run strength and river conditions can override fishing effort in affecting harvest and catch, the harvest potential of this fishery may be increasing due to a combination of increased public awareness of its availability and improvements in the gear and fishing techniques used to target king salmon; however, most recent estimates suggest that harvests have declined from the 1990s and exploitation rates remain low (Brase 2009b, Table 4).

At the 2013 board meeting, the board will be presented with the *Escapement Goal Review of Select AYK Region Salmon Stocks, 2013*; this report recommends no change to the current Chena River king salmon escapement goal.

The board will also deliberate over **proposals 137** and **138** which address the *Yukon River Summer Chum Salmon Management Plan* (5 AAC 05.362) and *Yukon River Fall Chum Salmon Management Plan* (5 AAC 01.249). Any changes to these management plans may affect the chum salmon sport fisheries in the Tanana River drainage.

Recent Board of Fisheries Actions

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

Current or Recommended Research and Management Activities

There has been some concern raised about the effect that Moose Creek Dam may have on Chena River salmon passage. The dam is designed to allow water to pass freely through 3 floodgates at normal river stages. Fish passage is unimpeded until the river rises, placing property downstream at risk of flooding. When flow exceeds 8,000 cfs, the floodgates are partially closed to maintain that flow rate downstream from the dam. Water is diverted along the floodway to the Tanana River. The floodgates have seldom been lowered while adult king salmon were passing through the structure, and then, only for short periods of time. A fishway built into the side of the structure is designed to allow fish passage if a large volume of water is backed up behind the dam. Because the water rarely gets high enough to flow down the fishway, its potential to pass migrating salmon is essentially untested.

A DIDSON sonar was deployed downstream of the dam in 2007 to estimate the number of migrating salmon during periods of high water (> 2 consecutive days) when tower counts could not be completed. A mixture model based on length was used to allocate the total count of salmon passing the sonar into numbers of king and chum salmon (Huang 2012). Results were compared to actual tower counts and suggested this methodology is an appropriate means to estimate passage when conditions prohibit tower counts. The project objective is to position 2 sonars so they can record images from each half of the river, 24 hours a day, 7 days a week.

Salcha River

Background and historic perspective

The Salcha River is located approximately 40 miles east of Fairbanks via the Richardson Highway. It is a tannic stained rapid-runoff system, approximately 120 miles long originating in the Tanana Hills to the north (Figure 3). Numerous recreational cabins are located along the lower 70 miles of the river.

The Salcha River supports the largest king salmon escapement in the Tanana River drainage, with average annual returns of over 8,000 fish from 2006 to 2010 (Table 3). Adult king salmon enter the Yukon River during or shortly after breakup, and migrate up the Tanana River to enter the mouth of the Salcha River (965 miles from the Bering Sea) between late June and the second week of July, and continue up the Salcha River to spawning areas. The run ends in late July or early August.

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

The Salcha River king and chum salmon runs have been annually assessed since 1987 using mark-recapture experiments or by a counting tower located near the Richardson Highway Bridge (Table 3; Brase 2012; Brase and Doxey 2006; Burkholder 1991; Doxey 2004; Doxey et al. 2005; Evenson 1995, 1996; Evenson and Stuby 1997; Savereide 2012a-b; Skaugstad 1988–1990a, 1992–1994; Stuby and Evenson 1998; Stuby 1999–2001). Operation of the Salcha River counting tower is currently contracted to Bering Sea Fishermen's Association (BSFA), with

funding from the U.S./Canada Yukon River Pacific Salmon Treaty. BSFA closely follows the project design and methodology established by Division of Sport Fish (which operated the tower from 1993 to 1998) for this project. Contractor staff report king salmon passage counts to the Division of Commercial Fisheries at the end of each day so that the department can calculate and track cumulative passage. Counting conditions on the Salcha River can be highly variable depending on water height and river turbidity.

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

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

The bag and possession limits for king salmon in the Tanana River drainage have remained unchanged since the early 1960s, at 1 fish ≥ 20 inches (~510 mm).

Recent Fishery Performance

The 2011 king salmon harvest was 256 fish, with a catch of 769 fish; these were both below the 5-year average harvest (2006–2010) of 280 fish and average catch of 942 fish (Tables 4 and 5). It is difficult to determine if effort is increasing or decreasing in the salmon fishery, using SWHS data, because the Salcha River supports a multi-species sport fishery.

Similar to the Chena River, in 2012, the Salcha River had poor counting conditions throughout a portion of the king salmon run, which limited viewing conditions; however, the missed counts were extrapolated for and the count of 7,165 king salmon should be considered a good estimate of escapement. (Table 3; C. Stark, Fisheries Biologist, BSFA, Fairbanks; personal communication).

Fishery Objectives and Management

Similar to the process described under the Chena River king salmon section of this report, the EG committee recommended a Salcha River king salmon BEG of 3,300–6,500 fish in 2001. Unlike the Chena River, the Salcha River king salmon BEG range has been met or exceeded every year since 1990.

The Salcha River is also managed under the *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060), and an in-house management plan developed in 2009 to guide sport fish management of the Salcha River king salmon fishery (Brase 2009a).

In 2011 and 2012, the Salcha River king salmon fishery was restricted to catch-and-release only by EO (Appendix A). This action was taken because Yukon River indicators suggested that the king salmon run was weak. Restrictions had been placed on subsistence, commercial, and sport

users in the Yukon River, and closing the Salcha River (and all other Tanana River tributaries) to retention of king salmon seemed prudent based on recent years' production and lack of data from the current year.

In 2010, downriver salmon assessment projects indicated that the chum salmon run was very weak. Therefore, on August 20, in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 AAC 01.249), the chum salmon sport fisheries were closed throughout the Yukon River drainage, including the Salcha River and remainder of the Tanana River drainage (Appendix A).

Current Issues and Fishery Outlook

Typically, more sport anglers target king salmon on the Salcha River than on the Chena River, possibly due to better water clarity, larger run size, and ease of access to good fishing locations.

At the 2013 board meeting, the board will be presented with the *Escapement Goal Review of Select AYK Region Salmon Stocks, 2013*; this report recommends no change to the current Salcha River king salmon escapement goal.

The board will also deliberate over **proposals 137** and **138** which address the *Yukon River Summar Chum Salmon Management Plan* (5 AAC 05.362) and *Yukon River Fall Chum Salmon Management Plan* (5 AAC 01.249). Any changes to these management plans may affect the chum salmon sport fisheries in the Tanana River drainage.

Recent Board of Fisheries Actions

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

Current or Recommended Research and Management Activities

It is recommended that the department continue to work with BSFA contractors, who operate the Salcha River escapement monitoring project, in order to receive daily updates of the number of salmon passing the counting tower and river conditions.

COHO SALMON

Delta Clearwater River

Background and Historical Perspective

Coho salmon migrate to spawn in small spring-fed tributaries on the south side of the Tanana River drainage. These tributaries, near Delta Junction, provide critical habitat for the largest known coho salmon spawning concentrations in the Yukon River drainage. Because spring-fed systems do not freeze and coho salmon spawn into the late fall, these fish provide the latest open-water fishing opportunities in the region. Several such spring-fed systems exist throughout the upper portion of the Tanana River drainage, the largest of which is the DCR (Figure 2).

The DCR supports the largest documented spawning stock of coho salmon in the Yukon River, with escapements averaging over 10,000 fish/year from 2007–2011 (Table 6). The DCR is about 20 miles in length, is road accessible and supports the largest recreational fishery for coho salmon in the Tanana River drainage. From 2006 to 2010, an average of 254 coho salmon were

harvested of the 3,200 fish caught annually in the DCR (Tables 4 and 5). In 2011, the harvest of 284 fish was above the 5-year average (Table 4).

Annual escapement index counts of coho salmon have been conducted by boat survey since 1972 (Brase 2012; Brase and Doxey 2006; Doxey 2004; Doxey et al. 2005; Evenson 1995, 1996; Evenson and Stuby 1997; Parker 1991; Savereide 2012a-b; Skaugstad 1994; Stuby and Evenson 1998; Stuby 1999–2001). Escapement counts are conducted from an elevated platform on a riverboat during the peak of the coho salmon spawning period (generally mid-October) in that portion of the DCR from its confluence with the Tanana River, upriver to mile 18 (~29km), or to the uppermost navigable point.

Coho salmon are the last of the salmon species to enter the Yukon River and may be seen in the DCR starting in mid-September. The peak of the run is in mid-October. Property owners living near the river have reported coho salmon spawning as late as January. The springs provide favorable overwintering habitat for juvenile coho salmon that rear in the river. Carcass sampling from 1984 to 1990 indicated that, on average, 14% of returning coho salmon were 3 years old (1.1), 79% were 4 years old (2.1), and the remaining 7% were 5 years old (3.1) (Parker 1991). Therefore, the majority of the coho salmon fingerlings in the DCR rear for 3 winters (including 1 winter rearing in river gravel), then outmigrate and spend 1 winter in the ocean before returning (Parker 1991).

Recent Fishery Performance

Coho salmon in the DCR provide the last open-water fishery of the year, attracting both local and nonlocal anglers who want the opportunity to catch a salmon. Anglers can fish from shore or by boat, which can be launched at the state park campground or at a boat launch at river mile 8.5 (~13.5 km) off Jack Warren Rd. Coho salmon are caught from mid-September through October using various spoons, large spinners, or flies.

The coho salmon fishery on the DCR has steadily grown in popularity since 1984 (Parker 2009b). The majority of coho salmon are released (Tables 4 and 5); the quality of the salmon flesh in the DCR is not as desirable as fish caught closer to the confluence of the Yukon and Tanana rivers. In 2011, the catch of 3,761 coho salmon was above of the 5-year average of 3,215 fish (Table 5).

Fisheries Objectives and Management

Coho salmon assessment in the Yukon River drainage is quite limited and relies heavily on information from commercial and subsistence harvests; icy winter conditions make sampling difficult and expensive. The only coho salmon escapement goal presently in place for the Yukon River drainage is the DCR. The current coho salmon escapement goal (5,200–17,000 fish; sustainable escapement goal (SEG)), was adopted by the department in 2004, and replaced the previous minimum threshold of 9,000 fish. The goal continues to be based on a boat survey during peak spawning. These boat counts are conducted on the navigable portion of the river from the confluence with the Tanana River upstream approximately 18 river miles. The average count from 2007 to 2011 in the DCR was 10,209 fish (Table 6).

The department monitors DCR coho salmon escapement between mid-September and early October to determine if any inseason management action is necessary. Management objectives state that if 2,500 fish are found in the lower 8 miles of river between September 15 and October 1, it is likely that the escapement goal will be met and no management actions to restrict harvest

will occur. However, if less than 1,500 fish are found in the lower 8 miles of river during the same time period, the sport fishery may be closed by EO. The present bag and possession limit is 3 coho salmon. Yukon River sonar counts and catch rates from a test fish wheel on the Tanana River near Nenana are used as a preliminary index of DCR coho salmon run strength. With these data and a preliminary escapement estimate, the department has reasonable tools to predict if the coho salmon sport fishery needs to be restricted.

In 2012, approximately 305 coho salmon were counted on September 28 from the state campground (mile 8 or ~13km) downriver to mile 1 (~1.6 km). Because this count was below the 1,500 fish trigger, the coho salmon fishery was restricted to catch-and-release fishing only. The fishery was not closed completely because there were thought to be fish still holding downriver and due to the unusually high water event experienced in the Middle Tanana River area in late September. Commercial fishery harvests and assessment projects in the Lower Yukon and Tanana rivers indicated that the coho salmon run was slightly late and below average in size. The final escapement estimate for 2012 was 5,230 coho salmon, which slightly surpassed the lower bound of the SEG.

Current Issues and Fishery Outlook

Between 2001 and 2005, large numbers of coho salmon returned to the DCR. However, since 2005, there has been a significant decrease in the run size, signaling a change in return per spawner in the DCR (Table 6). In 2012, the escapement of 5,230 coho salmon was 51% below the recent 5-year average (2007–2011) of 10,209 fish. During the past 10 years, the escapement goal for the DCR has been met or exceeded every year.

At the 2013 board meeting, the board will be presented with the *Escapement Goal Review of Select AYK Region Salmon Stocks, 2013*; this report recommends no change to the current DCR coho salmon escapement goal.

Recent Board of Fisheries Actions

The last board action affecting salmon sport fishing in the DCR was in 1998 when a 3 fish bag and possession limit for coho and chum salmon was established drainagewide.

Current or Recommended Research and Management Activities

The preliminary lower DCR survey (mid-September) and peak DCR coho salmon survey should be conducted annually to assess the coho salmon run in relation to the 5,200–17,000 fish SEG.

KING, COHO, AND CHUM SALMON

Other TRMA Fisheries

Background and historic perspective

Several other river drainages in the TRMA support spawning populations of salmon; these include the Chatanika (king and chum salmon), Nenana (king, chum, and coho salmon) and the Goodpaster rivers (king and chum salmon). The furthest upstream tributary of the Tanana River drainage in which substantial king salmon spawning occurs is the Goodpaster River.

The Tanana River, from its confluence with the Gerstle River to the Little Delta River, is crucial habitat for returning chum salmon. Alluvial aquifers associated with porous floodplain gravels store water and stabilize winter flows in this area near Delta Junction. All the large aquifers are

located on the south side of the Tanana River. Groundwater seeps into the Tanana River, providing spawning habitat for chum and coho salmon.

Coho salmon migrate to spawn in small spring-fed tributaries in the south side of Tanana River drainage. Several such springs are known to exist throughout the TRMA, including the Richardson Clearwater River, Providence Creek, and Blue Creek.

The Chatanika River king salmon population was assessed sporadically by boat survey and then annually from a counting tower from 1998 to 2005 (Table 3; Brase and Doxey 2006; Doxey 2004; Doxey et al. 2005; Stuby 1999–2001). The counting tower project was discontinued in 2005 due to consistently annual high water conditions which resulted in poor viewing conditions and poor quality estimates in most years.

The Nenana River drainage is believed to support the second largest coho salmon spawning population in the Tanana River drainage, and has been surveyed regularly by boat and aerial survey since 1993 (Chris Stark, Bering Sea Fishermen's Association biologist, personal communication). These surveys indicate that the recent average total Nenana River drainage coho salmon escapements have been approximately 2,000 fish (Table 6).

Teck-Pogo Inc. (now Sumitomo), a mining corporation working within the Goodpaster River drainage, conducted aerial surveys for king salmon from 1998 to 2003 as part of environmental assessment studies (Table 3). In 2004, Teck-Pogo Inc. contracted BSFA to monitor the Goodpaster River king salmon escapement for 20 years. BSFA subcontracted Tanana Chiefs Conference (TCC) to operate a counting tower. Since 2004, TCC has operated the counting tower on the North Fork of the Goodpaster River. In 2012, an estimated 778 king salmon passed the counting tower under moderately favorable counting conditions (Table 3; C. Stark, Fisheries Biologist, BSFA, Fairbanks; personal communication).

Fishery Objectives and Management

Due to a lack of a long time series of return data, there are no escapement goals associated with any of the other TRMA salmon populations.

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

In 2011 and 2012, all tributaries were restricted to king salmon catch and release only by EO (Appendix A). This action was taken because lower river indicators suggested that the king salmon run was weak, and in 2011, counting towers on the Chena and Salcha rivers were inoperable. Restrictions had been placed on subsistence, commercial, and sport users in the Yukon River, and closing all Tanana River tributaries to retention of sport-caught king salmon seemed prudent and reasonable based on recent years' production and the lack of reliable inseason escapement data (in 2011).

Current Issues and Fishery Outlook

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

At the 2013 board meeting, the board will deliberate on **proposal 153,** which would repeal the regulation that closes Fielding Lake to salmon fishing. There are no salmon in Fielding Lake.

Recent Board of Fisheries Actions

At the 2010 board meeting, a proposal was adopted which relocated the regulatory boundary marker between the Upper and Lower Chatanika River, above which is closed to salmon fishing. The former regulatory boundary was located 1 mile (~1.6 km) upstream from the Elliott Highway Bridge and was originally put in place for the whitefish spear sport fishery that occurred in the area through 1993. Other regulations used this point as a reference in order to maintain consistency. The new boundary is the Elliott Highway Bridge itself. This new location provides a more permanent and recognizable boundary.

The board also adopted a proposal which closed the Tok River drainage to sport fishing for salmon to provide protection for a developing stock. In 2008, the department received a report of about 50 spawning coho salmon in the Tok Overflow #1 (30 miles upstream in the Tok River) (Parker 2009b). In October 2009, department staff again surveyed the same area and counted 13 coho salmon. These were the first historical documentations of any coho salmon in these springs and given low numbers of fish, the board supported providing protection to this small salmon stock.

In 2007, the board adopted a proposal to allow catch-and-release fishing for king salmon in the lower 25 miles of the Goodpaster River from July 1 through August 31 (Parker 2008).

Current or Recommended Research and Management Activities

The Chatanika River drainage was an important mining area from the 1920s through 1950s. In 1926, the Davidson Ditch Diversion Dam was built. It was used to support industrial activity in the area until it became inoperable in 1967 due to flood damage. In 2002, the dam was removed through a cooperative partnership among several state, federal, and private nonprofit organizations. This project restored fish passage to more than 65 miles (105 km) of upstream habitat for king and chum salmon. Staff from BSFA annually monitor the watershed above the old dam site for recolonization by salmon adults and/or juveniles. Juvenile salmon have been observed from the former dam site to approximately 6.2 miles (10 km) upriver every year since the dam was removed, except in 2009, when no juveniles were observed, despite extensive trapping and survey efforts (C. Stark, Fisheries Biologist, BSFA, Fairbanks; personal communication).

Aerial surveys are conducted on other coho salmon-producing streams in the area. For example, since 2000, aerial surveys have been performed consistently by the Division of Commercial Fisheries to count Richardson Clearwater River (RCR) coho salmon. In 2012, an estimated 515 coho salmon were counted on the RCR (A. Padilla, Commercial Fish biologist, ADF&G, Fairbanks; personal communication); average escapement for 2007–2011 was 510 fish (Table 6).

A foot survey was conducted on Blue Creek for the first time in 2007, from the mouth to head of the springs (approximately 1.2 miles). Peak salmon counts in Blue Creek showed 2,200 chum and 102 coho salmon (Parker 2008). In 2012, 53 coho and 6 chum salmon were counted in the same area by aerial survey.

NORTHERN PIKE

Minto Flats

Background and historic perspective

The Minto Flats wetlands complex is located about 35 miles west of Fairbanks between the communities of Nenana and Minto (Figure 3). 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 protection and enhancement of habitat, conservation of fish and wildlife, and to guarantee 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, a group of large interconnected, generally shallow and heavily vegetated lakes in the eastern Flats, 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 not regularly flooded. 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.

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

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

The Tolovana River drainage/Minto Flats complex northern pike population has supported a major proportion of the TRMA northern pike sport fishery for many years (Table 7). It was primarily a summer fishery until the mid-1980s, when an intensive sport fishery developed on concentrations of northern pike overwintering in the Chatanika River just upstream from the mouth of Goldstream Creek. A subsistence fishery for northern pike (and whitefish) occurs near the village of Minto and at historically used sites in the eastern portions of Minto Flats (Andrews 1988). Gillnets are used throughout the open-water period and northern pike are taken through the ice with hook-and-line.

From 1984 to 1986, total harvest of northern pike from the Minto Flats complex doubled from 3,128 fish to 6,488 fish (Brase 2008). It was believed and later demonstrated by radiotelemetry studies (Roach 1998), that these fish were the spawning stock for the Minto Lakes. After 1987, regulations were implemented that closed sport fishing for northern pike at Minto Flats between October 15 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 (~760 mm).

Estimated sport catch and harvest of northern pike in the Minto Flats complex peaked in 1994 with a harvest of 9,489 fish and a catch of 52,191 fish. Estimated sport harvest and catch continued to decline until 2001, when reported catches started to increase (Brase 2009b). A significant increase in the recent years' catch and harvest began in 2003, when harvest went from 650 fish in the Minto Flats complex, to 1,284 fish (Table 7). Harvests were at that higher level through 2007, they dropped in 2008, and have remained at a lower level since then.

Currently, Minto Flats is closed to sport fishing for northern pike from October 15–May 31; the bag and possession limit is 5 fish, only 1 of which may be ≥ 30 inches long (~760 mm).

Northern pike population assessments have been performed in the Minto Lakes area every 3 to 5 years since 1987. As a surrogate for abundance estimates of northern pike in the entire Minto Flats (200,000 ha), the department estimates abundance of northern pike in the Minto Lakes Study Area, which contains an estimated 15,000 acres of summer habitat for northern pike (Roach 1998). The 2008 estimate of 9,854 northern pike ≥ 400mm (~16 in) was significantly less than estimates from either 2003 or 1997 (25,227 and 16,546 fish, respectively; Scanlon 2006, Roach 1998) (Table 8). Similar results were also observed for pike ≥ 600mm (~24 in), with the 2008 estimate of 2,092 fish being significantly smaller than the 2000 and 1997 estimates (5,331 and 3,251 fish, respectively; Scanlon 2001, Joy 2009).

Recent Fishery Performance

The 2011 catch of northern pike in the Minto Flats was 3,362 fish, which was lower than the recent 5-year average (2006–2010) of 6,931 fish (Table 7). In 2011, fishing effort in Minto Flats was below average, with an estimated 1,460 angler-days compared to the 5-year average of 2,061 days (Appendix B). The majority of the effort at Minto Flats is probably directed toward northern pike, even though effort is not estimated by target species in the SWHS.

Although Minto Flats is closed to northern pike sport fishing from October 15 through May 31, there is a subsistence fishery that occurs throughout the winter. To participate in any subsistence fishery, one needs to be an Alaska resident. Residents must acquire a Tolovana Subsistence Northern Pike Permit from the department's Division of Commercial Fisheries in Fairbanks. Subsistence fishers commonly harvest northern pike near the confluence of the Chatanika River and Goldstream Creek (Figure 3) late in the winter/early in the spring. The winter subsistence northern pike harvest has averaged 927 fish over the past 5 years (2006–2010) from an average number of 56 permit holders (Table 9).

Fishery Objectives and Management

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

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

The subsistence management plan is slightly different: 1) subsistence fishing for northern pike is open year-round; however, a permit is required (Alaska residents only); 2) prior to 2010 there were no daily and/or annual limits; however, in 2010, the board established a 10-fish bag, 20-fish possession limit for the fishery that occurs in that portion of the Chatanika River upstream from its confluence with Goldstream Creek; 3) gillnets may be used only April 15–October 14; and, 4) a hook-and-line may be used only if fishing through the ice. If subsistence harvest in the Chatanika River drainage upstream of the confluence of the Chatanika River and Goldstream Creek is greater than 1,500 northern pike from January 1 to the ice-free period, these waters will be closed by EO to fishing for northern pike through the ice.

Finally, both the sport and subsistence management plans for northern pike require use of single hooks in that portion of the Chatanika River drainage upstream of the confluence of the Chatanika River and Goldstream Creek, to the Fairbanks Nonsubsistence Area boundary (approximately 1 mile (~1.6 km) below the boat launch).

In 2007, over 1,500 northern pike were harvested in the winter subsistence fishery (Table 9); therefore, on February 16, 2007, the Division of Commercial Fisheries closed the subsistence fishery by EO for the remainder of the winter in that portion of the Chatanika River drainage upstream from the confluence of the Chatanika River and Goldstream Creek. On May 1, an EO was issued by Division of Sport Fish reducing the summer season sport bag and possession limits throughout the Minto Flats area to 2 fish, only 1 of which could be greater than or equal to 30 inches (~750 mm).

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

Current Issues and Fishery Outlook

Harvest of northern pike in the lakes and flowing waters of the Minto Flats area appears to be less than the maximum 20% exploitation rate specified in regulation. The 2001–2010 (10-year) average sport fish harvest of northern pike in the Minto Flats was 970 fish (Table 7) and the 2001–2010 (10-year) average subsistence harvest was 712 fish (Table 9); the total of these 2 harvest estimates is 1,682 northern pike. The 2008 abundance estimate in the Minto Flats index area was 9,854 northern pike larger than ~16 inches (400mm, Table 8); 20% of this abundance is 1,971 fish. Therefore, if sport and subsistence harvests continue to maintain current levels and the population of northern pike in Minto Flats does not decrease, there should be no need for restrictions to the sport fishery.

At the 2013 board meeting, the board will deliberate over **proposal 96** which would increase the northern pike sport fishing season to year-round in select lakes of the TRMA. The lakes of the Minto Flats area are not included in the proposal.

Proposal 92 would allow use of large treble-hooks in all waters of the TRMA for taking fish other than salmon. These large hooks are standard sport fishing gear for northern pike.

At the 2013 meeting, the board will also deliberate over **proposals 99 and 100,** which will allow retention of northern pike in subsistence fisheries that occur in a portion of the Tanana drainage adjacent to the Minto Flats and Tolovana River areas.

Recent Board of Fisheries Actions

In 2010, the board adopted a proposal which aligned the language in the subsistence and sport fish versions of the *Minto Flats Northern Pike Management Plan* (5 AAC 01.244 and 5 AAC 74.044). The description of the area used to estimate the exploitation rate of northern pike in the 2 versions of the plan was not the same, whereas, the intent of the plans were to include the same area and fish stocks. The adopted proposal aligned the description of the area for which the exploitation rate is calculated.

Current or Recommended Research and Management Activities

Performing a northern pike population estimate in the Minto Flats is a priority before the next board meeting to assess whether the population has rebounded from the low population estimated in 2008.

TRMA Lakes

Background and Historical Perspective

Northern pike sport fisheries occur in several lakes in the TRMA, including George, Volkmar, Deadman, Healy, and Mineral lakes. Of these lakes, George Lake has the largest amount of fishing effort and harvest. Hook-and-line is the predominant gear used to harvest northern pike, although spears are also used during the winter months. In 1993, 549 households responded to a northern pike survey to gather information on the distribution of participation and harvest, and kinds of gear used by successful northern pike anglers. Results showed that 84% of participation and 82% of the harvest occurred during the open water months (Bingham and Parker 1995). Fishing occurred slightly more often on rivers (51%) than on lakes (49%) during the open water period. Only 14% of the total participation occurred during the ice-covered season, of which 86% of effort was on lakes. Much of the effort directed towards pike in the TRMA is nonconsumptive fishing (catch-and-release). In 2010, only 13% of the total catch of northern pike in the Tanana River drainage was harvested (Table 7).

George Lake is a semi-remote lake located about 35 miles southeast of Delta Junction and about 5 miles northeast of the Alaska Highway (Figure 2). The lake is large (4,500 ac), but shallow, maximum depth is only 35 feet (~10 m), and the majority of the shoreline is privately owned. The lake has one major inlet and a navigable outlet, George Creek, which flows to the south into the Tanana River. Nearshore waters are shallow with large beds of aquatic vegetation.

George Lake is typically ice-free from late May to mid-October and is seasonally accessible by boat, snowmachine, and airplane (equipped with floats or skis). During the open water season, fishing pressure is believed to be highest from June 1 (when the season opens) through mid-July. Little ice fishing occurs before late December or early January because poor ice conditions on the Tanana River prevents snow machine access. Year-to-year total fishing effort at George Lake can be variable due to poor snowmachine conditions (low snowfall and open water on the Tanana) and difficult boat access (low creek levels). During the ice fishing season, northern pike

and burbot are taken by hook-and-line, as well as with spears. The department has annually issued between 1 to 6 ice house permits for George Lake since the early 1980s.

Volkmar Lake is semi-remote and is relatively close to Delta Junction and Fort Greely (Figure 2). There are numerous private land parcels and cabins around the shoreline, relatively easy wintertime access, and good catch rates of northern pike. Volkmar Lake is situated north of the Tanana River, and most of the fishing effort is thought to occur through the ice during spring when temperatures are more moderate and the Tanana River can be crossed safely. During summer, Volkmar Lake can only be accessed by float-equipped aircraft. Northern pike stock assessment studies are done periodically for both George and Volkmar lakes (Table 10; Pearse and Hanson 1993; Pearse 1994; Scanlon 2001; Wuttig and Reed 2010).

In 1995, a record 1,263 angler-days occurred on Volkmar Lake, with a harvest of 1,084 pike (Parker 2009a). In 1996, effort and harvest fell to the lowest recorded level (191 angler-days and 9 fish harvested). In 1996, anglers reported that size and abundance of pike in Volkmar Lake had declined. At the 1997 board meeting, the board adopted a bag and possession limit of 1 fish, no size limit, as a conservation measure. Stock assessment in 2000 estimated a population of 615 northern pike ≥18 inches (~450 mm) in Volkmar Lake; it is thought that the large harvest in 1995 was likely responsible for the decline in population and harvests at that level were not sustainable (Parker 2009a).

Recent Fishery Performance

The 5- and 10-year average catches and harvests of northern pike in both George and Volkmar lakes have remained very similar, although there is annual variability (Table 7). Both these lakes are almost exclusively northern pike fisheries; therefore, estimates of effort may be applied to these lakes more readily than for other multi-species fisheries.

Fishing effort in George Lake is highly variable, ranging from 249 to 1,645 angler-days in just the past 5 years (Appendix B). This variability may be due to water levels in George Creek, which are not always high enough to allow anglers boat access into the lake, or due to ice conditions on the Tanana. When there is severe overflow, it is difficult to cross the Tanana on snowmachine. In 2001 and 2003, harvest of northern pike in George Lake increased dramatically as more anglers were able to access the lake via boat (due to high water), but declined in 2002 and 2004 because the outlet was low. In 2007, harvest increased at George Lake because the outlet was boat accessible during the spring. The harvest of 82 northern pike in 2011 was the lowest in the past 10 years (Table 7).

Since 2001, fishing effort on Volkmar Lake has averaged 177 angler-days per year (Appendix B). Since 2001, harvests of northern pike at Volkmar Lake ranged from 0 fish in 2007 to 127 in 2002 (Table 7). From 2006 to 2010, average harvest and catch of northern pike was 38 and 207 fish, respectively (Table 7).

Fisheries Objectives and Management

George Lake

A draft departmental management plan for George and Volkmar lakes was developed in 2007; previously the fishery had been managed for a annual exploitation rate of 10%–20%. The revised management objective for George Lake is to maintain a population size greater than 9,200 northern pike ≥18 inches (~450 mm) in size. An abundance less than this is the threshold at which a management action to restrict harvest would be taken by the department.

The department conducted stock assessment for northern pike in George Lake during May 2006 and estimated the population size to be 16,204 fish ≥ 18 inches (~450 mm; Table 10), with an additional 4,268 fish between 12 and 18 inches (~305-450 mm; Wuttig and Reed 2010). The population estimate is well above the objective for George Lake at which a management action would need to occur.

Volkmar Lake

The management objective for Volkmar Lake is to maintain a population of northern pike ≥ 18 inches (~450 mm) of 2,000 fish or greater, as specified in the 2007 management plan. Although no formal abundance or exploitation-based management objective exists for Volkmar Lake, 2,000 fish was selected as the population size at which any regulatory change would be considered to increase harvest. An increase in the bag limit is recommended to allow for additional harvest opportunity if the population rises above 2,000 fish.

In 2000, the estimated abundance of northern pike >450 mm (~18 in) in Volkmar Lake was 615 fish (Scanlon 2001). Angler effort and harvest were minimal after 1997, presumably due to a reduced bag and possession limit and angler perceptions of low northern pike abundance. In 2005, the population of northern pike >450 mm (~18 in) had increased to 1,814 fish (Wuttig and Reed 2010) and in 2009; the population had increased to 4,017 fish (Wuttig 2010).

Current Issues and Fishery Outlook

George Lake

Based on recent population estimates, the northern pike population in George Lake appears healthy and current harvests sustainable. During the late 1980s and 1990s, George Lake supported a large population of relatively small northern pike (~20 in (510 mm) (Clark et al 1988, Pearse and Hanson 1993). Recently, anglers and some members of the local Fish and Game AC have expressed their satisfaction of their summer fishing experiences at George Lake because of good catch rates, particularly of larger-sized fish (e.g., >24 inches (~610 mm)).

Stock assessment conducted during 2006 indicates a higher proportion of larger fish in the population compared to 1987. In 1987, 48% of the northern pike population was estimated to be over 18 inches (~450 mm; Clark et al. 1988). In 2006, 79% of the northern pike population was estimated to be ≥18 inches (~450 mm; Wuttig and Reed 2010). In 2006, it was estimated there were approximately 1,013 northern pike ≥30 inches (~750 mm) or about 6% of the estimated population. In 1987, only 3.4% of the population, or 300 fish were estimated at 30 inches (~750 mm) or more in length.

Volkmar Lake

The northern pike population in Volkmar Lake has exceeded the abundance threshold of 2,000 fish larger than ~18 inches (450mm). It is consistent with management guidelines to increase the bag limit to allow additional harvest opportunity. The bag limit was increased to 2 fish in 2010.

Recent Board of Fisheries Actions

In January 2010, the board adopted a proposal which increased the bag and possession limit in Volkmar Lake from 1 fish (no size limit) to 2 fish, of which only 1 can be over 30 inches (~750 mm) in length. The board also adopted a proposal which reduced the spring spawning closure for northern pike in Volkmar and George lakes by 20 days. This aligned the open season for all

the lakes in the TRMA, with the exception of the Tolovana drainage and Harding Lake, to June 1–April 20.

Current or Recommended Research and Management Activities

Northern pike populations should continue to be monitored in George and Volkmar lakes to assess possible fisheries impacts from the recent regulation changes.

Other TRMA Northern Pike Fisheries

Harding Lake is located about 45 road miles southeast of Fairbanks along the Richardson Highway and is the largest roadside lake north of the Alaska Range (Figure 3). 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 vulnerable to anglers. In 2000, northern pike fishing at Harding Lake was closed due to low abundance; for details about the closure and habitat rehabilitation efforts see Brase (2009c).

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 TRMA. 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. Other lakes in the Upper Tanana River drainage with northern pike populations are Sand, "T", Mansfield, Dog, Island, Tetlin, Takomahto, Jatahmund, Island, and American Wellesley lakes.

The northern pike present in the Tanana River drainage provide the population reservoir which, through the movements of individual fish, ensures continued viability of small stocks and availability of fishing opportunity wherever suitable habitat occurs, including colonization of ponds. Northern pike colonize suitable gravel pits and other ponds when the river floods into them and the pits become connected to the river, or when people illegally introduce northern pike into those waters. Many of these areas are road-accessible and rarely produce large numbers of fish or 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 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, 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 suggested that adult northern pike in that river move little during the year (Pearse 1994).

Providing harvest opportunity at sustainable levels is an overriding management responsibility. However, in roadside ponds stocked with salmonids, such as rainbow trout, and 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.

The department will continue to monitor these small northern pike 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.

At the 2013 board meeting, the board will deliberate over **proposal 96,** which would increase the northern pike sport fishing season to year-round in select lakes of the TRMA.

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 have supplied fish to TRMA waters.

Some initial stocking events were "bucket-biology" experiments where fish were simply transported from 1 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 source can be used. In addition, all potential brood source and hatchery-raised fish must undergo pathology testing to ensure they are disease-free before being used as broodstock or outstocked into any water bodies.

At present, just over 100 lakes may be stocked in the TRMA. 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 that has been stocked with (sterile) rainbow trout; however, this practice ended in 2010. These stocked waters offer a range of fishing opportunities, including neighborhood urban ponds, large and small roadside lakes, remote lakes that are only trail-accessible and sometimes only in winter, and a few remote lakes only accessible by airplane. They function within the spectrum of fisheries management to provide diverse angling opportunities, shift pressure from wild stocks, and provide harvest alternatives. Diversity also provides an opportunity for winter fishing.

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

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

fingerlings are stocked into remote lakes because those lakes have the ability to meet the lower demand, plus it is too expensive to transport larger fish with aircraft.

Recent Fishery Performance

Fishing the stocked waters of the TRMA is very popular because the bag and possession limits are typically very liberal (10 fish, only 1 fish 18 inches or larger (~460 mm)) and most of the lakes/ponds are easily accessible. Approximately 58% of the recent 5-year average annual TRMA sport harvest comes from stocked lakes in the area, although catch of stocked species has been in a steady decline since 2002, likely a result of reduced hatchery production (Table 11).

Fishery Objectives and Management

In 2004, the board adopted the *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065) into regulation. This plan defines how the department should meet public demand for diverse fishing opportunities. The plan defines 3 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 TRMA that are in the special management category include: Harding, Little Harding, Summit (near Cantwell), Monte, Donnelly, and Rainbow lakes. Dune and Koole lakes are managed under the conservative management approach. All remaining lakes in the TRMA 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 species, life stage, stocking frequencies, and 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 2012 Region III stocking plan may be accessed electronically via the department's website.

Current Issues and Fishery Outlook

In 2005, the Alaska Legislature approved construction of new hatcheries in both Fairbanks and Anchorage to replace the outdated Anchorage facilities at Ft. Richardson and Elmendorf AFB, which were no longer producing as many fish as they once did due to changes to the base boiler systems. These changes resulted in less hot water, necessary for accelerating fish growth rates. The new William Jack Hernandez (Anchorage) and Ruth Burnett (Fairbanks) Sport Fish hatcheries are currently in operation and began producing catchable-sized fish in 2012. Once these hatcheries become fully operational, the biomass of fish stocked in the TRMA is predicted to double.

A major issue in the TRMA is a lack of public access to many small ponds/gravel pits in the Fairbanks area. Without guaranteed public access, the department is unable to stock a water body; therefore, an opportunity is lost for small neighborhood fisheries to develop.

At the 2013 board meeting the board will deliberate over **proposals 88, 89, 90, and 237** that may affect several stocked lakes in the TRMA. **Proposal 88** would restrict the season on Rainbow Lake to open May 15–September 30 only. **Proposal 89** would remove Little Harding Lake from the *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065) and close it to fishing for northern pike. **Proposal 90** would move Little Harding, Harding, Summit, Monte, and Donnelly lakes from the special management to the regional management category of the *Tanana River Area Stocked Waters Management Plan*. **Proposal 237** would move Rainbow

Lake from the special management to the regional management category of the *Tanana River Area Stocked Waters Management Plan*.

Proposal 91 would update the *Tanana River Area Stocked Waters Management Plan* by removing several lakes from the plan that are no longer stocked.

Recent Board of Fisheries Actions

At both the 2010 and 2007 meetings, the board adopted the updated stocked waters list.

In 2007, the board adopted a proposal to change the management approach for Koole Lake from the regional to conservative under the *Tanana River Area Stocked Waters Management Plan*. This change reduced the bag and possession limit from 10 fish (all species combined), of which only 1 may be 18 inches or greater in length (~450 mm), to 5 fish (all species combined), of which only 1 may be 18 inches or greater in length (~450 mm).

Current or Recommended Research and Management Activities

Fingerling coho salmon are stocked in Quartz Lake because the lake produces sufficient numbers of catchable fish from fingerling stockings. However, recent population assessments in Quartz Lake have shown that survival of rainbow trout fingerlings from August through June appears to be much lower. For this reason, the department is now stocking subcatchable rainbow trout into Quartz Lake. This problem with survival can be averted if stocking of fingerlings can occur earlier in the summer when water temperatures are cooler.

The ongoing strategy is to stock species most suited to a particular lake's physical characteristics at a size to account for lake productivity, harvest pressure, and to minimize transport costs. Rainbow trout and Arctic grayling do well in most lakes in the TRMA and support summer fisheries. Coho and king salmon also do well in most lakes and provide an aggressive fish during winter when other species are less active. Arctic char are long-lived and can grow to a large size, which makes them attractive to anglers. In some lakes, more than 1 species is stocked to provide diversity and to take advantage of different seasonal behavior. The most popular combination is rainbow trout and coho salmon.

ACKNOWLEDGMENTS

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

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TABLES AND FIGURES

Table 1.–Number of angler-days of sport fishing effort expended by recreational anglers and total sport harvest of freshwater fish species in statewide, Region III (AYK-UCUS) and the Tanana River Management Area (TRMA) waters; 2001–2011.

	Year											5-yr Average	10-yr Average 2001–2010
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2006–2010	
Angler-days													
Statewide	2,261,941	2,259,091	2,219,398	2,473,961	2,463,929	2,297,961	2,543,674	2,315,601	2,216,445	2,000,167	1,919,313	2,274,770	2,305,217
Region III	194,138	220,276	206,705	217,041	183,535	175,274	204,032	183,084	194,019	184,824	144,755	188,247	196,293
Region III as a % of Statewide	9%	10%	9%	9%	7%	8%	8%	8%	9%	9%	8%	8%	9%
TRMA	91,135	108,462	99,934	116,486	93,398	79,677	100,956	72,335	92,737	96,859	67,378	88,513	95,198
TRMA as a % of Region III	47%	49%	48%	54%	51%	45%	49%	40%	48%	52%	47%	47%	48%
Total FW Harvest													
Statewide	1,043,036	1,109,901	1,052,301	1,185,153	994,001	885,912	954,028	931,248	946,936	864,629	890,591	916,551	996,715
Region III	114,278	161,753	125,109	136,623	108,887	103,379	113,693	100,567	94,923	87,561	56,263	100,025	114,677
Region III as a % of Statewide	11%	15%	12%	12%	11%	12%	12%	11%	10%	10%	6%	11%	11%
TRMA	49,197	86,796	58,055	57,918	43,196	35,248	40,717	30,949	30,689	31,783	19,348	33,855	46,368
TRMA as a % of Region III	43%	54%	46%	42%	40%	34%	36%	31%	32%	36%	34%	34%	39%

Source: Jennings et al. (2004, 2006a–b, 2009a-b, 2010a-b, 2011a-b, *In prep*); Walker et al. (2003).

Table 2.–Number of fish harvested and caught by recreational anglers fishing in the Tanana River drainage (includes stocked waters), 2001–2011.

Year	King Salmon	Chum Salmon	Coho Salmon	Landlocked Salmon	Rainbow Trout	Dolly Varden / Arctic Char	Lake Trout	Arctic Grayling	Northern Pike	Burbot	Sheefish	Whitefish	Other Species
Harvest													
2001	667	29	1,122	10,197	19,919	3,368	445	7,074	4,207	1,297	9	785	78
2002	478	307	541	17,693	38,562	6,645	709	12,987	3,436	4,009	92	1,086	251
2003	2,153	63	1,317	6,680	26,292	4,854	860	10,084	2,947	2,561	59	167	18
2004	1,319	98	716	8,459	25,554	4,111	646	6,773	4,895	3,446	177	1,485	239
2005	483	144	267	3,056	17,829	2,752	1,082	10,061	4,624	2,487	129	114	168
2006	638	315	629	2,499	16,998	1,818	791	5,982	3,276	1,903	53	252	94
2007	549	41	339	4,289	17,841	2,038	648	6,739	3,900	3,623	37	656	17
2008	254	61	170	5,352	10,576	2,990	506	8,122	1,381	1,227	83	227	0
2009	836	71	115	2,540	10,053	2,733	1,193	8,134	3,016	1,879	23	96	0
2010	313	62	369	2,832	11,056	1,965	1,086	8,298	2,652	2,010	0	1,300	106
2011	372	77	284	1,227	7,663	1,189	443	5,179	1,209	1,024	16	641	24
5-yr Average 2006–2010	518	110	324	3,502	13,305	2,309	845	7,455	2,845	2,128	39	506	43
10-yr Average 2001–2010	769	119	559	6,360	19,468	3,327	797	8,425	3,433	2,444	66	617	97
Catch													
2001	2,422	1,240	6,791	24,121	59,441	8,212	2,304	110,064	20,512	2,005	41	1,798	246
2002	3,227	1,109	5,694	47,019	108,597	15,147	4,816	177,070	25,146	4,869	98	1,597	278
2003	7,000	1,791	15,377	19,880	80,447	13,224	3,595	144,505	26,591	3,332	415	1,018	994
2004	6,339	1,196	5,796	23,785	73,299	14,855	3,816	142,373	36,710	4,591	518	1,831	732
2005	1,633	1,372	2,844	11,972	46,646	7,904	5,164	128,377	33,900	3,226	454	682	537
2006	2,619	1,445	5,230	7,102	50,484	9,980	3,678	93,276	18,866	3,296	73	969	135
2007	2,463	305	3,343	13,450	53,861	7,147	2,523	149,388	31,577	5,427	37	1,181	82
2008	915	636	1,739	9,593	41,522	7,172	2,000	116,973	10,330	1,590	195	1,418	0
2009	2,632	526	4,330	8,795	42,664	6,161	4,526	146,575	18,881	4,256	38	1,539	43
2010	1,859	158	3,679	7,276	49,225	5,800	5,034	122,898	20,076	3,164	300	1,760	268
2011	1,432	620	3,761	2,980	35,547	4,806	2,296	87,411	13,672	1,224	158	1,023	47
5-yr Average 2006–2010	2,098	614	3,664	9,243	47,551	7,252	3,552	125,822	19,946	3,547	129	1,373	106
10-yr Average 2001–2010	3,111	978	5,482	17,299	60,619	9,560	3,746	133,150	24,259	3,576	217	1,379	332

Source: Jennings et al. (2004, 2006a–b, 2009a-b, 2010a-b, 2011a-b, *In prep*); Walker et al. (2003).

Table 3.–Abundance estimates and methods of estimation for king salmon in the Chena, Salcha, Chatanika, and Goodpaster rivers, 2000–2012.

	Chena		Salcha		Chatanika		Goodpaster	
Year	Abundance	Method	Abundance	Method	Abundance	Method	Abundance	Method
2000	4,694	M-R[a]	4,595	Tower	398	Tower	2,175	Helicopter
2001	9,696	Tower	13,328	Tower	964	Tower	1,457	Helicopter
2002	6,967	M-R[a]	4,644 [b]	Tower	719	Tower	1,440	Helicopter
2003	8,739[c]	Tower	11,758 [d]	Tower	1,008	Tower	3,004	Helicopter
2004	9,645	Tower	15,761	Tower	2,444	Tower	3,673	Tower
2005	no estimate[e]	Tower	5,988	Tower	no estimate[e]	Tower	1,184	Tower
2006	2,936	Tower	10,400	Tower	ND	ND	2,479	Tower
2007	3,564	Tower	5,631 [b]	Tower	ND	ND	1,581	Tower
2008	3,212	Tower	5,300 [b]	Tower	ND	ND	1,880	Tower
2009	5,253	Tower	12,788	Tower	ND	ND	4,280	Tower
2010	2,382	Tower	6,135	Tower	ND	ND	1,125	Tower
2011[f]	no estimate[e]	Tower	7,200	Tower +Aerial	ND	ND	1,325	Tower
2012[f]	2,220	Tower	7,165	Tower	ND	ND	778	Tower
BEG Range	2,800–5,700		3,300–6,500		No escapement goal		No escapement goal	
10-yr Average 2002–2011	5,339		8,569				2,197	
5-yr Average 2007–2011	3,606		7,427				2,038	

Source: Brase 2012; Brase and Doxey (2006); Doxey (2004); Doxey et al. (2005); Savereide (2012a-b); Stuby (2000 & 2001).

[a] M-R = Mark-recapture experiment.

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

[c] 11,100 king salmon when expanded for noncounting days.

[d] 15,500 king salmon when expanded for noncounting days.

[e] No estimates were produced due to extreme high water events throughout the run. Chena River king salmon escapement was likely within the BEG range.

[f] Preliminary results.

Table 4.–Sport harvest of king, coho, and chum salmon in the Tanana River drainage, 2001–2011.

	Year											5-yr average	10-yr average
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2006–2010	2001–2010
King Salmon													
Chena River	536	178	976	762	57	265	78	150	413	32	84	188	345
Salcha River	108	269	1,127	481	351	317	471	74	397	143	256	280	374
Chatanika River	23	0	13	37	0	0	0	30	0	16	0	9	12
Goodpaster River[a]	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0	0
Other Tanana	0	31	37	39	75	56	0	0	26	122	32	41	39
Total Tanana Drainage	667	478	2,153	1,319	483	638	549	254	836	313	372	518	769
Coho Salmon													
Nenana River drainage	118	24	11	78	0	37	0	86	10	160	0	59	52
Delta Clearwater River	816	517	1,272	511	267	580	311	65	105	209	284	254	465
Other Tanana	188	0	34	127	0	12	28	19	0	0	0	12	41
Total Tanana Drainage	1,122	541	1,317	716	267	629	339	170	115	369	284	324	559
Chum Salmon													
Chena River	0	167	0	28	32	118	0	15	0	50	77	37	41
Minto Flats	16	117	0	0	32	130	0	0	53	0	0	37	35
Salcha River	0	23	25	14	64	15	32	46	0	12	0	21	23
Delta Clearwater River	0	0	0	0	0	52	0	0	0	0	0	10	5
Other Tanana	13	0	38	56	16	0	9	0	18	0	0	5	15
Total Tanana Drainage	29	307	63	98	144	315	41	61	71	62	77	110	119

Source: Jennings et al. (2004, 2006a–b, 2009a-b, 2010a-b, 2011a-b, *In prep*); Walker et al. (2003).

ND = No data.

[a] Prior to 2007, the Goodpaster River was closed to salmon fishing. In 2007, the Goodpaster River was open to catch-and-release only.

Table 5.–Sport catch of king, coho, and chum salmon in the Tanana River drainage, 2001–2011.

	Year											5-yr Average	10-yr Average
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2006–2010	2001–2010
King Salmon													
Chena River	1,579	1,920	3,012	4,571	503	1,208	824	530	1,506	515	599	917	1,617
Salcha River	707	1,157	3,752	1,514	582	747	1,575	299	982	1,108	769	942	1,242
Chatanika River	55	86	13	168	12	0	0	86	0	16	32	20	44
Goodpaster River[a]	ND	ND	ND	ND	ND	ND	0	0	104	0	0	40	21
Other Tanana	81	55	223	86	536	568	64	0	40	220	32	178	187
Total Tanana Drainage	2,422	3,227	7,000	6,339	1,633	2,619	2,463	915	2,632	1,859	1432	2,098	3,111
Coho Salmon													
Nenana River drainage	739	98	461	1,046	0	97	15	298	19	410	0	168	318
Delta Clearwater River	5,394	5,311	14,665	4,061	2,640	4,864	3,210	475	4,311	3,214	3,761	3,215	4,815
Other Tanana	658	285	251	689	204	269	118	966	0	55	0	282	350
Total Tanana Drainage	6,791	5,694	15,377	5,796	2,844	5,230	3,343	1,739	4,330	3,679	3,761	3,664	5,482
Chum Salmon													
Chena River	390	779	189	505	398	292	26	185	101	50	551	131	292
Minto Flats	16	117	25	28	95	130	0	0	70	0	0	40	48
Salcha River	57	38	1,047	355	82	166	165	46	35	24	44	87	202
Delta Clearwater River	65	23	50	42	0	533	105	0	0	11	14	130	83
Other Tanana	712	152	480	266	797	324	9	405	320	73	11	226	354
Total Tanana Drainage	1,240	1,109	1,791	1,196	1,372	1,445	305	636	526	158	620	614	978

Source: Jennings et al. (2004, 2006a–b, 2009a-b, 2010a-b, 2011a-b, *In prep*); Walker et al. (2003).

ND = No data.

[a] Prior to 2007, the Goodpaster River was closed to salmon fishing. In 2007, the Goodpaster River was open to catch-and-release only.

Table 6.–Coho salmon escapement estimates from the Tanana River drainage, 2002–2012.

Surveyed Stream	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	5-yr Average 2007–2011	10-yr Average 2002–2011
Delta Clearwater River	38,625	102,800	37,550	31,175	15,950	14,650	7,500	16,850	5,867	6,180	5,230	10,209	27,715
Richardson Clearwater River	874	6,232	8,626	2,024	271	553	265	155	1,002	575	515	510	2,058
Nenana River													
Lost Slough	0	85	220	430	194	ND	1,342	410	1110	ND	ND	954	474
Teklanika River	328	658	450	325[a]	160[a]	ND	1,539[b]	ND	280	ND	0	280	429
Otter Creek	1,910	4,535	3,370	3,890	1,916	ND	1,652	680	720	ND	ND	1,017	2,334
Julius Creek	15	1	280	280	0	ND	0	2	0	ND	ND	1	72
*Wood Creek	935	3,055	840	1,030	634	ND	578	470	340	ND	0	463	985
*Clear Creek	160[c]	884	140[c]	35[c]	972	ND	292	0[d]	130	ND	0	211	570
*Glacier Creek	42[c]	62[c]	90[c]	70[c]	14[c]	ND	0[d]	0[d]	0[d]	ND	0	0	0
Lignite Creek	130	67	91	378	168	ND	343	113	234	ND	ND	230	191
June Creek	95	74[b]	85[b]	201[b]	66[b]	ND	42[b]	18	ND	ND	ND	18	87

Source: U.S./Canada Yukon River Panel Joint Technical Committee (JTC 2009), C. Stark, biologist, BSFA, Fairbanks; personal communication.
ND = No data.

[a] Silty; poor visibility.

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

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

[d] Beaver dam blocking stream mouth.

* Tributaries to Julius Creek.

Table 7.–Sport harvest and catch of northern pike in the Tanana River drainage, 2001–2011.

	Year											5-yr Average	10-yr Average
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2006–2010	2001–2010
Harvest													
Minto Flats	641	483	1,260	1,199	1,880	935	1,712	258	765	569	396	848	970
Minto Flats complex [a]	654	650	1,284	1,390	2,052	1,204	1,809	386	873	609	422	976	1,091
George Lake	610	223	738	149	853	217	776	264	567	681	82	501	508
Healy Lake	0	39	0	45	0	9	0	0	88	0	0	19	18
Deadman Lake	28	35	0	76	24	42	0	72	13	0	0	25	29
Volkmar Lake	40	127	24	30	12	55	0	51	26	59	16	38	42
Mineral Lake (into Station Creek)	73	0	57	0	177	41	45	0	170	168	0	85	73
Other Tanana	2,802	2,362	844	3,205	1,506	1,708	1,270	608	1,279	1,135	689	1,200	1,672
Total Tanana Harvest	4,207	3,436	2,947	4,895	4,624	3,276	3,900	1,381	3,016	2,652	1,209	2,845	3,433
Catch													
Minto Flats	2,849	8,806	8,706	19,205	14,839	7,284	11,346	2,926	6,623	6,477	3,362	6,931	8,906
Minto Flats complex[a]	2,916	10,085	12,997	21,159	16,768	8,447	14,077	3,988	7,915	8,088	3,911	8,503	10,644
George Lake	5,146	2,149	4,097	2,723	4,484	2,958	6,889	1,442	3,152	4,010	1,574	3,690	3,705
Healy Lake	0	255	449	151	0	27	0	0	704	0	0	146	159
Deadman Lake	379	571	546	754	1,091	179	345	180	707	0	0	282	475
Volkmar Lake	390	304	339	603	280	186	174	51	244	381	244	207	295
Mineral Lake (into Station Creek)	344	666	244	0	977	122	465	0	440	309	0	267	357
Other Tanana	11,337	11,116	6,919	11,320	10,300	6,947	9,627	4,669	5,719	7,288	7,943	6,850	8,524
Total Tanana Catch	20,512	25,146	25,591	36,710	33,900	18,866	31,577	10,330	18,881	20,076	13,672	19,946	24,159

Source: Jennings et al. (2004, 2006a–b, 2009a-b, 2010a-b, 2011a-b); Walker et al. (2003).

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

Table 8.–Estimated northern pike abundance in the Minto Lakes Study Area, 1987–1988, 1990–1991, 1996–1997, 2000, 2003, and 2008.

	≥ 400mm (~16 in)		≥ 525 mm (~20 in)		≥ 600mm (~24 in)	
Year	Abundance	SE	Abundance	SE	Abundance	SE
1987	–	–	11,257	3,075	–	–
1988	–	–	13,233	3,143	–	–
1990	–	–	27,418	6,800	–	–
1991	–	–	17,633	5,480	–	–
1996	23,850	7,799	20,695	6,765	7,616	883
1997	16,547	1,754	14,639	1,552	3,251	174
2000	–	–	–	–	5,331	1,152
2003	25,227	4,529	13,900	2,918	7,683	2,347
2008	9,854	1,701	–	–	2,092	448

Source: Burkholder (1989, 1990); Hansen and Burkholder (1992); Joy (2009); Roach (1997, 1998); Scanlon (2001, 2006).

SE = standard error.

Table 9.–Number of subsistence permits issued, returned, and reported fished, and total subsistence harvest of northern pike in the Tolovana River drainage, 1995–2012.

Year	Permits Issued	Permits Returned	Fished	Total Harvest
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	31	386
2006	102	96	55	786
2007	118	109	54	1,837
2008	146	136	79	1,339
2009	113	108	51	560
2010	96	90	42	115
2011	70	69	27	100
2012	68	10	7	303
5-Yr Average 2006–2010	115	108	56	927
10-Yr Average[a] 2001–2010	95	88	44	712

Source: ADF&G, Commercial Fisheries Division, Fairbanks; unpublished data.

[a] These years are used to compare and summarize with the SWHS estimates.

Table 10.–Estimates of abundance of northern pike >18 inches (~450 mm) in George and Volkmar lakes, 1985–2009.

	Volkmar Lake		George Lake	
Year	Abundance	SE	Abundance	SE
1985	4,020	250	No Survey	
1986	4,028	587	No Survey	
1987	4,230	634	8,495	1,086
1988	2,196	148	15,117	4,086
1989	1,115	179	12,354	1,473
1990	2,019	349	8,107	892
1991	2,509	289	10,939	959
1992	2,542	369	7,001	540
1993	No Survey		No Survey	
1994	No Survey		No Survey	
1995	No Survey		No Survey	
1996	No Survey		No Survey	
1997	No Survey		No Survey	
1998	No Survey		No Survey	
1999	No Survey		No Survey	
2000	615	161	No Survey	
2001	No Survey		No Survey	
2002	No Survey		No Survey	
2003	No Survey		No Survey	
2004	No Survey		No Survey	
2005	1,814	449	No Survey	
2006	No Survey		16,204	3,293
2007	No Survey		No Survey	
2008	No Survey		No Survey	
2009	4,017	307	No Survey	

Source: Timmons and Pearse 1989, Clark and Gregory 1988, Clark et al. 1988, Pearse 1990, Pearse 1991, Pearse and Burkholder 1993, Pearse 1994, Hansen and Pearse 1995, Scanlon 2001, Wuttig and Reed 2010, Wuttig 2010.

SE = standard error.

Table 11.–Contribution of stocked fish to the Tanana River drainage total harvest and catch, 2001– 2011.

	Year											5-yr Average	10-yr Average
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2006–2010	2001–2010
Effort													
Effort on Stocked Waters	40,388	49,508	41,859	51,606	35,001	32,693	37,303	34,091	38,832	43,513	24,776	37,286	40,479
Total TRMA Effort	91,135	108,462	99,934	116,486	93,398	79,677	100,956	72,335	92,497	96,859	67,378	88,465	95,174
Percent Stocked Waters Effort	44%	46%	42%	44%	37%	41%	37%	47%	42%	45%	37%	42%	42%
Harvest													
Rainbow trout	19,725	38,516	26,228	25,344	17,791	16,878	17,841	10,576	9,866	10,910	7,663	13,214	19,368
Landlocked salmon	10,197	17,693	6,680	8,459	3,056	2,551	4,289	5,352	2,540	2,832	1,227	3,513	6,365
Arctic grayling	1,051	1,884	1,704	296	806	1,068	498	546	292	775.25	181	636	892
Arctic char	2,581	6,452	4,595	3,796	2,617	1,631	1,967	2,780	2,704	1,667	1,178	2,150	3,079
Lake trout	153	180	167	115	256	378	116	237	409	330	0	294	234
Other	39	244	0	192	0	43	0	0	0	19	0	12	54
Total stocked fish harvest	33,746	64,969	39,374	38,202	24,526	22,549	24,711	19,491	15,811	16,533	10,249	19,819	29,991
Total TRMA Harvest (stocked+wild)	49,197	86,796	58,055	57,918	43,196	35,248	40,717	30,949	30,689	31,783	19,348	33,877	46,455
Percent Stocked Waters Harvest	69%	75%	68%	66%	57%	64%	61%	63%	52%	52%	53%	58%	63%
Catch													
Rainbow trout	59,197	108,551	80,308	72,867	46,497	50,306	53,744	41,522	42,443	48,609	35,547	47,325	60,404
Landlocked salmon	24,121	47,084	19,880	23,797	11,972	7,352	13,450	9,593	8,795	7,276	2,980	9,293	17,332
Arctic grayling	8,483	15,692	16,465	10,338	11,212	10,028	5,095	11,312	10,583	6,655	6,809	8,735	10,586
Arctic char	6,764	14,244	12,470	13,127	7,417	9,476	6,968	6,130	5,678	4,714	4,000	6,593	8,699
Lake trout	835	1,213	987	1,020	1,169	1,814	362	548	1,433	1,188	37	1,069	1,057
Other	207	271	0	343	0	43	6	0	0	31	0	16	90
Total stocked fish catch	99,607	187,054	130,110	121,492	78,267	79,019	79,625	69,105	68,932	68,473	49,373	73,031	98,168
Total TRMA Catch (stocked+wild)	239,197	394,667	318,169	315,841	244,711	197,153	270,784	194,083	240,966	221,497	154,977	224,897	263,707
Percent Stocked Waters Catch	42%	47%	41%	38%	32%	40%	29%	36%	29%	31%	32%	33%	36%

Source: A. Behr, Stocked Waters biologist, ADF&G, Fairbanks; personal communication; catch and harvest data; *Source*: Jennings et al. (2004, 2006a–b, 2009a-b, 2010a-b, 2011a-b, *In prep*); Walker et al. (2003).

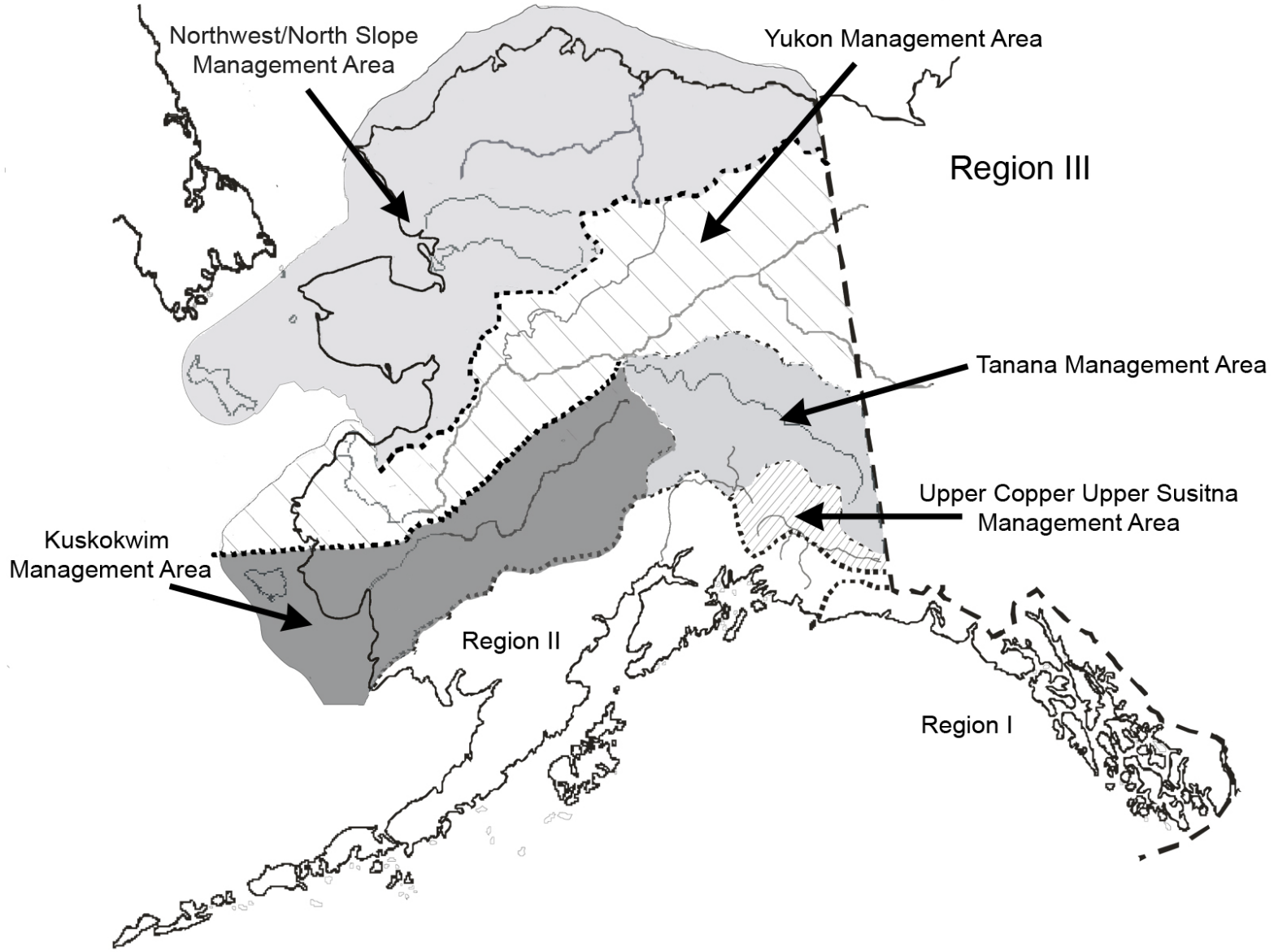

Figure 1.–Map of the sport fish regions in Alaska and the 5 Region III management areas.

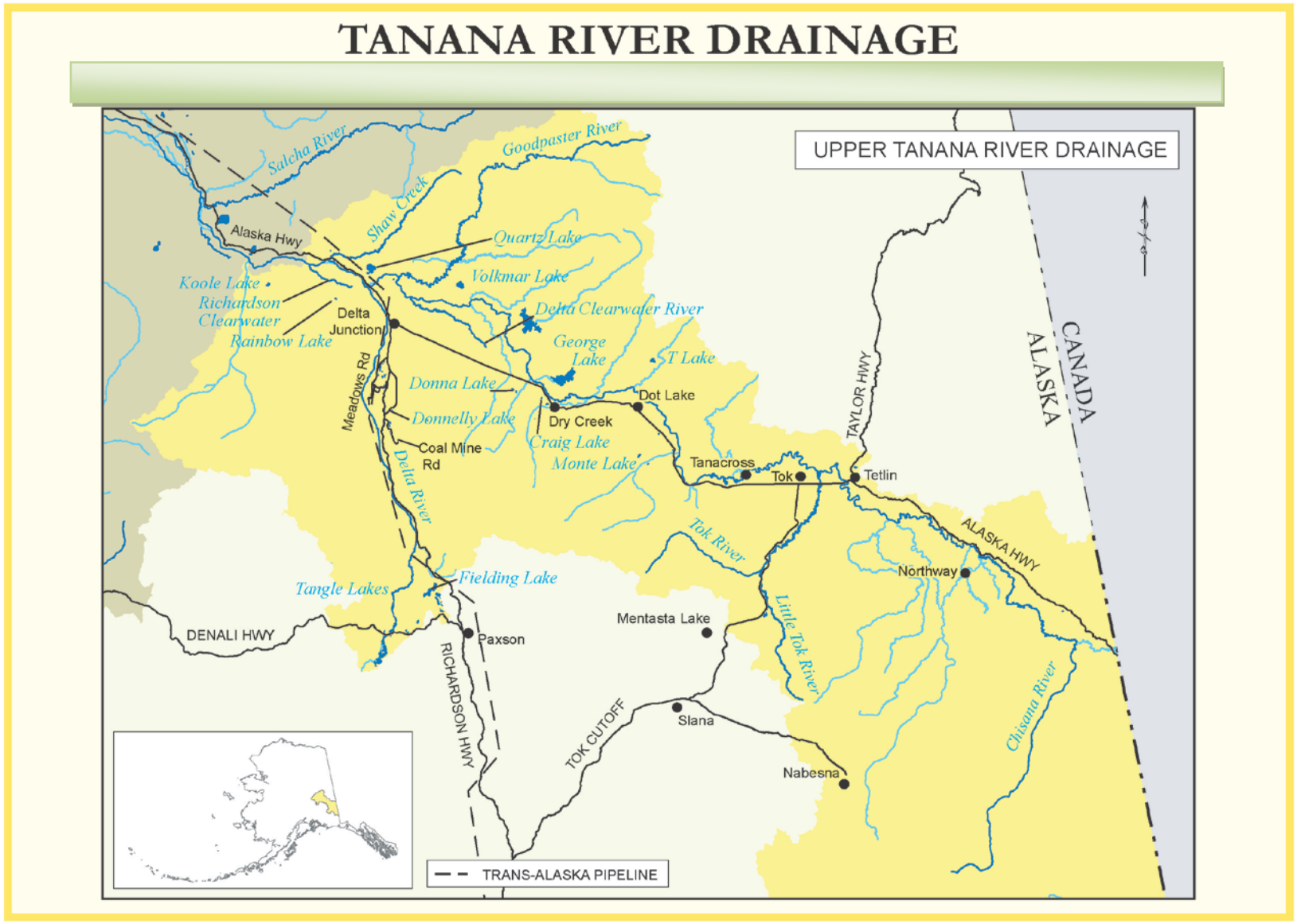

Figure 2.–Map of that portion of the Tanana River drainage located upriver from the Salcha River.

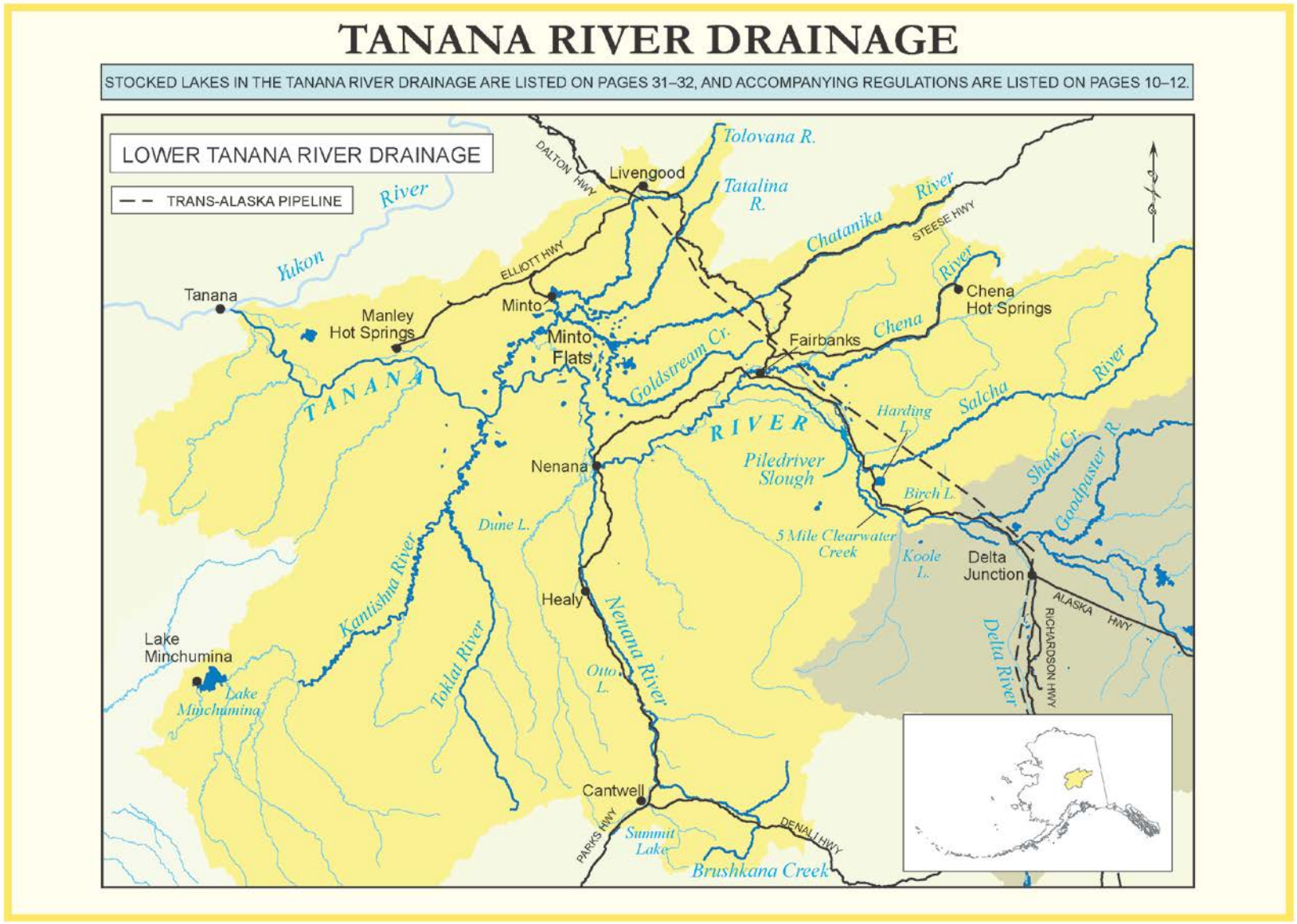

Figure 3.–Map of that portion of the Tanana River drainage located downriver from Shaw Creek.

APPENDIX A

Appendix A1.–Emergency orders issued for Tanana River Management Area sport fisheries, 2010–2012.

Year	E. O. Number	Explanation
2010	3-KS-04-10	Closed sport fishing for king salmon in all waters of the Chena River drainage and the Tanana River within a 1/2 mile radius of the mouth of the Chena River effective 12:01 a.m., Wednesday, July 28, 2010.
	3-CS-01-10	Prohibited retention of chum salmon in all waters of the Tanana River drainage effective 12:01 a.m., Friday, August 20, 2010
2011	3-KS-05-11	Prohibited retention of king salmon in all flowing waters of the Tanana River drainage effective 12:01 a.m. Saturday, July 23, 2011. Use of bait in all tributaries of the Tanana River drainage was also prohibited.
2012	3-KS-07-12	Prohibited retention of king salmon in all flowing waters of the Tanana River drainage effective 12:01 a.m. Saturday, July 21, 2012. Use of bait in all tributaries of the Tanana River drainage was also prohibited.
	3-KS-09-12	Closed sport fishing for king salmon in all waters of the Chena River drainage and the Tanana River within a 1/2 mile radius of the mouth of the Chena River effective 12:01 a.m., Monday, July 30, 2012.
	3-SS-01-12	Prohibited retention of coho salmon in all waters of the Delta Clearwater River drainage, including the Clearwater Lake drainage, effective 12:01 a.m. Saturday, October 6, 2012.

APPENDIX B

Appendix B1.–Estimates of effort (angler-days) for select areas of the Tanana River drainage, 2001–2011.

	Year											5-yr Average	10-yr Average
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2006–2010	2001–2010
Total Chena	19,177	18,869	21,828	31,485	17,491	13,372	24,026	14,802	16,804	15,408	10,401	16,882	19,326
Upper Chena	6,831	6,243	7,374	11,320	8,773	4,257	9,507	5,688	6,017	8,007	3,921	6,695	7,402
Lower Chena[a]	12,346	12,626	14,454	20,165	8,718	9,115	14,519	9,114	10,787	7,401	6,480	10,187	11,925
Piledriver Slough	5,190	4,246	2,317	2,546	1,079	1,293	1,519	1,900	4,695	2,338	1,768	2,349	2,712
Total Chatanika	2,680	3,844	4,223	5,487	4,605	3,947	5,312	3,558	3,526	4,137	3,401	4,096	4,132
Upper Chatanika	1,372	1,907	1,834	2,917	2,711	2,520	2,352	1,966	1,897	2,438	1,796	2,235	2,191
Lower Chatanika[a]	1,308	1,937	2,389	2,570	1,894	1,427	2,960	1,592	1,629	1,699	1,605	1,861	1,941
Salcha River	5,471	5,954	5,032	4,859	4,851	4,866	5,656	3,394	6,124	6,567	2,821	5,321	5,277
Harding Lake[b]	1,038	2,094	2,246	2,675	1,118	1,913	749	1,504	1,068	2,336	1,540	1,514	1,674
Minto Flats	1,118	2,349	2,023	1,892	3,124	2,416	2,595	887	2,984	1,424	1,460	2,061	2,081
Nenana Drainage[c]	2,010	2,061	1,834	1,801	2,086	1,296	979	1,721	2,699	1,666	2,472	1,672	1,815
Delta Clearwater River	4,671	4,580	6,006	3,357	4,507	4,850	5,149	2,248	5,018	4,193	5,048	4,292	4,458
Tangle Lakes Drainage above Wildhorse Creek	4,004	4,994	5,820	3,737	4,299	3,600	5,463	3,443	4,065	7,050	4,478	4,724	4,648
George lake	1,128	700	716	377	1,939	601	705	526	1,645	1,256	249	947	959
Fielding Lake	525	826	840	1,010	1,248	1,065	1,139	1,203	788	1,548	422	1,149	1,019
Volkmar Lake	188	372	313	193	44	139	57	145	134	184	50	132	177
Quartz lake	8,327	9,795	7,169	7,852	5,696	6,281	5,522	4,860	6,905	8,214	4,532	6,356	7,062
Coal Mine Road Lakes	504	1,023	425	481	102	507	503	971	548	805	929	667	587
Goodpaster River	787	912	925	612	1,402	892	1,305	823	1,949	1,132	993	1,220	1,074
Other Tanana	34,317	45,843	38,217	48,122	39,807	32,639	40,277	30,350	33,545	38,601	26,814	35,082	38,172
Total Tanana	91,135	108,462	99,934	116,486	93,398	79,677	100,956	72,335	92,497	96,859	67,378	88,465	95,174

Source: Jennings et al. (2004, 2006a–b, 2009a-b, 2010a-b, 2011a-b, *In prep*); Walker et al. (2003).

[a] Includes unspecified reaches.

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

[c] Includes Brushkana Creek.

APPENDIX C

Appendix C1.–Angler effort (angler-days) and fish species kept and released in the Tanana River Area, as reported in the freshwater guide logbooks, 2006–2011.

Year	Angler Effort	King Salmon	Coho Salmon	Dolly Varden	Lake Trout	Rainbow Trout	Arctic Grayling	Northern Pike	Sheefish
Fish Kept (Harvested)									
2006	676	10	58	0	ND	1	68	ND	ND
2007	1,555	17	274	2	0	101	78	23	0
2008	1,156	10	153	4	0	68	12	20	0
2009	1,290	31	75	9	0	349	7	57	1
2010	1,101	6	95	1	0	10	43	124	0
2011	662	2	88	30	0	115	34	133	0
Fish Released									
2006	676	13	144	38	ND	629	2,338	ND	ND
2007	1,555	29	169	0	0	961	3,167	160	0
2008	1,156	3	59	16	0	773	1,477	154	4
2009	1,290	28	133	8	2	148	5,353	135	5
2010	1,101	31	54	0	3	12	6,072	318	0
2011	662	4	92	45	1	103	8,758	406	0

Source: Sigurdsson and Powers (2009–2012).
ND = No data.

APPENDIX D

Appendix D 1.–Reference information specific to 2013 Alaska Board of Fisheries proposals.

Proposal	Proposal Subject	Text (page #)	Table #	Figure #	Appendix
88	Close Rainbow Lake to fishing Oct 1–May 14.	26	11	2	-
89	Close Little Harding to fishing for northern pike and remove Little Harding from stocked waters management plan.	26	11	-	-
90	Remove Little Harding, Harding, Summit, Monte, and Donnelly lakes from the special management approach in the stocked waters management plan.	26	11	2, 3	-
237	Remove Rainbow Lake from the special management approach in the stocked waters management plan.	26	11	2	-
91	Update the Tanana River Management Area stocked waters management plan.	26	11	-	-
92	Allow large hooks in all waters for taking fish other than salmon.	19	-	-	-
93	Clarify the single-hook artificial lure regulation.	-	-	-	-
94	Clarify Chena River methods and means regulation to be consistent with area regulations.	-	-	-	-
96	Increase the northern pike fishing season to year-round in TRMA lakes.	22, 24, 25	7, 8, 10	2, 3	-
99	Repeal the regulation prohibiting retention of northern pike in subsistence fisheries in portions of the Tanana River drainage.	19	9	-	-
100	Allow retention of northern pike in subsistence fisheries in the Tanana River drainage.	19	9	-	-
137	Develop an optimum escapement or inriver goal for the Yukon River summer chum salmon stock that originates above Pilot Station	8 & 14	4, 5	-	-
138	Modify the fall chum salmon management plan trigger point from 500,000 to 400,000.	8 & 14	4, 5	-	-
153	Repeal the regulation that closes Fielding Lake to salmon fishing.	14	-	-	-