Fishery Management Report No. 22-30

Fishery Management Report for Sport Fisheries in the Tanana Management Area, 2021

Note: On 12/22/2022, lake trout abundance estimates were updated on page 22.

by

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and

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December 2022

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	′
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	″
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANAGEMENT REPORT NO. 22-30

FISHERY MANAGEMENT REPORT FOR SPORT FISHERIES IN THE TANANA MANAGEMENT AREA, 2021

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

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ABSTRACT

Information specific to sport and personal use fisheries in the Tanana River Management Area (TRMA) in 2021, and information for 2022, is presented. Estimates of fishing effort, total harvest and catch are summarized through the 2021 season. This information is provided to the Alaska Board of Fisheries, as well as to the general public and interested parties. Details of major fisheries within the area are presented including descriptions of the performance of these fisheries, regulatory actions by Alaska Board of Fisheries, social and biological issues, and descriptions of ongoing research and management activities. This report emphasizes fisheries for which regulatory proposals will be considered at the upcoming Board of Fisheries meeting during January 2023.

Keywords: Tanana River Management Area, Chatanika River, Chena River, Delta Clearwater River, Fielding Lake, Harding Lake, Minto Flats, Tanana River, stocked lakes, Arctic grayling, northern pike, burbot, Chinook salmon, chum salmon, coho salmon, lake trout, rainbow trout, sport fisheries, sport fishery management, personal use fisheries, fisheries management plans

EXECUTIVE SUMMARY

This document provides a wide array of information specific to the sport fishing opportunities and personal use fisheries that exist within the Tanana River Management Area (TRMA). Information specific to proposals that the Alaska Board of Fisheries (BOF) will address at its January 14–18, 2023, meeting is contained within this report. To assist BOF members in acquiring information in a timely manner, Appendix A has been constructed. This table guides the reader to specific information contained within the text, tables, and figures that will be useful in evaluating regulatory proposals.

INTRODUCTION

This report provides information for the TRMA and is one in a series of reports annually updating fisheries management information within Region III (Figure 1). The report is provided for the BOF, Fish and Game Advisory Committees (ACs), the general public, and other interested parties. It presents a description of area fisheries, summary of the fisheries effort, harvest and catch, fisheries assessment information, and the management strategies that are developed from that information.

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

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

Division of Sport Fish management and research activities are funded by Fish and Game and Federal Aid in Fisheries Restoration funds. Fish and Game funds are derived from the sale of

state sport fishing licenses. Federal Aid funds are derived from federal taxes on fishing tackle and equipment established by the Federal Aid in Sport Fish Restoration Act (also referred to as the Dingell-Johnson Act or D-J Act). D-J funds are provided to the states at a match of up to 3-to-1 with the Fish and Game funds. Additional funding specified for providing, protecting, and managing access to fish and game is provided through a tax on boat gas and equipment established by the Wallop-Breaux Act. Other peripheral funding sources may include contracts with various government agencies and the private sector, or in a few cases, State of Alaska general funds.

This area management report provides information regarding the Tanana River Management Area and its fisheries for 2021, with information, if available, from the 2022 season. This report is organized into 2 primary sections: a management area overview, including a description of the management area and a summary of effort, harvest, and catch for the area (based on data from the Alaska Sport Fishing Survey); and a section on the significant area fisheries, including specific harvest and catch by species and geographical region or drainage.

Sport fishing effort and harvest of fish species in Alaska have been estimated and reported annually since 1977 using a mail survey. The Alaska Sport Fishing Survey (commonly referred to as 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 survey data. A questionnaire is mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or nonresident). Currently, information gathered from the survey includes participation (number of anglers and days fished), number of fish caught and harvested by species, and site for guided and unguided fishing. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaska waters as well as the sport harvest. Survey results for each year are not available until the following year; hence, the results for 2021 were not available until fall 2022. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest or for fisheries that require more detailed information or inseason management.

The utility of SWHS estimates depends on the number of responses received for a given site (Mills and Howe 1992). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation for estimates from 1977 to 1990. 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.
3. Estimates based on 30 or more responses are generally representative of levels of fishing effort, catch, and harvest.

More recently, SWHS estimates were compared to onsite creel surveys for estimates from 1996 to 2006, and it was found that SWHS estimates began to correspond to creel survey estimates when the coefficient of variation (CV) of a SWHS estimate was ≤ 0.30 (Clark 2009). Clark

(2009) recommended CVs of harvest estimates from the SWHS should be 0.30 or less before using the estimates for evaluating long term trends.

SECTION I: TANANA RIVER MANAGEMENT AREA OVERVIEW

TANANA RIVER MANAGEMENT AREA DESCRIPTION

The Tanana River drainage is the second largest tributary of the Yukon River that drains an area of approximately 45,918 mi^2 (73,898 km^2; Brabets et al. 2000; Figures 1–3). The glacial Tanana River is formed by the confluence of the Chisana and Nabesna Rivers near Tok and the Alaska-Canada border and flows toward the northwest for ~570 mi (970 km) to its terminus at the Yukon River. The Tanana River receives both the majority of its flow as well as its largest sediment loads from glacial tributary rivers (Chisana, Nabesna, Tok, Delta, Nenana, Kantishna, and Toklat Rivers) flowing out of the Alaska and Wrangell Mountain ranges and entering the south side of the Tanana River. All major tributaries (Goodpaster, Salcha, Chena, Chatanika, and Tolovana Rivers) flowing into the north side of the Tanana River are clear water streams originating from the Tanana Hills uplands. Large alluvial aquifers are located on the south side of the Tanana River and influence fish production by storing water and providing more stable base flow during winter. The Delta Clearwater and Richardson Clearwater Rivers are the 2 most important sportfishing streams that originate from these aquifers.

Most of the 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 area's access to sport fisheries. The Fairbanks North Star Borough (FNSB) and part of the Denali Borough lie within the TRMA. Approximately 100,000 people live in this area, which encompasses the city of Fairbanks; Fort Wainwright Army Base; Eielson Air Force Base; and the communities of Nenana, North Pole, and Salcha (U.S. Census Bureau 2010). Other communities and municipalities located within the TRMA include Anderson, Big Delta, Cantwell, Delta Junction, Dot Lake, Dry Creek, Ester, Fort Greely Army Base, Fox, Healy, Lake Minchumina, Livengood, Manley Hot Springs, Minto, Nabesna, Northway, Tanacross, Tetlin, Tok, Two Rivers, and Whitestone.

The TRMA offers various fishing opportunities ranging from lake trout *Salvelinus namaycush* 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. In addition, there are 6 public use cabins available through a reservation and permit system.

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 which are commonly targeted by sport anglers: Chinook salmon, coho salmon, Arctic grayling, burbot *Lota lota*, lake trout, and northern pike *Esox lucius*. Chum salmon *O. keta*, Dolly Varden *S. malma*, sheefish (inconnu) *Stenodus leucichthys*, least cisco *Coregonus sardinella*, humpback whitefish *C. pidschian*, broad whitefish *C. nasus*, and round whitefish *Prosopium cylindraceum* are caught occasionally by sport anglers. Longnose suckers *Catostomus catostomus*, Alaska blackfish *Dallia pectoralis*, lake chub *Couesius plumbeus*, slimy

sculpin *Cottus cognatus*, and Arctic lamprey *Lampetra camtschatica* are also present but not targeted by sport anglers.

Rainbow trout *O. mykiss* are not native to the Tanana River drainage but have been stocked in many lakes and are sterile. Arctic char *S. alpinus*, coho salmon, Chinook salmon, and lake trout are also stocked in selected lakes. Chinook salmon reared from eggs collected in the summer and coho salmon reared from eggs collected in the fall are all stocked the following season. Lake trout eggs collected in the fall are reared for 2 years before being released as juveniles, and it takes an additional 3–5 years for them to grow to a desirable size for sport anglers.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the TRMA are found in 5 AAC 74.001 through 5 AAC 74.995 (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). Specific management plans and policies that affect TRMA sport fisheries include the following:

- *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)
- *Yukon River Summer Chum Salmon Management Plan* (5 AAC 05.362)
- *Policy for the management of sustainable salmon fisheries* (5 AAC 39.222);
- *Policy for statewide salmon escapement goals* (5 AAC 39.223)
- *ADF&G Genetic Policy* (06/11/1985)
- *Lake stocking policy for Sport Fish Division* (02/25/2013)
- *ADF&G Statewide stocking plan for sport fish*

MAJOR ISSUES

Salmon Fisheries

Salmon fisheries are often the most contentious fisheries in Alaska, and those within the TRMA are no exception. In terms of allocation, subsistence salmon fisheries have a regulatory priority over commercial, personal use, and sport fisheries when there are conservation concerns. This priority can lead to regional and/or user group conflicts when commercial fisheries occur in the Lower Yukon River before subsistence users in the upper portion of the drainage can harvest any salmon in their fish wheels and nets. In recent years, the Division of Commercial Fisheries has issued emergency orders to reduce harvest of salmon (particularly Chinook salmon) in the Yukon River drainage commercial and subsistence fisheries in order to try to achieve escapement goals and treaty obligations with Canada. There has not been a directed commercial fishery for Chinook salmon since 2008, and in 2021 and 2022, all salmon fisheries were closed to the taking of all salmon (Chinook, chum, and coho) within TRMA fisheries due to poor escapements in the Yukon River drainage.

Public Access through Military Lands

There are many stocked lakes located on military lands in the TRMA. To access these areas, the public must acquire a Recreation Access Permit (RAP) for getting onto the military installations (Ft. Wainwright Army Base, Eielson Air Force Base, and Donnelly Training Areas [DTA]) and check in, either online or by telephone, before entering an area to ensure training exercises are not occurring. Annually, some stocked lakes in portions of the DTA near Delta Junction, are temporarily closed to public access due to large scale military training exercises.

Invasive Species

In 2010, a large infestation of the invasive aquatic plant *Elodea* sp. was discovered in the lower 10 miles of Chena (Badger) Slough. The following year it was identified in the Chena River and Chena Lakes, and it has been discovered at 17 more locations over the next 10 years (Table 1). 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 Chena (Badger) Slough for at least 3 years. This plant has the potential to spread throughout the Tanana River drainage and degrade fish habitat by displacing native vegetation.

The Fairbanks Soil and Water Conservation District is coordinating the substantial multiagency effort working towards the eradication of *Elodea* in the Tanana River drainage. Efforts include public outreach, surveys, permitting (e.g., completion of environmental impact statements), monitoring, grant/funding proposals, and eradication. Public outreach has included educating pilots, signage at boat launches, and community meetings with residents concerned with the proposed chemical application of Fluridone. Continued eradication and identification efforts are ongoing pending funding and permits. Funding remains a significant challenge and the U.S. Fish and Wildlife Service (USFWS) has been a major contributor, while ADF&G has provided some logistical support. Survey areas have been expanded to include float ponds and remote lakes accessed by float planes, such as Dune Lake. Meanwhile, treatment schedules were initiated to eradicate *Elodea* the last few years where it has been found.

In contrast with the invasive *Elodea*, ADF&G staff often encounter members of the public who believe that northern pike are an invasive species in the Tanana River drainage. Northern pike are native to many areas of Alaska including the Yukon, Kuskokwim, and Tanana River drainages, but they are invasive in Cook Inlet freshwaters (Kenai and Susitna River drainages, Anchorage Bowl lakes). The effort to educate the public of the detrimental effects of the invasive northern pike in Southcentral Alaska has inadvertently created some confusion about the native range of northern pike in Alaska.

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).[1] Estimates of angling effort in the TRMA averaged approximately 66,221 angler-days during the last 5 years prior to 2021 (2016–2020; Table 2). Recent 5- and 10-year averages are presented to help identify a potential change or trend for the current reporting year (i.e., 2021).

[1] Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 23, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

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. Overland transportation to off-road waters includes hiking, off-road vehicles, snowmachines, or dog teams. Access to the many remote sites requires 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.

In the TRMA, stocked lakes (47%) and the Chena River (12%) received the highest percentage of effort in 2021 (Table 2). The most popular fish species caught and harvested in the TRMA were stocked species, followed by Arctic grayling, northern pike, and burbot (Table 3). Arctic grayling were the most popular species caught making up 54% of the total catch. Stocked rainbow trout was the most commonly harvested species, which highlights the popularity and importance of stocked lakes to the TRMA. Rainbow trout harvest was 70% of the overall harvest for all species combined.

Information regarding the guided sport fishery for 2021 is not available due the discontinuation of the freshwater guide logbook after 2018. Note that the SWHS reports catch, which includes both harvested and released totals, and harvest; whereas the guide logbook historically reported both fish released, and fish kept. Catch and harvest from guided anglers is included in the SWHS estimates.

SECTION II: FISHERIES

Recreational angling occurs throughout the TRMA in diverse habitats, providing anglers the opportunity to target a wide variety of fish species. This section focuses on the major fisheries in the TRMA that consistently get the highest amount of fishing effort or most subjected to regulatory changes either inseason or thru the BOF process.

TANANA RIVER DRAINAGE SALMON

The following section provides information relative to Proposal 65. The Tanana River drainage has runs of Chinook, chum (summer and fall), and coho salmon. Most anglers target Chinook and coho salmon and their harvest is relatively small (Table 4, Appendix B1). Salmon are also an important subsistence and commercial species in the drainage. Commercial, subsistence, and personal use (Tanana River near Fairbanks) fisheries are managed by the Division of Commercial Fisheries (DCF).

Fishery Description

Chinook Salmon

The Tanana River drainage supports the largest spawning stocks of Chinook salmon in the Alaskan portion of the Yukon River drainage. Most of the Tanana River Chinook salmon spawn in the Salcha and Chena Rivers, whereas lesser numbers spawn in the Chatanika and Goodpaster Rivers and some tributary streams of the Nenana River. Adult Chinook salmon enter their natal streams starting late June and the run normally ends in early August.

A Chinook salmon sport fishery has occurred in Tanana River tributaries since before statehood, and the bag and possession limit for Chinook salmon in most of the Tanana River drainage has remained unchanged since the early 1960s: 1 fish 20 in (~510 mm) or longer. Several areas closed to salmon fishing include the Delta and Tok Rivers and the Upper Chatanika, Chena, Salcha, and Goodpaster Rivers. In the Lower Goodpaster River, only catch-and-release fishing is allowed. Most of the Chinook salmon fishing occurs in the Chena and Salcha Rivers. While Chinook salmon sport fisheries in the TRMA are relatively small compared with fisheries in Southcentral and Southeast Alaska, they are very popular because it provides one of the few opportunities to catch large fish near Fairbanks. Although some fish may be harvested in the sport fishery, most fish are released because of their lower quality for consumption (Tables 4 and 5).

Chinook salmon escapements have been annually assessed for the Chena River since 1986 and for the Salcha River since 1987 using either mark–recapture experiments, counting towers, or sonar (Table 6; Barton 1987, 1988; Barton and Conrad 1989; Skaugstad 1988–1994; Evenson 1991–1993, 1995, 1996; Evenson and Stuby 1997; Stuby and Evenson 1998; Stuby 1999–2001; Doxey 2004; Doxey et al. 2005; Brase and Doxey 2006; Brase 2012; Savereide 2012a–b, 2014; Stuby and Tyers 2016). Currently, both sonar and counting towers are used.

Counting conditions can be highly variable depending on water level, and sonar technology has been implemented to improve counts during turbid and high-water conditions (Savereide 2012a–b; Stuby and Tyers 2016). In 2005 and 2011, the Chena River was extremely high and turbid throughout most of the Chinook salmon run; therefore, escapement was not estimated. In 2014 and 2016, the Chena River was high and turbid throughout much of the Chinook salmon run; however, an abundance estimate was produced using a Dual Frequency Identification Sonar (DIDSON).

For inseason management when visual counts are not possible, sonar imagery is used to apportion Chinook and chum salmon using a 26-inch total length (650 mm TL) criteria; all chum salmon are assumed to be smaller. Smaller Chinook salmon are not counted, but their contribution is minor and does not affect inseason management actions in the sport fishery. Moreover, their exclusion results in a more conservative approach for meeting the escapement goal. Final estimates of Chinook salmon are produced using a mixture model post season (Huang 2012; Stuby and Tyers 2016). Counting operations terminate in mid-August, as such, final chum salmon escapement estimates are considered a minimum because the chum salmon migration continues into September.

Historically, the Chena River Chinook salmon sport fishery was managed under a management plan with an escapement goal and a guideline harvest allocation for the sport fishery. A guideline annual sport harvest objective of 300–600 Chinook salmon in the Chena River was adopted by the BOF in 1990. An aerial survey escapement index of 1,700 fish was set by DCF in 1992. In 1993, Division of Sport Fish staff expanded this aerial survey escapement index into an actual escapement goal of 6,300 fish, as measured at the counting tower. This goal was calculated based on averages of available escapement data. 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, ADF&G formed an escapement goal (EG) committee to evaluate and calculate EGs for the Chena and Salcha River Chinook salmon and for some Yukon River drainage chum salmon stocks. The EG process is designed to set escapement ranges that maximize potential yield and is periodically updated as more data is collected, and modelling efforts evolve. The current biological escapement goal (BEG) range that was established in 2001 is 2,800–5,700 Chinook salmon in the Chena River and 3,300–6,500 in the Salcha River.

Chum Salmon

Chum salmon are primarily available to anglers in July and August and are targeted or caught incidentally while fishing for Chinook salmon. Chum salmon are far more abundant than Chinook salmon and are subject to a more liberal bag and possession limit (3 fish per day vs. 1 fish per day for Chinook salmon). Harvest and catch are typically less than half that of Chinook salmon (Tables 4 and 5). There are no escapement goals for chum salmon in the Tanana River drainage.

Coho Salmon

Coho salmon spawn in small spring-fed tributaries on the south side of the Tanana River drainage, and in the mainstem Tanana River. These waters, particularly near Delta Junction, provide critical habitat for the largest known aggregations of coho salmon in the Yukon River drainage. Because these spring-fed tributaries do not freeze and coho salmon spawn into the late fall, these fish provide the last open-water fishing opportunities for salmon in the region. Several such spring-fed systems exist throughout the upper portion of the Tanana River drainage, the largest of which is the Delta Clearwater River (DCR). The Nenana River drainage is believed to support the second largest coho salmon spawning population in the Tanana River drainage after the DCR, and DCF has regularly conducted boat and aerial surveys of the river since 1993 (Table 7).

The DCR supports the largest documented spawning stock of coho salmon in the Yukon River drainage, with escapements averaging over 3,602 fish/year during 2017–2021 (Table 7). The DCR is about 20 mi (32 km) in length, is road accessible, and supports the largest recreational fishery for coho salmon in the Tanana River drainage. Coho salmon are the last of the salmon species to enter the Yukon River and arrive in the DCR starting in mid-September. The peak of the run is in late October; however, property owners living along the river have reported coho salmon spawning as late as January.

Annual escapement index counts of DCR coho salmon have been conducted by boat survey since 1972. Counts are conducted from an elevated platform on a riverboat during the peak of the coho salmon spawning period (generally late October or early November). The index section encompasses most of the spawning area of the run (>95%) and extends 18 river miles (29 km) upstream from its confluence with the Tanana River.

Fishery Management Objectives

The Tanana River as a tributary of the Yukon River has a several management plans, an international agreement, and a policy that affects the management of salmon resources within the drainage. Salmon resources within the State of Alaska are governed by the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222). The goal of this policy is to ensure conservation of salmon in freshwater and marine habitats, protection of customary and traditional subsistence uses and other uses, and the sustained economic health of Alaska's fishing

communities. In addition, because Chinook, fall chum, and coho salmon also spawn across the border into Canada, these species are also managed through the Alaska/Canada *Yukon River Salmon Agreement*, which represents an international commitment to the restoration, conservation, and management of Yukon River salmon. Approximately 40–50% of Yukon River Chinook salmon spawn in Canada (Eiler et al. 2014). Per this treaty, an Interim Management Escapement Goal (IMEG) has been established to manage for 42,500–55,000 Chinook salmon to cross the border into Canada. Salmon escapements at the U.S./Canada border are estimated by sonar near Eagle, Alaska. The IMEG for fall chum salmon is 70,000–104,000. Currently no IMEG exists for coho salmon, and the relative proportion of Canadian-bound fish is poorly understood.

Chinook salmon are managed within the Alaska portion of the Yukon River drainage by the *Yukon River King Salmon Management Plan* (5 AAC 05.360), which provides guidelines to manage Yukon River Chinook salmon for sustained yield and guides all management decisions for subsistence, commercial, and sport fish uses. The sport fishery in the Tanana River drainage is managed to coordinate with the commercial and subsistence fisheries. Restrictions to sport fishing for Chinook salmon for conservation purposes correspond to abundance levels that are based on inseason daily counts from the Pilot Station sonar and are designed to achieve the IMEG across the Canadian border.

Summer and fall chum salmon are managed within the Yukon River drainage with the *Yukon River Summer Chum Salmon Management Plan* (5 AAC 05.362) and *Yukon River Fall Chum Salmon Guideline Harvest Ranges* (5 AAC 05.365). Inseason run size projections for fall chum salmon are based on the historical run size estimates of summer chum salmon, which is ⅓ of the run strength of the summer chum salmon (Estensen et al. 2021).

Coho salmon usually enter the Yukon River in mid-to-late July and are primarily targeted in the fall. Yukon River drainage coho salmon are managed with the *Yukon River Coho Salmon Management Plan* (5 AAC 05.369). The primary goal of this plan is to provide for the management of directed commercial coho salmon fishing in the Yukon River.

In the Tanana River drainage, the *Tanana River Salmon Management Plan* (5 AAC 05.367) provides additional management direction for salmon resources. The *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060) mandates that all the Tanana River fisheries (commercial, subsistence, personal use, and sport) for Chinook salmon be managed in a manner such that the Chinook salmon biological escapement goals (BEG) are achieved in the Chena River (2,800–5,700 fish) and the Salcha River (3,300–6,500 fish). The DCR is the only river in the entire Yukon River drainage for which there is a coho salmon escapement goal. The sustainable escapement goal (SEG) for coho salmon (5,200–17,000 fish) for the DCR was adopted by the BOF in 2004, which replaced the previous minimum threshold of 9,000 fish within the index area. Due to lack of a long time-series of escapement data, there are no escapement goals associated with any other TRMA salmon populations. When an emergency order (EO) is implemented that restricts fishing regulations for a salmon species, it typically applies to all flowing waters in the Tanana drainage.

The BEGs are evaluated on a 3-year cycle in synchrony with the BOF meeting cycle for the Arctic-Yukon-Kuskokwim (AYK) Region. There has been only one action taken by the BOF with regards to the Tanana River salmon fisheries since 2001 when the *Chena and Salcha River King Salmon Sport Harvest Management Plan* was adopted. At the most recent BOF meeting in

2019, the Toklat River drainage was opened to sport fishing year-round for salmon and nonsalmon species, with the exception of a 3-mile corridor centered near the Kobi-McGrath trail, which will remain closed to protect spawning habitat

Recent Fishery Performance

Chinook Salmon

The preseason outlook for 2021 was for a run size of 102,000 to 189,000 Chinook salmon for the Yukon River drainage, which was smaller than the 2020 outlook and potentially as small as the low runs from 2012 and 2013 (Appendix B2). Because of the poor projected run size, a cautious management approach was taken for the subsistence fisheries, which began with the season closed. After the Pilot Station sonar in the Lower Yukon River strongly indicated a weak run, the TRMA sport fishery was closed on 24 June 2021 to protect the spawning population and to align with the subsistence restrictions as required by the *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 74.060; Appendix B3). Far fewer Chinook salmon passed by the Pilot Station sonar (124,845) than was recorded the previous year, and the run was smaller than what was recorded in 2012 and 2013 (Appendix B2). Likewise, the Chena and Salcha Rivers had extremely low escapements (Table 6). The Chena River had an estimated escapement of 1,416 (SE = 80) Chinook salmon, which was less than the BEG for the third year in a row. The Salcha River had an estimated escapement of 2,081 (SE = 98) Chinook salmon, which was less than the BEG. Due to the fishery closure, the TRMA harvest of Chinook salmon was estimated to be 0 and catch was estimated to be 207 (Tables 4 and 5). The estimated catch represented Chinook salmon that were captured incidentally and released immediately as these fish could not be targeted. These values are similar to the last 5- (2016–2020) and 10-year (2011–2020) catch estimates of 455 and 504, respectively.

The preseason outlook for 2022 was for a run size of 99,000 to 150,000 Chinook salmon for the Yukon River drainage. Similar to 2021, the Chinook salmon fishery began closed for subsistence, and ultimately, the Chinook salmon run in 2022 was the lowest on record with an overall escapement of 44,581. The TRMA sport fishery was closed on 20 June 2022 to protect the spawning population and to align with the subsistence restrictions. The Chena and Salcha Rivers had extremely low escapements as well. The preliminary estimate of Chena River Chinook salmon escapement was 355 (SE = 39) and below the BEG range for the fourth year in a row. The preliminary estimate of Salcha River Chinook salmon was 1,041 (SE = 57) and was below the BEG range for the second year in a row.

Chum salmon

For 2021, the drainagewide outlook for summer chum salmon was for approximately 1.2 million, and that for fall chum salmon was 652,000, which were below average, but still anticipated to provide for subsistence and commercial harvests and meet escapement goals. However, the number of summer chum salmon that was estimated by the Pilot Station sonar was 153,718, and 146,197 for fall chum salmon (Appendix B2). These values were well below the escapement goals of 500,000–1,200,00 for summer chum salmon and 300,000–600,000 for fall chum salmon, and the runs in 2021 were the lowest on record. Despite closures to the subsistence and sport fisheries early in the run (July 1), no escapement goals were met (Appendix B3). For the sport fishery, 0 chum salmon were harvested and 12 were caught and released in 2021 (Tables 4

and 5). These numbers were very similar to the last 5- (2016–2020) and 10-year (2011–2020) catch estimates of 8 and 24, respectively.

The drainagewide summer chum salmon outlook for 2022 was for a run size of approximately 333,000 fish, and approximately 110,000 fish for fall chum salmon. Because these run size estimates were below the escapement goals set for chum salmon passage past Pilot Station sonar, the season began closed for subsistence fisheries (Appendix B2). The sport fisheries for the TRMA closed on June 24 (Appendix B3). The summer chum salmon run was the second lowest on record after 2021, with an estimate of 437,032 fish counted at Pilot Station sonar. The fall chum salmon run was also low with a preliminary estimate of 236,953 fish estimated by the Pilot Station sonar.

Coho salmon

The 2021 coho salmon outlook was for an average run size of 240,000 fish. The Pilot Station sonar operated through September 7, 2021, and recorded an incomplete inriver estimate of 37,255 coho salmon, which was well below the historical average of 147,000 fish for this date (Appendix B2). The peak boat survey on the DCR in early November estimated 913 coho salmon, which was well below the escapement goal of 5,200–17,000 fish (Table 7). Because of the very poor 2021 coho salmon run, sport fishing for coho salmon in the TRMA closed on August 26, 2021 (Appendix B3). For the sport fishery, 0 coho salmon were harvested and 13 were caught and released in 2021. These numbers were well below the last 5- (2016–2020) and 10-year (2011–2020) harvest estimates of 302 and 241, and catch estimates of 2,635 and 3,256, respectively (Tables 4 and 5). These numbers reflect the recent trend of restrictions and closures to salmon fisheries in the TRMA.

In 2022, the coho salmon run was forecasted to be below average. Similar to the previous year, the Pilot Station sonar ceased operations on September 7, 2022, and recorded an incomplete inriver estimate of 92,101 fish (Appendix B2). This value was larger than that recorded in 2021, but still well below the historical cumulative median of 145,378 and historical run size of 234,000 fish. Therefore, the sport fisheries for coho salmon in the TRMA were closed on 8 September 2022 to ensure adequate spawning escapement (Appendix B3).

Research and Management Activities

The TRMA has 3 long term salmon enumeration projects for the Chena River (Chinook and chum salmon), Salcha River (Chinook and chum salmon), and the Delta Clearwater River (coho salmon). The enumeration project in the Chena River at the Moose Creek Dam has evolved and currently entails a counting tower paired with a DIDSON sonar positioned on each bank. This dual system, combined with the refined mixture model to better apportion Chinook and chum salmon (Stuby and Tyers 2016), is highly accurate and robust to the dynamic counting conditions and high water that occurs in the Chena River. Similarly, an enumeration project in the Salcha River just upstream of the Richardson Highway Bridge also entails a counting tower paired with an Adaptive Resolution Imaging Sonar (ARIS), uses the refined mixture model to better apportion Chinook and chum salmon, and ensures counts under most water conditions in the Salcha River. In 2020, funding was not available to operate the Salcha River enumeration project, and an estimate of escapement was not produced for 2020.

In the DCR, a visual count from a boat through an 18-mile stretch of river is used to determine if the run will meet the SEG of 5,200–17,000 coho salmon. ADF&G monitors DCR coho salmon

escapement between mid-September and early October to determine whether any inseason management action is necessary. Yukon River sonar counts and catch rates from fish wheels in the Tanana River are used as preliminary indices of DCR coho salmon run strength. In general, these indices are poor predictors and if the return to the DCR appears marginal, then early season boat surveys in the DCR are relied on more heavily. Despite increased assessment effort (i.e., multiple boat surveys) and restrictions to the fishery, the lower bound of the escapement goal has not been reached for past 4 years (2018–2021). A peak survey count of 1,750 coho salmon occurred October 20, 2022 (Table 7).

ADF&G's Alaska Freshwater Fish Inventory (AFFI) conducted surveys on fish species presence/absence in the lower (2022), middle (2021), and upper (2020) TRMA streams. Fish were primarily sampled with electroshocking equipment. Collected anadromous fish (primarily salmon) were used to nominate waters to the State of Alaska's Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes (Anadromous Waters Catalog, AWC), to update fish life stage information for waters already listed in the AWC, and/or to list nonanadromous resident species for the AFFI online mapping catalog. Habitat characteristics and water quality of each stream sampled was also noted.

ADF&G DCF, USFWS, and the Yukon Delta Fisheries Development Association are conducting a cooperative drainagewide radiotelemetry project on coho salmon in 2022 to better understand movements, run timing, and to document spawning locations. Three-hundred fifty radio transmitters were deployed in the Lower Yukon River and results are pending. Because of recent poor returns of Chinook and chum salmon, coho salmon have become more important as a subsistence resource, so locating and documenting spawning locations and later nominating them to the AWC will be important for future protection of habitats in critical spawning areas.

Research projects are being planned and have been implemented to try to better understand the 3-year discrepancy (2019–2021) between the Canadian origin salmon counted by the Pilot Station sonar and the much lower-than-expected passage at the border. During 2022, multiple agencies, including ADF&G DCF, collected tissue samples from Chinook salmon in different locations from the Lower to Upper portions of the Yukon River to test for the presence of *Ichthyophonus* to see if this disease may be a trigger for the lower than anticipated number of Chinook salmon reaching Canada in recent years. In 2023, ADF&G DCF will be implementing a radiotelemetry project on Chinook salmon as an additional tool to better understand this discrepancy. Approximately 500 Chinook salmon will be systematically radiotagged in the Lower Yukon River and tracked throughout the drainage. This project is slated to operate for 3 seasons (2023–2025).

Multiple agencies have been deploying temperature data loggers in different locations of the Yukon River drainage and a central database has been created. The water temperatures during 2020–2022 were not as high as recorded in 2019, where temperatures above 72°F (22°C) were recorded during 14–19 July 2019 in the Lower Yukon River near Emmonak (Stuby 2021). Migrating adult Pacific salmon are sensitive to warm water (>18°C) with a range of consequences from decreased spawning success to early mortality (von Biela et al. 2020). Water temperatures above 70°F for prolonged periods can cause salmon mortality (McCullough et al. 2001). Heat stress was a factor during 2019 when thousands of summer chum were documented to have died due to heat stress with egg skeins still intact. In contrast, there were no reports of premature deaths for Chinook salmon, just the disappearance of a large proportion of Canadian-origin fish.

ARCTIC GRAYLING

Chena River: Arctic Grayling

Fishery Description

The following section provides information relative to Proposals 69 and 70. The Chena River Arctic grayling population offers high-quality sport fishing opportunities to anglers because its ease of access and high proportion of large fish. There is road access for nearly the entire length of the river from its outlet to mile 57 (91 km) of Chena Hot Springs Road. It flows through Fairbanks, North Pole, Eielson Air Force Base, Fort Wainwright Army Base, the Chena River State Recreation Area, and affords anglers several options for access. The Chena River State Recreation Area, in particular, is a popular boating, camping, and fishing destination for residents and nonresident visitors traveling along the road system.

The Chena River Arctic grayling fishery has been popular since before statehood and has increased in popularity as Fairbanks and the surrounding area have been developed and access has improved. The fishery occurs almost entirely during open water from April through October. Anglers target Arctic grayling throughout the road- and boat-accessible sections of the river and its tributaries, and some anglers fly into the headwaters to begin float trips for fishing. Badger Slough (historically referred to as Chena Slough) is a particularly important tributary because it provides significant spawning and rearing habitat, as well as easily accessible fishing locations.

The Chena River has historically supported the largest Arctic grayling fishery in North America. The average annual fishing effort (for all species) for the 10-year period (1977–1986) was about 30,500 angler-days, with most of this effort thought to be targeting Arctic grayling (Brase 2009b). Between 1986 and 1987, estimates of abundance declined (Table 7; Clark and Ridder 1987, 1988) as did average harvest from 28,440 fish/year (1977–1984) to 7,051 fish/year (1985–1986). In 1988, due to evidence of a decline in the Arctic grayling population, the bag and possession limit was reduced from 10 fish to 5 fish, fishing was restricted to catch-and-release during the spring spawning period (April 1 through the first Saturday in June), and the use of bait was prohibited. Although harvest decreased for 2 years after the imposition of these restrictions, and abundance estimates increased after 1989, both harvest and effort increased substantially in 1989 (Brase 2009b), prompting the lowering of the bag limit from 5 to 2 fish. By 1990, annual estimates of abundance suggested that these new regulations were not sufficient to reduce harvest nor effective in increasing the population, and in 1991, the fishery was restricted by EO to catch-and-release only (Brase 2009b). The BOF made this a permanent regulatory change in 1994. Angler effort remained high after catch-and-release regulations were adopted, averaging 36,073 angler days (1995–1999), but effort has decreased substantially over time with 8,120 angler-days in 2021 (Table 2) and 6,768 angler days for the previous 5-year average (2016–2021).

In 1993 and 1994, ADF&G initiated a program of enhancement by stocking hatchery- and pond-reared Arctic grayling spawned from the Chena River stock. Approximately 61,000 catchable fish were stocked into the Chena River. Survival of these fish was estimated as part of the ongoing stock assessment efforts during 1993–1995 and determined to be too low to justify the cost of the enhancement effort. This program was discontinued after 1994 (Clark 1994–1996).

Once the fishery became catch-and-release only, estimated summer abundance of Arctic grayling ≥6 in TL (≥150 mm fork length [FL]) within the index area ranged from a low of 26,756

(SE = 3,286) fish in 1991 to a high of 45,145 (SE = 3,852) fish in 1995 (Table 8). The last estimate, which was conducted in July 2005, was 27,698 (SE = 3,661) Arctic grayling ≥6 in TL (≥150 mm FL; Wuttig and Stroka 2007), of which 7,393 were ≥12 in TL (≥270 mm FL). An estimate of spring spawner abundance in 1998 was 23,335 (SE = 3,082) Arctic grayling ≥6 in TL (≥150 mm FL), of which 18,861 (SE = 2,491) were ≥12 in TL (≥270 mm FL; Ridder 2000).

Fishery Management Objectives

In 2004, the BOF adopted the *Tanana River Area Wild Arctic Grayling Management Plan* (5 AAC 74.055), which directed ADF&G to manage Arctic grayling fisheries for long-term sustained yield while providing and maintaining fishery qualities that anglers desire. The *Tanana River Area Wild Arctic Grayling Management Plan* has 3 management approaches: regional, conservative, and special. Each of these approaches has different means of achieving the goals of sustained yield (reduce bag and possession limits, reduce fishing season, only allow catch-and-release, modify other methods and means). The Chena River is in the special management category.

Additionally, in 2004 ADF&G drafted an "in-house" *Fishery Management Plan for the Chena River Arctic Grayling Sport Fishery* (Doxey and Brase *Unpublished*)[2] to provide guidance. This drafted management plan was based on stock assessments conducted during summer in the lower 149 km (92 miles) of the river when the area is dominated by smaller, younger Arctic grayling. The objectives are as follows:

1. Maintain a minimum abundance of 8,500 Arctic grayling ≥12 in TL (~305 mm FL) in the upper river (river mi 45–90, or river km 72–144).
2. Maintain a minimum abundance of 2,200 Arctic grayling ≥12 in TL (~305 mm FL) in the lower river (downriver from river mi 45 or ~72 km at the Moose Creek Dam).

These objectives that were based on a time series of summer abundance estimates have been deemed insufficient to monitor the population because most adult Arctic grayling (≥12 in TL) are upstream of the index area. More larger fish occupy the index area during spring than during summer (Ridder 2000), because larger, adult fish from upriver seasonally migrate into the index area for spawning (Ridder 1998a). An assessment of Arctic grayling in the study area during the spawning period serves as a better index for the status of the greater population as was recognized for the nearby Goodpaster River that has a management plan based on spring spawner abundance. A new management plan is being developed for the Chena River Arctic grayling that will be based on abundance objectives for the spring spawning population.

During the most recent AYK BOF meeting in 2019, there was a proposal submitted by the Fairbanks AC that would allow harvest of Arctic grayling less than 12 inches from June 1–July 15 in the Chena River, from 500 yards downstream of the Nordale Road Bridge to the Chena River confluence with the Tanana River, and in Piledriver Slough. Due to a lack of contemporary data, and in order to conserve the Chena River/Piledriver Slough Arctic grayling population, the BOF and ADF&G agreed to create a youth-only fishery. This youth-only fishery allows for the retention of 1 Arctic grayling of any size for 4 consecutive weekends beginning the third Saturday in June.

[2] Doxey, M., and A. L. J. Brase. *Unpublished*. Fishery management plan for the Chena River Arctic grayling sport fishery. Alaska Department of Fish and Game, Division of Sport Fish, Fairbanks.

Recent Fishery Performance

Catch rates of Arctic grayling are highly dependent on river conditions: lower in years dominated by high, turbid flow and higher in years dominated by clear water. Lower flow allows Arctic grayling to easily see a lure or a fly. For example, in years with lower water levels, Arctic grayling catches were higher than average; and in years with higher water throughout the summer season, Arctic grayling catches were lower than average. The 2021 catch of Arctic grayling in the Chena River was 21,691 fish, which is above the previous 5-years average (16,574 fish; Table 9).

Prior to 2007, the SWHS divided the Chena River into the "upper river" and "lower river" at the South Fork (river mi 77 or ~124 km). Since 2007, the Chena River was divided into the upper and lower sections at the Moose Creek Dam (river mi 45 or ~72 km; Figure 4). The SWHS provides separate estimates of effort, catch, and harvest of all species for each section. Species distributions and regulations that close salmon fishing and prohibit the use of bait above the dam suggest that almost all the effort in the SWHS-designated upper river is directed toward Arctic grayling. The lower river supports a multi-species fishery that includes Chinook salmon, burbot, and northern pike. Although most of the effort in the Chena River is probably directed toward Arctic grayling, effort is not apportioned between species, and the multi-species fishery confounds attempts to describe the total effort targeting Arctic grayling within the Chena River sport fishery.

Research and Management Activities

The Chena River Arctic grayling spring spawning population was assessed May 2021 within the index area (lower 92 miles of the river; Figure 4; Gryska *In prep*). The abundance of Arctic grayling was 24,896 (SE = 1,518) for fish ≥12 inches TL (≥270 mm FL). Abundance in the lower section (downstream of the dam) was 15,627 (SE = 968), and abundance in the upper section was 9,842 (SE = 1,401). During May 2022, 120 adult Arctic grayling were radiotagged in the index area to describe their summer distributions relative to the index area. A description of their post spawning migration is forthcoming, and it will be integrated with the spring spawner abundance estimate of Arctic grayling, which will used to evaluate the effects of harvest and determine what level of harvest would be sustainable.

NORTHERN PIKE

Harding Lake: Northern Pike

Fishery Description

The following section provides information relative to Proposal 66. 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 are a high-profile game fish in Harding Lake because they can readily be caught around the lake's shoreline, ~75% of which is developed with residential houses or recreational cabins. In 2000, northern pike fishing at Harding Lake was closed due to low abundance; details about the closure, population changes, and habitat rehabilitation efforts are discussed by Brase (2009b).

In summary, the decline in northern pike abundance in Harding Lake was primarily attributed to a substantial decrease in the lake surface elevation, which resulted in the loss of rearing habitat (i.e., shallow vegetated littoral areas; Scanlon and Roach 2000, Doxey 2003, Wuttig 2015). The

production of northern pike in the lake is strongly influenced by the availability of emergent vegetation in shallow (≤3 feet) water, particularly along the northern and northeastern shores (i.e., the northern flats). The availability of this type of habitat is related to the lake water levels that have fluctuated over time given the prevailing climate (e.g., several drought years in row). During the 1990s, drought conditions lowered the lake water level, and the loss of high-quality spawning and rearing areas is assumed to be the cause of the most recent northern pike population decline (Scanlon and Roach 2000).

In 2007, efforts were initiated to increase the lake surface elevation from 709 to 717 ft above sea level (ASL) by diverting a small creek into Harding Lake (Doxey 2003; USDA 2006). The target lake surface elevation was similar to the elevations observed in the 1980s and 1990s when the production of northern pike supported a directed sport fishery (Doxey 2003; Jim Vohden, Alaska Department of Natural Resources, Division of Mining, Land and Water, Fairbanks, unpublished data). Due to continued drought conditions, water levels had only increased to 713.7 ft ASL by 2014. Wetter weather conditions from 2014–2022 had increased the water level to 717.7 ft ASL by 2020, and large swaths of vegetated littoral areas had been inundated and remain (Jim Vohden, Alaska Department of Natural Resources, Division of Mining, Land and Water, Fairbanks, unpublished data).

The rehabilitation of the northern pike population is dependent on reestablishing vegetated littoral habitat. From 2016 to 2022, the lake elevation goal of 717 ft was nearly achieved every spring and has remained close to that threshold level. In 2012, the estimated abundance of northern pike ≥18 in TL (450 mm FL) was 567, which was still below the level of 1,000 fish ≥18 in TL (≥ 450 mm FL) needed to open the fishery to catch-and-release (Doxey 2003). In 2020, a stock assessment was conducted to see if the population was responding to the increased water levels. The estimated population was 704 northern pike ≥18 in TL (≥450 mm FL) was still below the management objective level of 1,000 fish, but the number of small northern pike <18 in TL (450 mm FL) caught during sampling had increased from 10 to 124 between the 2 studies, which was an indication that the inundated littoral areas were resulting in better recruitment.

Fishery Management Objectives

The Division of Sport Fish recognizes that the northern pike sport fishery in Harding Lake is the only major roadside northern pike sport fishery in Region III, and as such, it must be managed to provide a mix of opportunities including a reasonable likelihood of harvest for those who choose to do so. The ADF&G intent is to structure the management regime for Harding Lake northern pike to allow restoration of harvest when the population recovers sufficiently. A management plan was written and described below, which articulated the management objective and abundance-based measures to incrementally increase fishing opportunities for anglers (Doxey 2003).

The long-term management objective for Harding Lake northern pike is to maintain a population within which abundance of fish with a fork length of 18 inches (450 mm) or greater exceeds 2,500 fish. Initially, catch-and-release fishing may be proposed after abundance increases to a level at which the population can withstand mortality associated with catch-and-release without significant slowing of the rate of increase in abundance. Opportunity to harvest northern pike may be proposed when estimated abundance of fish ≥18 in TL (450 mm FL) reaches 1,700 fish. Initial harvest opportunity will likely be restricted to a bag and possession limit of a single fish,

but liberalization of both bag and size limit may be supported if the population exceeds 2,500 fish >18 in FL (450 mm FL).

Recent Fishery Performance

The Harding Lake northern pike fishery has been closed since 2000, and there has been no effort, catch, and harvest occurring for 22 years. There have been 3 stock status studies during summer of 2012, 2020, and 2022. The abundance of northern pike ≥18 in FL (450 mm FL) in 2012 was 567 (SE = 47; Wuttig 2015) and in 2020 was 704 (SE = 59; Gutierrez and Bernard 2021). The 2022 estimate of abundance was 927 (SE = 110) fish (Albert *In prep*).

Research and Management Activities

With reclaimed spawning and rearing habitat, northern pike are expected to increase in abundance and the fishery may resume. Studies during 2020 and 2022 have observed evidence of increasing recruitment and abundance. It is important to continue to closely monitor the population to identify when abundance objectives have been reached to allow opening a fishery. It is recommended that abundance be estimated annually using the Jolly-Seber model that requires one sampling event each year and will provide estimates of annual recruitment and mortality that can also be used to evaluate opening the fishery.

Minto Lakes: Northern Pike

Fishery Description

The following section provides information relative to Proposals 63 and 64. 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 continuation of public uses within the area. The Chatanika, Tolovana, and Tatalina Rivers, as well as Washington Creek, Goldstream Creek, and numerous other 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 terminus at the southwestern end of Minto Flats. The waterways of Minto Flats are slow and meandering.

Minto Lakes is a group of large interconnected, generally shallow, and heavily vegetated lakes located in the eastern portion of Minto Flats. They are a popular area for northern pike fishing and hunting for waterfowl and moose. Access to the area is primarily by boat or floatplane, and the area is utilized by guides and private individuals. Some private individuals and guides have cabins on the few sparse areas of higher ground that are not regularly flooded. Minto Lakes is thought to support the majority (i.e., >90%) of the northern pike sport fishery within the Tolovana River drainage (Table 11).

Minto Lakes are a major northern pike spawning and summer feeding area. In winter, much of the flowing and standing water within Minto Flats becomes anoxic, forcing fish to move to discrete oxygenated areas of the Chatanika and Tolovana Rivers. Partial winterkills are thought to occur, which can confound modeling of population dynamics to assess angler impacts. Northern pike are typically the only fish targeted by sport anglers in the Minto Flats area. These

large piscivores are located throughout Minto Flats and can be readily taken on many types of lures.

The Minto Flats northern pike fishery includes the Tolovana River, the Lower Chatanika River, Minto Lakes, and numerous sloughs and creeks, such as Goldstream Creek. Northern pike seasonally move between all these waterbodies; therefore, SWHS effort, catch, and harvest estimates for all of these waterbodies are summed and presented under the general heading of Minto Flats (Table 11 and Figure 5).

The Minto Flats northern pike population has supported a major proportion of the TRMA northern pike sport fishery for many years (Table 11). 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, which was also a traditional subsistence area. A subsistence fishery for northern pike (and whitefish) also occurs near the village of Minto and other historic 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.

Northern pike overwintering in the Chatanika River are predominantly (~75%–90%) fish that utilize Minto Lakes during the open water period (i.e., for spawning and feeding). This overwintering area has been termed the Chatanika River Overwintering Area (CROA; Roach 1998a; Albert 2016). After 1987, regulations were implemented that closed sport fishing for northern pike in Minto Flats between October 15 and May 31, and the bag limit was reduced from 10 fish to the current regulation of 5 fish per day, only 1 of which may be ≥30 in long.

Fishery Management Objectives

The Minto Flats northern pike population is managed under the *Minto Flats Northern Pike Management Plan* (5 AAC 74.044 for sportfishing and 5 AAC 01.244 for subsistence), which stipulate that the maximum exploitation rate of northern pike by all users in the "lakes and flowing waters of Minto Flats" 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 October 14 and a bag and possession limit of 5 fish, only 1 of which may be ≥30 in (762 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 may be ≥30 in, within the lakes and all flowing waters of Minto Flats for the remainder of the calendar year.

The subsistence management plan includes the following provisions:

1. Subsistence fishing for northern pike is open year-round to Alaskan residents; however, a permit is required.
2. Prior to 2010, there were no daily or annual limits; however, in 2010, the BOF established a 10-fish bag and 20-fish possession limit for the fishery that occurs in that portion of the Chatanika River upstream from its confluence with Goldstream Creek.
3. In 2019, the BOF amended the bag and possession limit to include a size restriction where only 2 fish of the 10-fish bag limit may be 30 inches or greater in length.

4. Starting January 1, 2018, the portion of the Chatanika River from an ADF&G regulatory marker located at the confluence of the Chatanika River and Goldstream Creek upstream approximately 1 mile to another ADF&G regulatory marker was closed to subsistence fishing through the ice.
5. Gillnets may be used only April 15–October 14.
6. 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 mi [~1.6 km] below the boat launch).

The *Minto Flats Northern Pike Management Plan* for subsistence fisheries (5 AAC 01.244) was amended during the 2016 BOF. These amendments closed ice fishing (subsistence) from the confluence of the Chatanika River and Goldstream Creek to an ADF&G regulatory marker approximately 3 river miles upstream. Shortly thereafter, an Agenda Change Request for the 2017 BOF cycle was submitted and adopted to change the 3-mile closed area in the Chatanika River to a 1-mile closed area, also with the lower boundary at the mouth of Goldstream Creek. At the 2019 BOF AYK meeting, the bag and possession limits were amended to include only 2 northern pike ≥30 inches of the 10 fish bag limit and only 4 northern pike ≥30 inches in possession.

Recent Fishery Performance

Estimated sport catch and harvest of northern pike in Minto Flats peaked in 1994 with a harvest of 9,489 fish and a catch of 52,191 fish (Brase 2009a). Since 2012, there have been high-water events in the Chatanika River drainage resulting in prolonged periods of high water throughout Minto Flats (Albert and Tyers 2020). These consistent high-water events are likely impacting levels of effort, harvest, and catch. In 2021, fishing effort in Minto Flats was below average, with an estimated 983 angler-days compared to the 5-year average of 1,045 angler-days (Table 2). Fishing effort is not estimated by target species in the SWHS; however, most fishing effort in Minto Flats is assumed to be directed at northern pike. The 2021 catch of northern pike in Minto Flats was 2,839 fish, which was below the recent 5-year average (2016–2020) of 3,160 (Table 11). Since 2011, harvests have trended down, and the most recent 5-year average of harvest is 436 fish (Table 11). The 2021 estimate of harvest was 251 northern pike.

Although Minto Flats is closed to northern pike sport fishing from October 15 through May 31, a State managed subsistence fishery occurs throughout the winter. To participate in any State subsistence fishery in Alaska, participants must be Alaska residents. Residents must acquire a Tolovana River Drainage Northern Pike Subsistence Permit from ADF&G Division of Commercial Fisheries in Fairbanks or online. Subsistence users commonly harvest northern pike through the ice in the CROA (Figure 5) late in the winter and early in the spring. The subsistence northern pike preliminary harvest for the entire Tolovana River drainage recently averaged 1,581 fish over the past 5 years (2017–2021) from an average number of 253 permits issued (Table 12). For 2021, the total subsistence harvest in the Minto Flats was 3,092 northern pike

among 425 permits issued. Total harvest (subsistence and sport) during 2021 of northern pike in Minto Flats was 3,343 fish. Prior to 2016, the DCF did not collect harvest data specific to the CROA and it was instead assumed that permits issued to FNSB residents were indicative of CROA effort and harvest since the fishery is typically dominated by Fairbanks residents.

Recent harvests of northern pike in the lakes and flowing waters of the Minto Flats area have been below the maximum 20% exploitation rate specified in regulation. Since 2005, subsistence harvests have been appreciable (Table 12), primarily by residents of the FNSB, and there has been a downward trend in sport fish harvest (Table 12). The assessment area used to manage the fisheries and calculate the 20% exploitation rate has changed multiple times in the past few decades (Table 13). Most recently, in 2018, the assessment area consisted of the Minto Lakes Study Area (MLSA) and the CROA. The MLSA is more consistent with the historical assessment area and the CROA was a "new" assessment area, aimed at estimating the abundance and length composition of the overwintering population in the CROA.

The 2018 abundance estimates for the MLSA and CROA were 11,443 and 14,675 northern pike larger than ~24 in (600 mm), respectively (Table 13). It is unclear as to what these abundance estimates mean to management because the 20% threshold exploitation rate is applied to the entirety of Minto Flats, and studies conducted in the MLSA and CROA are relative to those specific areas. If sport and subsistence harvests continue to maintain current levels and the population of northern pike in the assessed areas (MLSA and CROA) are indicative of the overall Minto Flats population, there should be no need for restrictions to the sport fishery relative to the 20% exploitation threshold. Additionally, recent high-water events throughout the Minto Flats are providing optimal rearing habitat for northern pike, but also negatively impacting the sport fishery due to difficulty accessing fishing spots when the water is high.

Research and Management Activities

Northern pike population assessments were performed in Minto Flats annually from 1987–1991 (Holmes and Burkholder 1988; Burkholder 1989, 1990, 1991; Hansen and Burkholder 1992). However, obtaining accurate and unbiased abundance estimates was difficult to achieve because experimental assumptions were often not met (Roach 1997, 1998a). These large, open-system experiments were fraught with low sample sizes, limited mixing of marked and unmarked fish, size and sex biases, and high-water during spring sampling events. Based on difficulties encountered during these early mark–recapture experiments and radiotelemetry studies conducted by Burkholder (1989), Burkholder and Bernard (1994), and Roach (1998a), the assessment area and study design was modified. Beginning in 1996 through 2008, northern pike abundance estimation experiments were done within the MLSA (Figure 5). The resulting estimates were used as an index of abundance of northern pike for the entire Minto Flats wetland complex (Table 13). In 2018, the population assessment study design was again modified. A 3-event mark–recapture experiment was conducted to estimate the overwintering population of northern pike in the CROA and the summer population in the MLSA. The 2018 estimate of overwintering northern pike in the CROA >24 in TL (600 mm FL) was 14,675 (SE = 1,631) fish and the summer abundance of northern pike >24 in TL (600 mm FL) in the MLSA was 11,443 (SE = 1,651; Albert and Tyers 2020). The 2018 MLSA summer estimate was well above the previous 2008 estimate of 2,219 (SE = 397) fish (Joy 2009; Albert and Tyers 2020).

Depending on what "assessed" population is used, the combined harvest of sport and all subsistence fisheries was 3,343 fish during 2021, which is exceeding the 20% exploitation rate

for both the MLSA and CROA population (16%). There are several subsistence permits from the Minto village that cumulatively harvest over 1,000 northern pike near the village. While some of those fish overwinter in the CROA, others overwinter in other areas. In other words, the Minto Flats population is larger than the CROA population and comparing exploitation against the CROA abundance is a conservative measure. A better understanding of the relative importance of all overwintering areas within the Minto Flats is needed to assess relative exploitation of discrete summer or spring spawning populations. In the absence of a Minto Flats-wide abundance estimate, the true exploitation rate will be unknown but the assumption is that is well below 20%.

Due to winter subsistence harvest exceeding 750 during 2021 and 2022, an EO was issued that reduced the sport fish bag limit from 5 to 2 northern pike, with only 1 over 30 inches during the sport fishery season. Given that sport angler harvest has consistently been substantially less than angler-days, it is unlikely that a bag limit reduction by emergency order has had an impact on most anglers. With the growing popularity of the subsistence fishery in the CROA, it is likely that harvest will continue to exceed the 750 fish management trigger and sport fish anglers will continue to see summer restrictions.

LAKE TROUT

Fielding Lake: Lake Trout

Fishery Description

The following section provides information relative to Proposal 71. Fielding Lake, located in the upper drainage of the Delta River, is a picturesque and popular recreational destination (Figure 6). Fielding Lake is accessible from the Richardson Highway at milepost 200.5 via a 2-mile gravel road; and it has a campground, public use cabin, and boat launch operated by the Alaska Department of Natural Resources, as well as numerous private cabins. The lake (elevation = 906 m, surface area = 538 ha, maximum depth = 23 m) lies within the Alaska Range, has several small inlets, and a single outlet stream that drains into the glacially fed Delta River. The lake begins to freeze by the middle of October and is usually ice free by mid-June.

During 1980s and 1990s, effort, catch, and harvest were greater than the most recent 10 years (Table 14). Since 1985, progressively more restrictive regulatory actions were enacted to maintain a sustainable fishery. The current bag and possession limit is 1 lake trout ≥26 in TL (~660 mm FL), only 1 unbaited single-hook artificial lure or fly may be used, and fishing for lake trout is not permitted from 1–30 September. During the last 10 years, unbiased estimates of sport fishing effort, catch, and harvests have often been unattainable due to insufficient number of respondents (Table 14), but they probably reflect relatively low effort.

ADF&G began conducting research on wild lake trout populations due to high harvest rates and perceived declines in lake trout abundance that had occurred in many TRMA lakes. Specific life history features of lake trout (slow growth, delayed maturity, and spawning in nonconsecutive years) combined with the short growing season at higher altitudes increase the vulnerability of the species to overharvest (Burr 1987, 2006). The effect of even modest fishing pressure can be significant.

In Fielding Lake, assessments of the spawning lake trout population were conducted in 1998–1999 and 2010–2011 (Parker et al. 2001; Schwanke 2013). Schwanke (2013) concluded

that the 1999 abundance estimate was biased low because sampling did not occur throughout the entire spawning period, which probably excluded a substantial but unknown number of fish from 1 or more sampling events in the experiment. Parker et al. (2001) and Schwanke (2013) did not estimate the abundance of spawning female lake trout because prior studies have found that males are present at spawning sites longer than females. Because the fall spawning estimates were inadequate, stock assessment techniques were changed to estimate abundance of population susceptible to angling during 2021, and this estimate allows a better evaluation of current exploitation.

Recent Fishery Performance

During 2021, Fielding Lake had 7 SWHS respondents that yielded biased estimates of 595 angler-days, 220 lake trout caught, and 0 harvested (Table 14). The previous 10-year average was 976 angler days, 267 lake trout caught, and 49 fish harvested (Table 14). Because several of these estimates were generated from too few respondents, they should be considered biased but indicative of low level of effort and harvest. To manage lake trout more conservatively, a 10% catch-and-release mortality is applied to the catch and the result added to the harvest estimated.

Fishery Management Objectives

There have been no proposals adopted regarding lake trout in the TRMA since 2007, when the BOF adopted the *Tanana River Area Wild Lake Trout Management Plan* (5 AAC 74.040). This plan directs ADF&G to manage wild lake trout populations by employing a conservative regulatory regime and maintaining harvest below the maximum sustained yield and provides guidelines to maintain harvest at sustainable levels. ADF&G uses estimates of abundance and total fishing mortality (estimated harvest plus an estimated 10% hooking mortality of fish that are caught and released) to ensure total fishing mortality does not exceed maximum sustained yield for this long-lived species. ADF&G considers an annual 10% exploitation rate to be a conservative guideline for management and below maximum sustained yield. Based on the 2021 abundance estimate, recent exploitation rates have likely remained below 10% total mortality under current regulations.

Research and Management Activities

Fielding Lake is one of the most intensively managed lake trout fisheries in Interior Alaska, and there was a desire to have an accurate estimate of the lake trout population susceptible (recruited) to angling gear. Hook-and-line sampling was successfully used for lake trout at another lake and the techniques were used for a stock assessment of Fielding Lake during June 2021 and 2022. This project used hook-and-line sampling in the summer to estimate the abundance of all lake trout 16 in TL (≥350 mm FL). Previous estimates of abundance occurred during the fall spawn and provided estimates of large males only, whereas the current estimate will be more robust and not simply an estimate of the male spawning population. The estimated abundance was 1,637 lake trout ≥14 in TL (SE = 240) and 1,262 lake trout ≥18 in TL (SE = 200; Albert *In prep*).

STOCKED WATERS

Fishery Description

The following section provides information relative to Proposals 72, 73, and 74. 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, Fort Richardson, Elmendorf Air Force Base, Clear Air Force Station, and other locations have supplied fish to TRMA waters.

The William Jack Hernandez (Anchorage) and Ruth Burnett (Fairbanks) Sport Fish Hatcheries began producing catchable-sized fish in 2012. The increase harvest of stocked fish observed since 2013 is attributed to this production. The Ruth Burnett Hatchery continues to perform at optimal production, and in 2019, the first lake trout eggs since 2000 were reared. In the fall of 2020, the lake trout stocking program was reinstated and subcatchables were stocked in select TRMA and Southcentral lakes. In 2020, the Arctic grayling egg take did not occur due to budget cuts and the COVID-19 pandemic. It is unclear when the Arctic grayling stocking program will resume. The Chinook salmon egg take on the Chena River has not occurred during 2020–2022 due to poor runs of Chinook salmon each year. Chinook salmon were instead provided by the William Jack Hernandez Hatchery, and given the poor Chinook salmon returns the last few years, the William Jack Hernandez Hatchery should continue to be the source of Chinook salmon for stocking.

Initial stocking events were often "bucket-biology" experiments when fish were simply transported from one lake to another, often without good documentation. Stocking Alaska's waterways has changed over the years, and now there are science-based policies in place that 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 out stocked into any waterbodies.

At present, 89 lakes are 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 rainbow trout (sterile); however, this practice ended in 2010. These stocked waters offer a range of both summer and winter 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. These lakes function to provide diverse angling opportunities, shift pressure from wild stocks, and provide harvest alternatives.

A variety of fish are stocked in the TRMA, including rainbow trout, Arctic grayling, Arctic char, lake trout, and landlocked salmon (Chinook and coho). These fish are produced at the Ruth Burnett Sport Fish Hatchery in Fairbanks and then transported by truck to Fairbanks and Delta Junction area lakes in the early summer and late fall. Some brood stock or eggs (e.g., rainbow trout) are provided by the William Jack Hernandez Sport Fish Hatchery in Anchorage. Occasionally, lakes, particularly Chena Lake and Cushman Lake, are stocked just prior to ice-up to supplement the winter fisheries at these locations.

Fish are stocked at 4 size categories: (1) fingerling (2 grams, ~3 in); (2) subcatchables (20–60 grams, ~ 5 in); (3) catchables (100–200 grams, ~9–10 in); and (4) surplus broodstock (up to 1,500 grams, ~15 in). Size-at-stocking depends on management needs at a particular stocking location, lake characteristics (e.g., productivity, prone to winterkill), 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 can meet the lower demand, and it is too expensive to transport the same numbers of larger fish with aircraft.

Additionally, to promote public participation and angling success, 6 public use cabins are available for reservation by permit. All of these cabins, except the one at George Lake, are on popular stocked lakes in the Delta Junction area.

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 in or larger), catch rates can be high, and most of the lakes/ponds are easily accessible. Approximately 39% of all effort and 60% of all harvest within the TRMA between 2011–2020 were supported by stocked lakes (Table 15).

Fishery Management Objectives

In 2004, the BOF adopted the *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065) into regulation. This plan defines how ADF&G should meet 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. Rainbow Lake is the only lake currently managed under the conservative management approach, and Harding Lake is managed under the special 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 hatchery and management staff. The stocking plan is a comprehensive list of species, life stages, 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 Statewide Stocking Plan, including the Region III stocking component, may be accessed on the ADF&G website at http://www.adfg.alaska.gov/index.cfm%3Fadfg%3DfishingSportStockingHatcheries.stockingPlan. Stocked waters are removed or reclassified from the stocking plan when there is a loss of public access, poor fish growth or survival, or insufficient effort. Lakes are added if new opportunities arise.

At the 2019 BOF meeting, the BOF adopted a proposal to update *Tanana River Area Stocked Waters Management Plan* (5 AAC 74.065) and removed Koole and Dune Lakes from the conservative management approach due to insufficient number of 18-inch fish observed during 2013 sampling and a decreasing trend in harvest to support the conservative management approach. All stocked lakes are currently managed under the regional management approach, except for Rainbow Lake, which is managed under the conservative approach.

Research and Management Activities

The ongoing strategy is to stock species most suited to a particular lake's physical characteristics at a size to account for lake productivity and 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 Chinook salmon also do well in most lakes and provide an aggressive fish during winter when other species are less active. Arctic char and lake trout are long-lived and can grow to a large size (≥18 in TL; ≥450 mm FL), which makes them attractive to anglers; however, they generally need deeper, cooler lakes to survive and grow slowly which may require 8 or more years before recruiting to the sport fishery. In some lakes, more than 1 species are stocked to provide diversity and to take advantage of different seasonal behavior of the fish. The most popular combination is rainbow trout and coho salmon. Every season, selected stocked lakes are assessed to ensure they are meeting public demand and that lake productivity is consistent with the current stocking regime for that particular lake. The assessments of stocked lakes should be continued.

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, ADF&G is unable to stock a water body; therefore, the ability to provide fishing opportunity within the Fairbanks city limits and surrounding area is lost until legal access to these water bodies is provided. Potential lakes will continue to be surveyed when a new lake or access becomes available. Two such lakes were suggested by the Natural Resources Department of Fort Wainwright. Birch Hill Lakes 1 and 2 on Fort Wainwright and adjacent to Fairbanks were sampled for fish and limnology during 2021 and 2022. Despite encouraging bathymetry, the lakes did not have adequate dissolved oxygen levels throughout their depth profile.

Another issue that has recently emerged is per- and polyfluoroalkyl substances (PFAS) contamination around Eielson Air Force Base and North Pole. Local wells and several stocked lakes are known to be contaminated with PFAS. Out of an abundance of caution, ADF&G has restricted waterbodies with PFAS contamination to catch-and-release only, and those lakes are currently not being stocked. The status of PFAS contamination in the area as described by the Alaska Department of Environmental Conservation will continue to be monitored.

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TABLES AND FIGURES

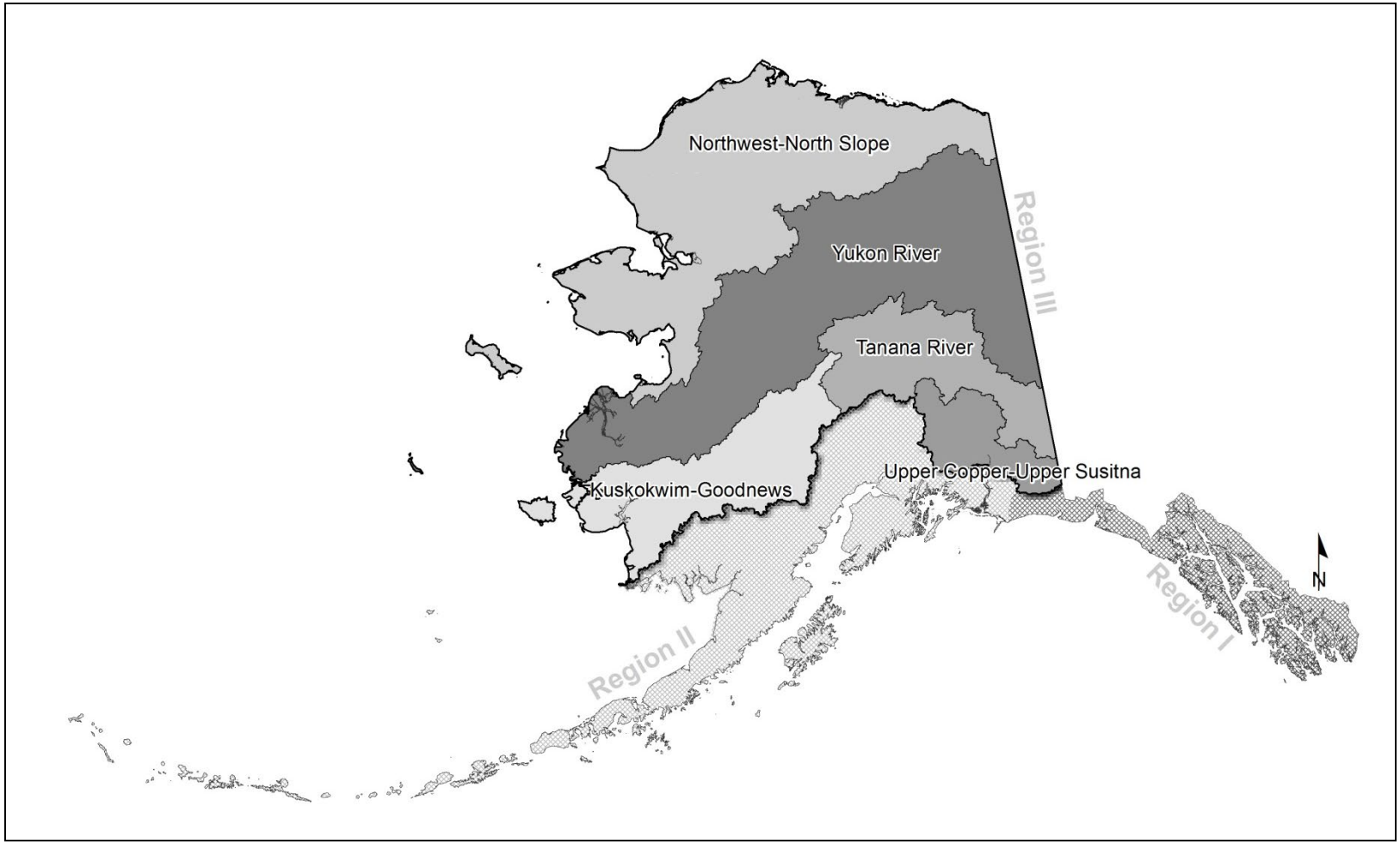

Figure 1.–The regional divisions (I–III) for ADF&G Division of Sport Fish, and the 5 management areas within Region III.

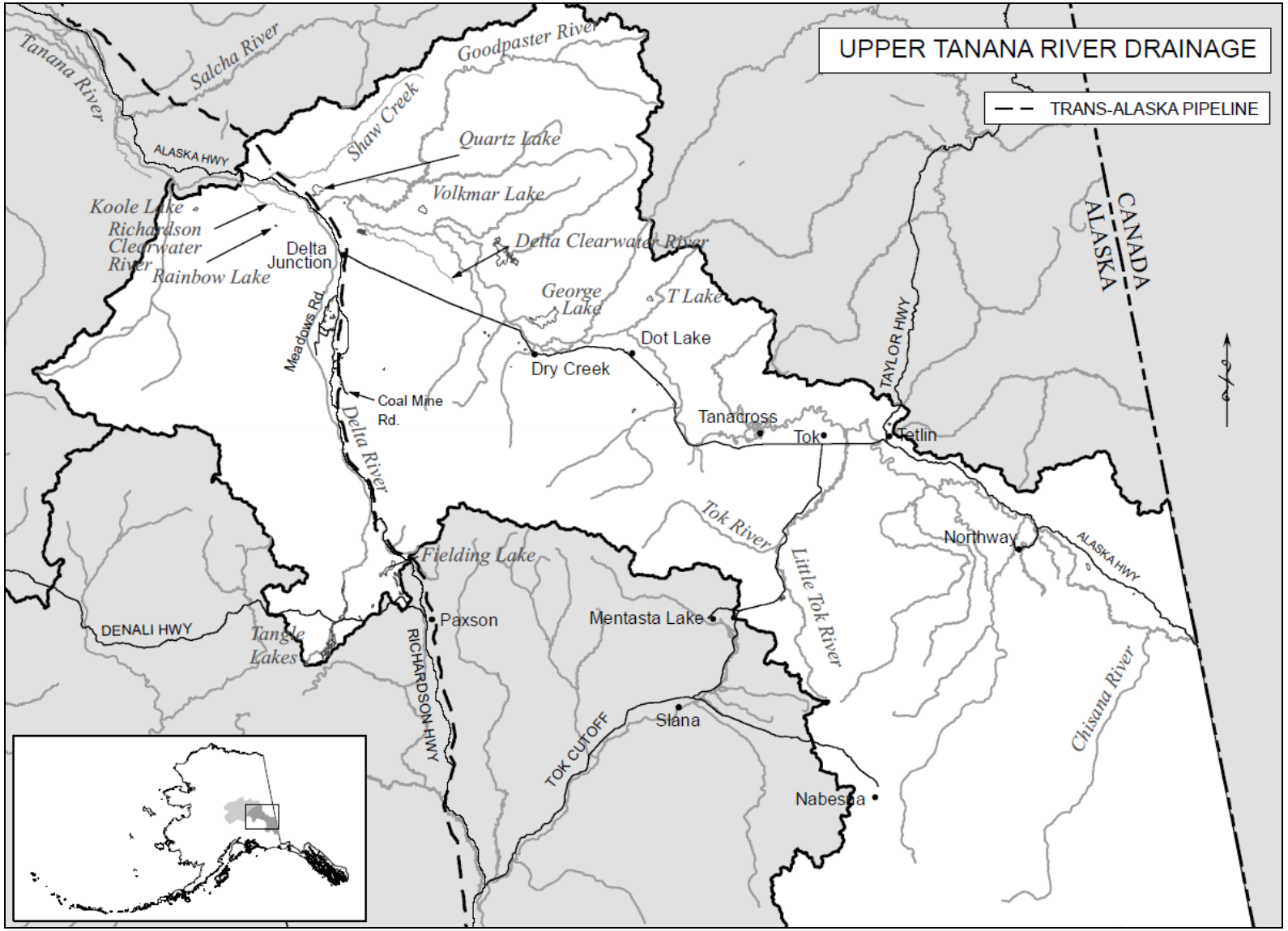

Figure 2.–The portion of the Tanana River drainage located upriver from the Salcha River.

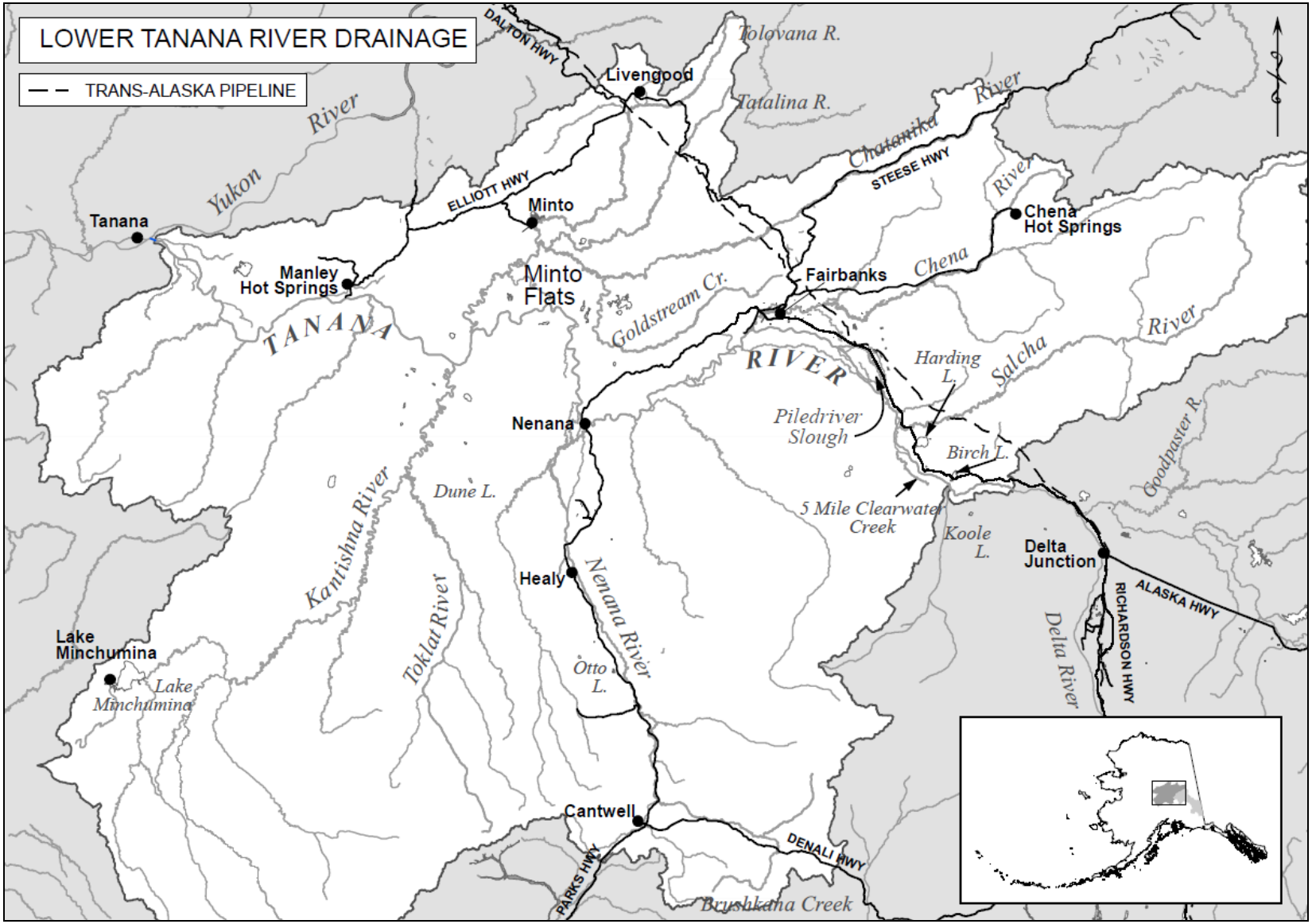

Figure 3.–The portion of the Tanana River drainage located downriver from Shaw Creek.

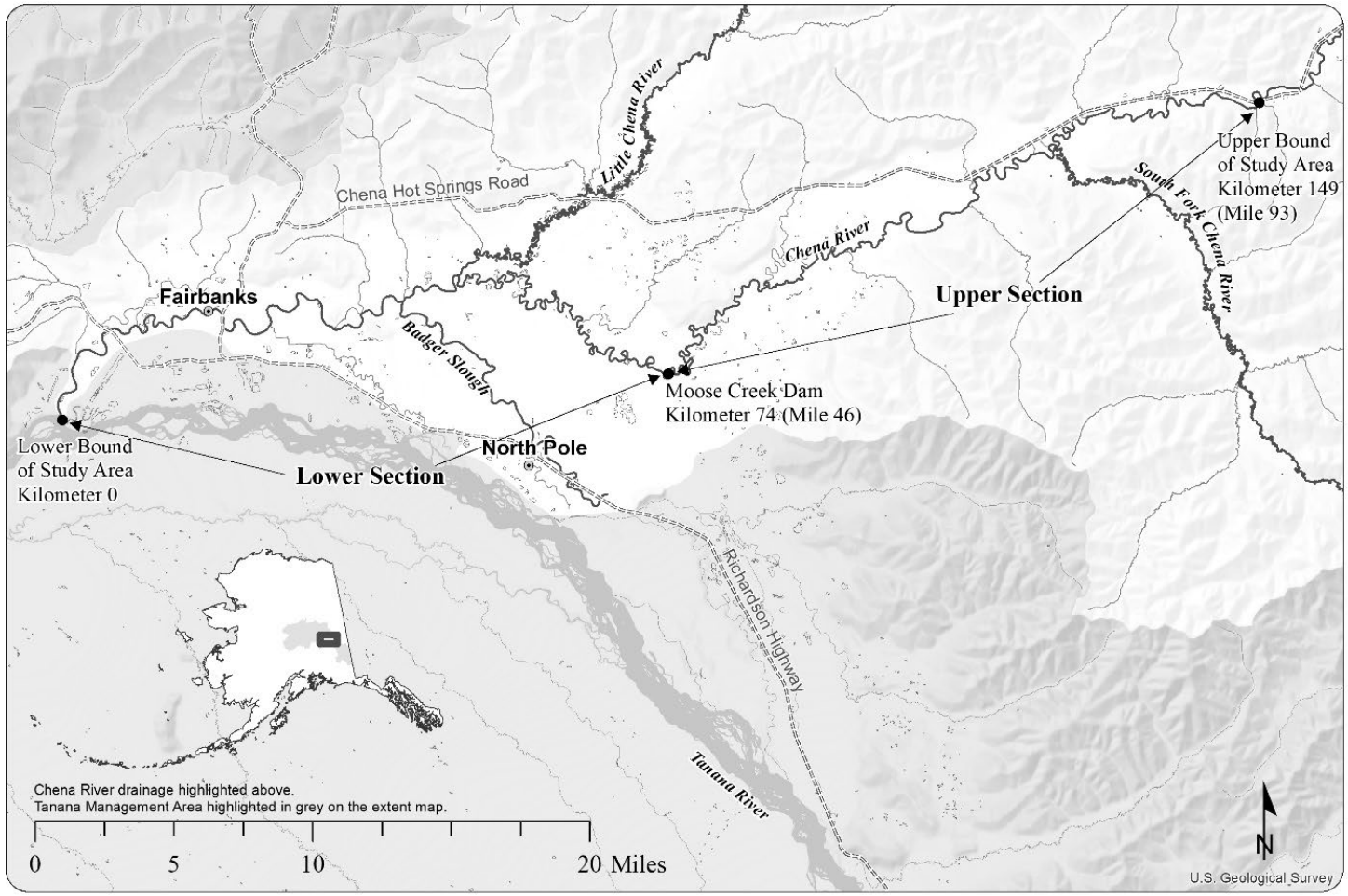

Figure 4.–Chena River study area for Arctic grayling stock assessment during May 2021.

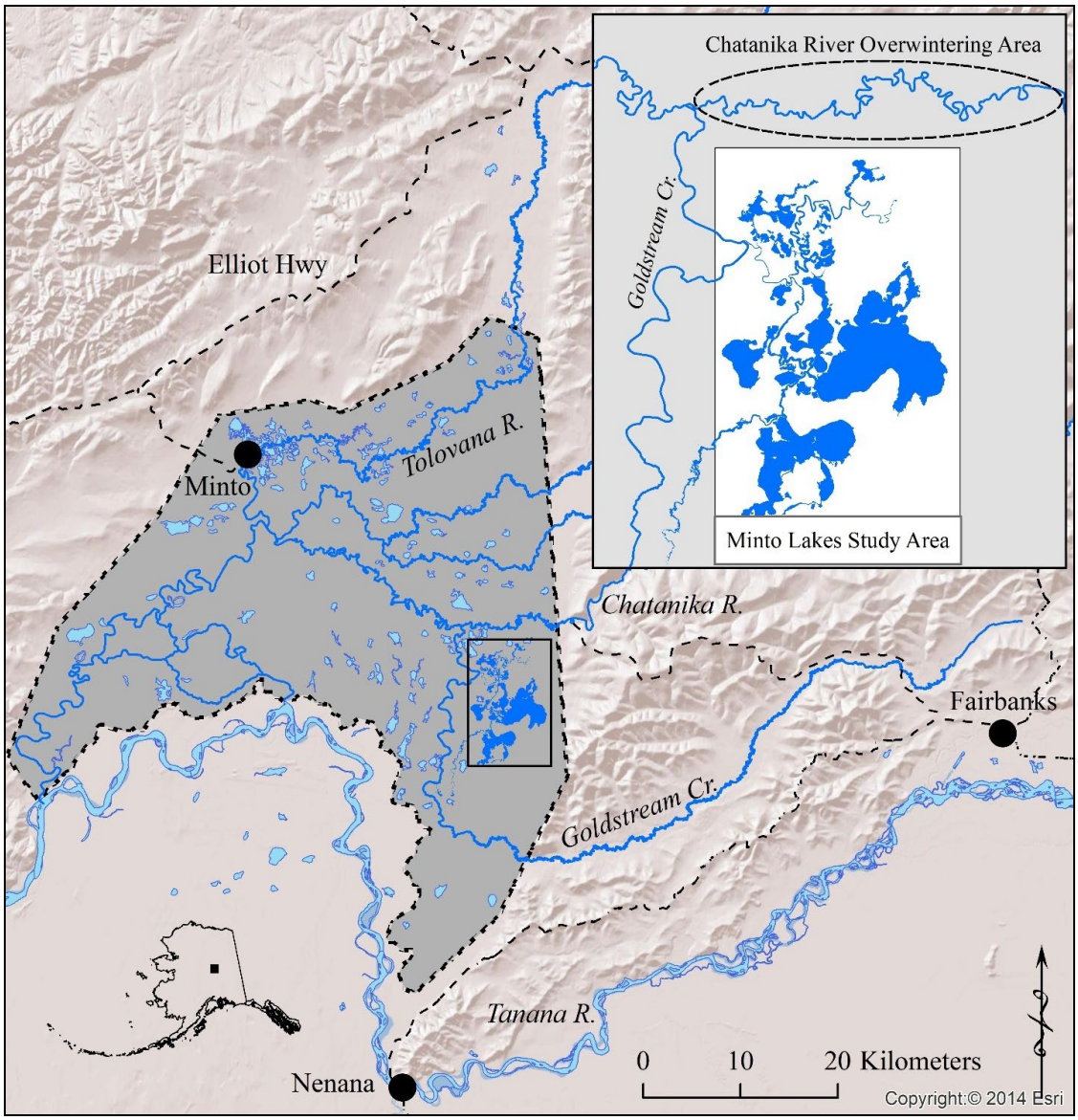

Figure 5.–Minto Flats with demarcation of harvest reporting area and the northern pike population assessment area.

Figure 6.–Map depicting the location of Fielding Lake.

Table 1.–Summary of known *Elodea* infested water bodies in Interior Alaska.

Water Body	Year detected	Acres
Chena Slough	2010	118.0
Chena River	2011	
Chena Lake	2011	230.0
Totchaket Slough	2014	
Bathing Beauty Pond	2018	12.0
Hot Springs Slough	2018	
Birch Lake	2018	800.0
Harding Lake	2020	2192.0
Lost Lake	2020	93.0
Piledriver Slough	2020	
Chena Cove	2021	4.0
Lady of the Lake	2021	1.5
28-mile pit	2021	7.2
Grayling Lake	2021	11.4
Hidden Lake	2021	16.7
Pike Lake	2021	19.0
Scout lake	2021	29.4
Moose Lake	2021	34.8
Polaris Lake	2021	47.7
Mullins Pit	2021	76.6

Table 2.–Estimates of effort (angler-days) for select areas of the Tanana River drainage, 2011–2021.

	Year											5-year Average	10-year Average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2016–2020	2011–2020
Chena Total [a]	10,401	8,296	19,219	20,293	11,210	8,021	8,460	5,370	6,675	5,313	8,120	6,768	10,326
Upper Chena	3,921	4,047	6,206	5,666	4,294	3,024	3,807	3,476	3,071	1,711	3,181	3,018	3,922
Lower Chena	6,480	4,249	13,013	14,627	6,916	4,997	4,653	1,894	3,604	3,602	4,939	3,750	6,404
Piledriver Slough	1,768	1,585	2,119	1,167	**644**	**250**	1,004	**1,124**	**935**	**608**	**434**	784	1,120
Chatanika Total[a]	3,401	6,200	6,665	5,144	4,060	4,168	6,439	3,699	4,061	3,526	3,649	4,379	4,736
Upper Chatanika	1,796	3,199	4,767	2,903	2,528	1,344	3,559	2,103	3,200	3,057	2,153	2,653	2,846
Lower Chatanika	1,605	3,001	1,898	2,241	1,532	2,824	2,880	1,596	861	**469**	1,496	1,726	1,891
Salcha River	2,821	3,264	3,492	1,406	2,042	2,629	1,371	2,252	**747**	**1,859**	2,841	1,772	2,188
Minto Flats	1,460	964	1,197	1,996	1,074	**400**	2,570	728	527	998	983	1,045	1,191
Nenana Drainage [b]	5,947	5,494	3,369	2,373	5,916	6,359	4,291	4,318	2,895	2,581	1,420	4,089	4,354
Delta Clearwater River	5,048	3,870	3,158	5,366	4,330	6,191	5,263	5,184	4,417	3,679	4,473	4,947	4,651
Tangle Lakes Drainage	4,478	4,326	6,199	5,519	3,999	4,619	4,696	4,431	4,732	6,252	3,706	4,946	4,925
George Lake	**249**	1,553	**474**	**641**	**289**	**256**	**148**	**1,135**	**401**	**379**	**467**	464	553
Fielding Lake	**422**	1,163	**1,545**	**714**	1,732	992	**1,108**	**551**	**805**	**726**	**595**	836	976
Volkmar Lake	**50**	**143**	ND	**53**	**360**	ND	**36**	**369**	**199**	ND	ND	201	173
Goodpaster River	993	**879**	**694**	**1,169**	**789**	**996**	**266**	**349**	**3,238**	**634**	**1,051**	1,097	1,001
Stocked Lakes Total[c]	24,776	25,885	29,722	43,082	30,819	28,949	20,815	27,840	25,812	28,679	31,204	26,419	28,638
Quartz Lake	4,532	3,988	1,347	4,114	4,593	5,865	4,203	6,350	3,153	3,805	4,466	4,675	4,195
Birch Lake	3,957	2,311	4,385	7,072	2,745	3,249	3,116	2,714	3,780	4,387	3,874	3,449	3,772
Harding Lake	1,540	1,309	1,961	1,096	1,323	**843**	**590**	**717**	**644**	**995**	**569**	758	1,102
Chena Lakes Recreation Area	2,962	**4,373**	8,820	11,827	5,885	6,733	5,986	4,504	7,524	9,463	8,644	6,842	6,808
Other stocked lakes	14,747	18,277	22,029	30,800	22,158	18,992	12,906	18,059	10,711	11,024	11,716	14,338	17,970
Other Tanana	5,564	6,069	7,448	7,217	8,977	7,225	10,430	8,011	7,861	4,747	6,778	7,655	7,355
Total Tanana	67,378	69,691	85,301	96,140	76,241	71,055	66,897	69,865	63,305	59,981	65,721	66,221	72,585

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: Although data are presented for all years, data in bold result from fewer than 12 respondents and are subject to high variance and as presented only indicate that sport fishing occurred in these waters. ND = no data.

[a] Includes unspecified reaches.

[b] Includes Brushkana Creek and Fish Creek.

[c] Includes "Other" lakes U0993.

Table 3.–Number of fish harvested and caught by recreational anglers fishing in the Tanana River drainage (includes stocked waters), 2011–2021.

Year	Chinook 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													
2011	372	77	284	1,227	7,663	1,189	443	5,179	1,209	1,024	16	641	24
2012	114	63	84	800	6,069	539	319	4,971	2,300	1,128	7	369	84
2013	11	8	139	1,179	9,067	835	799	5,952	2,087	1,436	7	810	21
2014	0	54	216	4,126	10,254	1,015	418	8,010	1,867	1,745	37	1,165	0
2015	13	0	180	1,753	22,119	610	484	5,591	1,838	1,877	0	193	261
2016	20	0	641	7,980	18,834	3,038	480	6,680	1,707	1,689	20	370	0
2017	18	23	236	3,655	11,286	942	375	4,449	1,096	1,032	7	745	189
2018	200	15	482	2,018	9,973	1,375	117	3,176	1,586	578	35	444	17
2019	19	0	72	1,234	12,661	606	428	3,008	2,524	1,078	15	135	0
2020	49	0	80	3,003	14,110	790	582	3,182	913	322	0	32	0
2021	0	0	0	1,477	16,279	170	36	2,515	1,706	680	39	95	103
5-year Average 2016–2020	61	8	302	3,578	13,373	1,350	396	4,099	1,565	940	15	355	41
10-year Average 2011–2020	82	24	241	2,698	12,204	1,094	445	5,020	1,713	1,191	14	495	60
Catch													
2011	1,432	620	3,761	2,980	35,547	4,806	2,296	87,411	13,672	1,224	158	1,023	47
2012	1,142	411	2,623	5,189	31,385	3,731	1,773	91,019	19,524	1,299	36	523	84
2013	129	580	1,952	3,947	31,462	5,050	1,472	148,797	15,293	1,693	79	1,647	99
2014	10	171	6,655	14,589	37,250	3,249	1,752	109,152	14,651	1,932	186	1,744	48
2015	48	189	4,393	3,323	60,475	4,937	4,330	108,078	14,743	2,929	69	422	586
2016	1,532	117	4,853	19,280	46,584	8,880	1,829	91,319	12,450	3,385	49	612	202
2017	138	627	3,218	8,642	30,366	1,971	4,924	99,450	11,807	1,200	7	822	436
2018	538	57	2,830	7,696	29,919	3,629	589	83,847	6,898	614	75	533	114
2019	36	24	1,579	8,824	42,292	3,556	1,226	124,653	16,880	1,265	15	314	232
2020	154	88	710	12,366	51,285	6,304	3,357	60,197	7,312	1,617	0	285	11
2021	207	12	13	5,790	47,712	1,711	738	76,690	7,238	765	39	111	197
5-year Average 2016–2020	480	183	2,638	11,362	40,089	4,868	2,385	91,893	11,069	1,616	29	516	199
10-year Average 2011–2020	516	288	3,257	8,684	39,657	4,611	2,352	100,392	13,323	1,716	67	794	186

Source: Alaska Sport Fishing Survey database [Internet]. 1996–. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Table 4.–Sport harvest of Chinook, coho, and chum salmon in the Tanana River drainage, 2011–2021.

	Year											5-year Average	10-year Average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2016–2020	2011–2020
Chinook salmon													
Chena River	84	38	0	0	0	0	18	0	0	0	0	4	14
Salcha River	256	76	0	0	13	20	0	200	**0**	0	0	44	57
Chatanika River	0	0	0	0	0	0	0	0	19	0	0	4	2
Goodpaster River	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0	0	0	0
Other Tanana	32	0	11	0	0	0	0	0	0	49	0	10	9
Total	372	114	11	0	13	20	18	200	19	49	0	61	82
Coho salmon													
Nenana River drainage	0	27	0	0	0	0	21	141	0	0	0	32	19
Delta Clearwater River	284	57	81	216	180	641	215	325	72	56	0	262	213
Other Tanana	0	0	58	0	0	0	0	16	0	16	0	6	9
Total	284	84	139	216	180	641	236	482	72	80	0	302	241
Chum salmon													
Chena River	77	0	0	0	0	0	0	0	0	0	0	0	8
Salcha River	0	0	0	0	0	0	23	0	0	0	0	3	2
Delta Clearwater River	0	63	8	54	0	0	0	0	0	0	0	5	2
Other Tanana	77	63	8	54	0	0	23	15	0	0	0	0	13
Total	77	0	0	0	0	0	0	0	0	0	0	8	24

Source: Alaska Sport Fishing Survey database [Internet]. 1996–. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: Although data are presented for all years, data in bold result from fewer than 12 respondents and are subject to high variance and as presented only indicate that sport fishing occurred in these waters.

Table 5.–Sport catch of Chinook, coho, and chum salmon in the Tanana River drainage, 2011–2021.

	Year											5-year Average	10-year Average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2016–2020	2011–2020
Chinook Salmon													
Chena River	599	245	95	10	0	0	57	20	17	33	207	25	108
Salcha River	769	682	23	0	13	1,425	20	518	**0**	**0**	0	393	345
Chatanika River	32	215	0	0	0	0	20	0	19	**0**	0	8	29
Goodpaster River	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0	0
Other Tanana	32	0	11	0	15	107	41	0	0	0	0	30	21
Total	1,432	1,142	129	10	28	1,532	138	538	36	33	207	455	504
Coho Salmon													
Nenana River drainage	0	212	130	357	0	0	258	141	**283**	**0**	**0**	136	138
Delta Clearwater River	3,761	2,316	1,747	6,278	4,378	4,853	2,844	2,503	1,063	686	0	2,390	3,043
Other Tanana	0	95	75	20	15	0	179	186	233	8	13	109	75
Total	3,761	2,623	1,952	6,655	4,393	4,853	3,281	2,830	1,579	694	13	2,635	3,256
Chum Salmon													
Chena River	551	118	0	38	19	27	415	0	0	0	0	88	117
Salcha River	44	42	290	0	118	0	18	15	**0**	**0**	0	7	53
Delta Clearwater River	14	0	130	24	52	21	182	0	24	0	0	41	42
Other Tanana	11	251	160	109	0	69	12	42	24	**88**	**12**	41	71
Total	620	411	580	171	189	117	627	57	24	88	12	183	288

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: Although data are presented for all years, data in bold result from fewer than 12 respondents and are subject to high variance and as presented only indicate that sport fishing occurred in these waters.

Table 6.–Abundance estimates and methods of estimation for Chinook salmon in the Chena and Salcha Rivers, 2005–2022.

	Chena River		Salcha River	
Year	Abundance	Method	Abundance	Method
2005	no estimate[b]	Tower	5,988	Tower
2006	2,936	Tower	10,400	Tower
2007	3,564	Tower	5,631[a]	Tower
2008	3,212	Tower	5,300[a]	Tower
2009	5,253	Tower	12,788	Tower
2010	2,382	Tower	6,135	Tower
2011	no estimate[b]	Tower	7,200	Tower and aerial
2012	2,220	Tower	7,165	Tower
2013	1,859	Tower	5,465	Tower
2014	7,192	Sonar	no estimate[b]	Tower
2015	6,291	Tower	9,000	Tower
2016	6,665	Sonar	2,675	Tower and sonar
2017	4,949	Sonar	4,195	Sonar
2018	5,947	Sonar	5,021	Sonar
2019	2,404	Tower	4,863	Tower
2020[c]	306[c]	Sonar	no estimate[d]	
2021	1,416	Tower	2,081	Tower
2022[e]	355	Tower	1,127	Tower
BEG Range	2,800–5,700		3,300–6,500	
10-year Average (2011–2020)	3,600		4,793	
5-year Average (2016–2020)	3,004		4,040	

Source: Brase and Doxey 2006; Brase 2012; Savereide 2012a–b, 2014; Stuby and Tyers 2016; Matter and Tyers 2020a–b)

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

[b] No estimates were produced due to extreme high-water events throughout the run. Chena River Chinook salmon escapement was likely within the biological escapement goal (BEG) range, based on results from the Salcha River escapement estimate.

[c] An incomplete count due to high water events and significant data gaps.

[d] The Salcha River tower did not operate due to insufficient funding.

[e] Preliminary data

Table 7.–Coho salmon survey counts from the Tanana River drainage, 2011–2022.

Surveyed stream	Year												5-year Average 2017–2021	10-year Average 2012–2021
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022[a]		
Delta Clearwater River	6,180	5,230	6,222	4,285	19,553	6,767	9,616	2,884	2,043	2,555	913	1,750	3,602	6,007
Richardson Clearwater River	575	515	647	1,941	3,742	1,350	ND	976	ND	475	17	54	489	1,208
Lost Slough	369	ND	721[b]	333	242	334	1,278	1,822	ND	28	126	43[c]	814	595
Nenana River mainstem	ND	106	225	ND	1,789	1,680	862	241	749	206	104	137[c]	432	662
Otter Creek (17-mile Slough)	912	405	425	886	3,890	2,746	1,942	347	424	507	ND	122[c]	805	1,286
Julius Creek	0	ND	0	0	ND	0	0	0	0	ND	ND	ND	0	0
Wood Creek[d]	0	0	55	649	1,419	1,327	2,025	361	184	231	226	ND[c]	605	648
Clear Creek[d]	516	0	2	25	164	27	9	0	5	3	0	92[c]	3	24
Glacier Creek[d]	156	0	30	0	6	20	0	11	0	0	0	2	2	7
Lignite Creek	ND	ND	1	37	26	ND	ND	ND	ND	ND	ND	ND[e]	0	21
June Creek	ND	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	0	3

Source: A. Padilla, Fishery Biologist, ADF&G, Division of Commercial Fisheries, Fairbanks, personal communication, 2022.

Note: ND = No data.

[a] Preliminary data.

[b] Incomplete survey (lack of daylight).

[c] Blizzard.

[d] Tributaries to Julius Creek.

[e] Flight restrictions.

Table 8.–Estimated abundance of Arctic grayling by size and by river section of the Chena River, 1985–1998, 2005.

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

Source: Holmes et al. 1986; Clark and Ridder 1987, 1988; Clark 1989–1991, 1993–1996; Ridder and Fleming 1997; Ridder 1998b, 1999; Wuttig and Stroka 2007.

Note: ND = no data.

[a] Total abundance is for fish ≥6 in TL (150 mm FL) unless otherwise indicated.

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

[c] Abundance estimate does not include fish 6–10 in TL (150 to 239 mm FL) for the upper section.

[d] In 2005, standard errors were not calculated for Arctic grayling 6–12 in TL (150–269 mm FL).

Table 9.–Sport catch of Arctic grayling in the Tanana River drainage, 2011–2021.

	Year											5-year Average	10-year Average
Water Body	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2016–2020	2011–2020
Chatanika River total[a]	7,150	4,855	10,362	18,102	6,086	8,791	8,702	4,686	4,265	5,297	3,214	6,348	7,830
Upper Chatanika	4,210	2,958	5,338	11,611	4,302	1,916	6,694	3,099	3,188	4,939	1,369	3,967	4,826
Lower Chatanika	2,940	1,897	5,024	6,491	1,784	6,875	2,008	1,587	1,077	**358**	1,845	2,381	3,004
Nenana R. drainage total	12,543	7,751	9,099	6,519	22,506	14,475	12,212	12,271	12,376	3,316	1,922	10,930	11,307
Fish Creek	4,961	6,753	3,693	3,352	8,786	6,307	5,815	7,392	8,138	**442**	**1,056**	5,619	5,564
Brushkana Creek	3,674	**1,236**	3,167	**731**	**1,377**	**1,013**	**1,226**	2,157	**2,190**	**2,008**	**818**	1,719	1,878
Chena River total[a]	15,579	18,776	53,034	24,234	24,836	12,920	25,594	13,968	26,164	4,224	21,691	16,574	21,933
Upper Chena	9,820	13,722	22,262	16,303	11,006	7,905	11,228	9,475	15,678	1,822	13,310	9,222	11,922
Lower Chena	5,759	5,054	30,772	7,931	13,830	5,015	14,366	4,493	10,486	2,402	8,381	7,352	10,011
Piledriver Slough	3,475	2,291	3,202	2,939	**1,395**	**451**	381	**636**	**5,612**	**855**	**404**	1,587	2,124
Salcha River	3,775	6,182	8,276	2,360	5,268	3,555	4,668	3,836	**1,331**	**1,664**	4,744	3,011	4,092
Goodpaster River	1,444	**1,274**	**236**	**1,895**	**1,041**	**2,576**	**338**	**431**	**2,900**	**116**	**529**	1,272	1,225
Delta Clearwater River	9,758	11,063	11,551	10,778	14,066	12,065	14,717	9,974	15,322	11,625	10,396	12,741	12,092
Fielding Lake	**424**	2,445	**2,027**	**903**	1,910	1,683	**7,618**	**895**	**1,171**	**962**	**334**	2,466	2,004
Tangle Lakes	18,653	19,281	30,820	24,806	16,813	19,927	16,908	25,545	31,160	25,644	19,264	23,837	22,956
Other Tanana	14,610	17,101	20,190	16,616	14,157	14,876	8,312	11,605	24,665	6,494	14,192	13,190	14,863
Total	87,411	91,019	148,797	109,152	108,078	91,319	99,450	83,847	124,653	60,197	76,690	91,893	100,392

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: Although data are presented for all years, data in bold result from fewer than 12 respondents and are subject to high variance and as presented only indicate that sport fishing occurred in these waters.

[a] Includes unspecified reaches.

Table 10.–Sport harvest of Arctic grayling in the Tanana River drainage, 2011–2021.

	Year											5-year Average	10-year Average
Water body	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2016–2020	2011–2020
Chatanika River total[a]	616	291	690	3,491	231	1,202	1,288	378	432	955	224	851	957
Upper Chatanika	496	89	417	765	193	400	934	287	244	955	82	564	478
Lower Chatanika	120	202	273	2,726	38	802	354	91	188	**176**	142	322	497
Nenana River total	756	828	473	600	1,410	1,532	656	398	104	507	133	639	726
Fish Creek	0	530	0	59	33	968	200	147	0	**133**	**85**	290	207
Brushkana Creek	283	**194**	357	**189**	**272**	**53**	**184**	169	**20**	**264**	**48**	138	199
Chena River total[a]	0	0	0	0	0	0	0	0	138	4	28	28	14
Upper Chena	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower Chena	0	0	0	0	0	0	0	0	101	4	28	21	11
Piledriver Slough	0	0	0	0	**0**	**0**	0	**0**	**0**	**0**	**0**	0	0
Salcha River	806	709	1,547	504	265	228	336	423	**74**	**195**	666	251	509
Goodpaster River	71	**202**	**17**	**302**	**19**	**214**	**87**	**143**	**616**	**0**	**42**	212	167
Delta Clearwater River	0	86	0	266	244	99	0	264	21	75	62	92	106
Fielding Lake	**70**	460	**381**	**139**	457	232	**116**	**0**	**39**	**0**	**192**	77	189
Tangle Lakes	2,031	1,245	1,482	1,271	1,502	1,309	1,274	867	1,100	872	576	1,084	1,295
Other Tanana	829	1,150	1,362	1,437	1,463	1,864	692	703	672	574	592	901	1,075
Total	5,179	4,971	5,952	8,010	5,591	6,680	4,449	3,176	3,008	3,182	2,515	4,099	5,020

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: Although data are presented for all years, data in bold result from fewer than 12 respondents and are subject to high variance and as presented only indicate that sport fishing occurred in these waters.

[a] Includes unspecified reaches.

Table 11.–Sport harvest and catch of northern pike in the Tanana River drainage, 2011–2021.

	Year											5-year Average	10-year Average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2016–2020	2011–2020
Harvest													
Minto Lakes[a]	396	303	350	485	360	75	523	219	**170**	**25**	**94**	202	291
Minto Flats[b]	422	412	382	597	372	**196**	589	390	746	261	251	436	437
George Lake	**82**	653	**67**	**431**	**433**	**102**	**0**	**559**	**365**	**75**	**19**	220	277
Healy Lake	ND	ND	**142**	**0**	**25**	**60**	**16**	**0**	ND	**0**	**0**	19	35
Deadman Lake (Alaska Hwy.)	**0**	**23**	ND	ND	ND	**0**	**32**	**0**	**77**	**0**	ND	22	19
Deadman Lake (Tolovana R.)	ND	ND	**57**	ND	ND	**91**	ND	ND	**39**	**139**	ND	90	82
Volkmar Lake	**16**	**31**	ND	**58**	**37**	ND	**11**	**72**	**24**	ND	ND	36	36
Mineral Lake (into Station Creek)	**0**	ND	**66**	**40**	**41**	**0**	**8**	**15**	**18**	**0**	**16**	8	21
Other Tanana	689	1,181	1,373	741	930	1,258	440	550	1,255	438	1,420	788	886
Total Tanana harvest	1,209	2,300	2,087	1,867	1,838	1,707	1,096	1,586	2,524	913	1,706	1,565	1,713
Catch													
Minto Lakes[a]	3,362	4,113	3,101	1,947	4,395	1,986	7,918	1,415	**1,519**	**244**	**764**	2,616	3,000
Minto Flats[b]	3,911	4,481	3,284	2,218	4,417	2,584	8,578	1,968	1,579	1,089	2,839	3,160	3,411
George Lake	**1,574**	8,463	**1,255**	**4,830**	**470**	**2,606**	**494**	**1,014**	**2,785**	**1,931**	**501**	1,766	2,542
Healy Lake	ND	ND	**1,480**	**29**	**371**	**196**	**183**	**143**	ND	**126**	**58**	162	361
Deadman Lake (Alaska Hwy.)	**0**	**1,570**	ND	ND	ND	**112**	**32**	**10**	**97**	**25**	ND	55	264
Deadman Lake (Tolovana R.)	ND	ND	**57**	ND	ND	**181**	ND	ND	**2,242**	**1,530**	ND	1,318	1,003
Volkmar Lake	**244**	**188**	ND	**145**	**817**	ND	**11**	**255**	**314**	ND	ND	193	282
Mineral Lake (into Station Creek)	**0**	ND	**196**	**259**	**104**	**145**	**49**	**15**	**252**	**101**	**99**	112	125
Other Tanana	7,943	4,822	9,021	7,170	8,564	6,626	2,460	3,493	9,611	2,510	3,741	4,940	6,222
Total Tanana catch	13,672	19,524	15,293	14,651	14,743	12,450	11,807	6,898	16,880	7,312	7,238	11,069	13,323

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: Although data are presented for all years, data in bold result from fewer than 12 respondents and are subject to high variance and as presented only indicate that sport fishing occurred in these waters. ND = no data.

[a] In 2019 Minto Lakes was added as a location to the SWHS.

[b] Includes Minto Lakes, Lower Chatanika River, Tolovana River, and Goldstream Creek.

Table 12.–Number of subsistence permits issued, reported fished, and total subsistence harvest of northern pike in the Tolovana River drainage, 1994–2022.

Year	Permits		Total harvest
	Issued	Fished	
1994	48	52%	1,193
1995	57	53%	1,088
1996	74	41%	1,916
1997	88	47%	1,344
1998	70	44%	431
1999	54	43%	400
2000	34	35%	352
2001	50	36%	277
2002	32	41%	521
2003	119	46%	966
2004	99	42%	393
2005	80	39%	386
2006	101	54%	865
2007	118	47%	1,837
2008	147	54%	1,363
2009	113	46%	563
2010	96	43%	125
2011	70	41%	110
2012	73	48%	525
2013	77	57%	231
2014	106	54%	478
2015	120	55%	765
2016	201	64%	1,020
2017	93	44%	137
2018	175	59%	1,040
2019	245	63%	1,633
2020	329	58%	2,005
2021	425	63%	3,092
2022 [a]	332	49%	1,259
5-year Average 2017–2021	253	57%	1,581
10-year Average 2012–2021	184	56%	1,093

Source: Ransbury and Gleason 2022.

[a] Preliminary data based on inseason reporting and returned permits. Permits are due January 10, 2023.

Table 13.–Estimated northern pike abundance in the Minto Lakes Study Area during 1996–2018, and with the Chatanika River Overwintering Area (CROA) in 2018.

		≥16 in TL (400 mm FL) [a]		≥24 in TL (600mm FL)		≥30 in TL (720 mm FL)	
Year	Area	Abundance	SE	Abundance	SE	Abundance	SE
1996	MSLA-B	23,850	7,799	7,616	883	–	–
1997		16,547	1,754	3,251	174	672	48
2000	MSLA-B	–	–	5,331	1,152	–	–
2003	MSLA-B	25,227	4,529	7,683	2,347	1,405	288
2008[b]	MSLA-A	16,045	3,132	2,219	397	958	362
	MSLA-B	9,854	1,701	2,092	448	635	635
2018	CROA	–	–	14,675	1,631	3,207	549
	MSLA-A	–	–	11,443	1,651	–	–

Source: Roach 1997, 1998b; Scanlon 2001, 2006; Joy 2009; Albert and Tyers 2020)

Note: SE = standard error.

[a] Estimated abundance of northern pike 16–24 in TL (400–599 mm FL) are biased, and the magnitude of this is unknown.

[b] In 2008, the geographical size of the study area was expanded and is referred to as "Area-A". "Area-B" is the same study area that was used during 1996–2003.

Table 14.–Estimated sport fishing effort (angler-days), lake trout harvest and catch, total lake trout fishing mortality, and regulations in Fielding Lake, 1981–2018.

Year	Respondents[a]	Effort[b]	Harvest	Catch	Total fishing mortality[c]	Regulations
1981	48	1,369	295	–	–	- 10 fish bag and possession limit, only 2 fish larger than 20-inches - setlines permited
1982	56	2,764	364	–	–	
1983	36	1,737	294	–	–	
1984	16	871	169	–	–	
1985	14	1,023	347	–	–	- 10 fish bag and possession limit, only 2 fish larger than 20-inches - setlines prohibitted - bait allowed
1986	25	1,682	136	–	–	
1987	12	1,032	127	–	–	
1988	21	1,728	364	–	–	
1989	37	1,664	195	–	–	- 2 fish bag and possession limit, 18-inch minimum size limit - setlines prohibitted - bait allowed
1990	33	1,255	186	321	200	
1991	34	1,572	295	870	353	
1992	41	1,910	170	247	178	
1993	41	1,827	276	939	342	
1994	40	2,129	52	213	68	- 1 fish bag and possession limit, 22-inch minimum size - setlines prohibitted - bait allowed
1995	46	3,575	44	486	88	
1996	23	960	42	260	64	
1997	23	1,259	55	270	77	
1998	25	1,601	19	300	47	
1999	25	1,154	43	279	67	
2000	20	827	18	221	38	
2001	17	525	12	106	21	- Open season, 1 Oct–31 Aug - 1 fish bag and possession limit, 26-inch minimum size - setlines prohibitted - bait allowed - single-hook only
2002	18	826	0	137	14	
2003	17	840	83	423	117	
2004	15	1,010	101	520	143	
2005	17	1,248	112	862	187	
2006	16	1,065	108	634	161	
2007	16	1,139	40	227	59	- Open season, 1 Oct–31 Aug - 1 fish bag and possession limit, 26-inch minimum size - setlines prohibitted - bait prohibitted - single-hook artificial lures only
2008	17	1,203	7	103	17	
2009	15	788	357	1,211	442	
2010	20	1,548	48	309	74	
2011	7	422	2	12	3	
2012	14	1,163	64	299	88	
2013	9	1,545	161	335	178	
2014	9	714	0	145	15	
2015	15	1,732	32	291	58	
2016	14	992	21	117	31	
2017	10	1,108	29	286	55	
2018	8	551	0	165	17	
2019	7	805	0	134	13	
2020	10	726	0	315	32	
2021	7	595	0	220	22	
2011–2020 Average	10	976	31	267	49	

[a] Estimates based on fewer than 12 respondents are only used to document that sport fishing occurred; estimates based on 12–29 respondents can be useful in indicating relative orders of magnitude and for assessing long term trends; and, estimates based on 30 or more respondents are generally representative of levels of effort, catch, and harvest.

[b] Sport fishing effort is measured in number of days fished and is not apportioned by species.

[c] Total fishing mortality accounts for catch and release mortality and equals Harvest +10% of the Catch after harvest has been accounted for.

Table 15.–Contribution of stocked fish to the Tanana River drainage total effort, harvest, and catch, 2011–2021.

	Year											5-year Average 2016–2020	10-year Average 2011–2020
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
Effort													
Effort on stocked waters	24,776	25,885	29,722	44,830	32,125	29,465	25,474	27,840	25,168	28,663	31,204	27,128	28,025
Total TRMA effort (stocked + wild)	67,378	69,691	85,301	96,140	76,241	71,055	66,897	65,361	63,305	59,981	65,721	65,320	72,127
Percent stocked waters effort	37%	37%	35%	47%	42%	41%	38%	43%	40%	48%	47%	42%	39%
Harvest													
Rainbow trout	7,663	6,069	9,067	10,254	22,086	18,834	11,082	9540	12446	13,706	16,279	13,122	12,075
Landlocked salmon	1,227	800	1,179	4,126	1,753	7,980	3,655	2,018	1,234	3,019	1,477	3,581	2,699
Arctic grayling	181	243	182	955	538	983	82	311	156	86	534	324	372
Arctic char	1,178	528	620	846	473	2,373	927	1100	533	687	170	1,124	927
Lake trout	0	32	43	25	80	0	0	57	63	0	0	24	30
Other	0	84	0	0	213	0	30	256	0	0	0	57	58
Total stocked fish harvest	10,249	7,756	11,091	16,206	25,143	30,170	15,776	13,282	14,432	17,498	18,460	18,232	16,160
Total TRMA harvest (stocked + wild)	19,348	16,847	22,351	28,907	34,919	41,459	24,053	20,016	21,780	23,063	23,100	26,074	25,274
Percent stocked waters harvest	53%	46%	50%	56%	72%	73%	66%	66%	66%	76%	80%	69%	62%
Catch													
Rainbow trout	35,547	31,385	31,462	37,250	60,442	45,812	29,218	28,255	41,591	50,574	47,655	39,090	39,154
Landlocked salmon	2,980	5,189	3,947	14,589	3,323	19,280	8,642	7,696	8,824	12,382	5,790	11,365	8,685
Arctic grayling	6,938	7,042	7,415	8,211	4,662	5,498	3,934	4,139	9,249	3,048	6,560	5,174	6,012
Arctic char	4,000	3,010	3,839	2,570	2,325	5,745	1,482	2,389	2,677	5,839	1,409	3,626	3,388
Lake trout	497	79	43	25	300	0	0	84	75	169	80	66	127
Other	0	84	0	48	384	0	30	892	0	0	0	184	144
Total stocked fish catch	49,962	46,789	46,706	62,693	71,436	76,335	43,306	43,455	62,416	72,012	61,494	59,505	57,509
Total TRMA catch (stocked + wild)	154,977	158,739	212,200	191,389	204,522	191,092	163,608	137,339	200,896	143,686	141,223	167,324	175,842
Percent stocked waters catch	32%	29%	22%	33%	35%	40%	26%	32%	31%	50%	44%	35%	33%

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 10, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

Note: The numbers presented in this table may vary slightly from year to year. Estimates of catch, harvest, and effort on stocked waters were generated using separate annual data exports form the ADF&G Statewide Harvest Survey Database (https://intra.sf.adfg.state.ak.us/swhs_est/presearch.cfm). Estimates in this database are often revised and summaries compiled from more recent data exports may be slightly different. Additionally, occasionally errors in previous year's estimates are found and corrected.

APPENDIX A:
CROSS REFERENCING BOARD OF FISHERIES INFORMATION

Appendix A1.–References to information specific to 2023 Alaska Board of Fisheries proposals.

Proposal	Proposal subject	Table	Figure	Appendix
63	Establish annual bag limit of 20 northern pike and modify daily bag limit of fish greater than 30 inches in the Chatanika Harvest Area	2, 11, 12, 13	3, 5	B3
64	Modify daily bag limit to require retention of the first 10 fish caught and length limit for northern pike in the Chatanika Harvest Area	2, 11, 12, 13	3, 5	B3
65	Require retention of sport caught salmon, if removed from the water, in the Tanana River Area	3, 4, 5, 6	2, 3	B1, B2, B3
66	Allow a catch-and-release fishery for northern pike in Harding Lake	2, 11	3	
67	Prohibit retention of northern pike caught on set lines in the Tanana River drainage	2, 11	2, 3	
68	Repeal the set line prohibition and bag and possession limit for burbot in T Lake	2, 16	2	
69	Close the catch-and-release fishery for Arctic grayling in the Lower Chena River and its tributaries, including Badger Slough from April 1 through May 15	2, 8, 9, 10	3	
70	Establish a bag and possession limit of 1 Arctic grayling, with no size limit, in the Lower Chena River and its tributaries, including Badger Slough, downstream of Moose Creek Dam to the Tanana River between June 1 and March 31	2, 8, 9, 10	3	
71	Remove the size limit for lake trout in Fielding Lake	2, 19	2	
72	Allow for catch-and-release fishing in Bathing Beauty Pond, Bear Lake, Moose Lake, Polaris Lake, Piledriver Slough, and Moose Creek	2, 20	3	
73	Update the list of stocked waters in regulation and add lake trout to stocked species with modified bag and possession limits	2, 20	2, 3	
74	Update the Tanana River Area Stocked Waters management plan to include lake trout	2, 20	2, 3	

APPENDIX B:
2010–2022 CHINOOK SALMON HARVEST AND ESCAPEMENT INFORMATION AND EMERGENCY ORDERS

Appendix B1.–Commercial, subsistence, and sport harvest of Chinook salmon in the Alaska portion of the Yukon River drainage, 2003–2021.

	Tanana River			Yukon River without Tanana			Total Alaska Yukon River		
Year	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
2003	1,813	2,145	2,153	39,305	54,814	566	41,118	56,959	566
2004	2,057	1,388	1,319	54,886	54,325	194	56,943	55,713	194
2005	453	1,828	483	31,886	51,581	0	32,339	53,409	0
2006	84	1,229	638	46,562	47,364	101	46,646	48,593	101
2007	281	1,717	549	34,202	53,457	411	34,483	55,174	411
2008	0	605	254	4,641	44,581	155	4,641	45,186	155
2009	0	1,285	836	316	32,520	27	316	33,805	27
2010	0	1,143	313	9,897	43,416	161	9,897	44,559	161
2011	0	1,367	372	82	39,613	102	82	40,980	102
2012	0	627	114	0	29,788	231	0	30,415	231
2013	0	367	11	0	12,166	155	0	12,533	155
2014	0	283	0	0	3,003	0	0	3,286	0
2015	0	440	13	0	7,137	0	0	7,577	0
2016	0	816	20	0	20,811	0	0	21,627	0
2017	0	778	18	168	37,258	0	168	38,036	0
2018	0	615	200	0	31,197	0	0	31,812	200
2019	0	597	19	3,110	47,782	19	3,110	48,379	38
2020	0	453	49	0	22,215	0	0	22,668	49
2021	0	7	0	0	1,995	0	0	2,002	0
Average									
2011–2020	0	634	82	336	25,097	51	336	25,731	78
2016–2020	0	652	61	656	31,853	4	656	32,504	57

Source: Commercial and subsistence harvest data from JTC (2022); sport harvest data from Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 23, 2022). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Appendix B2.–Season totals of salmon counted at Pilot Station and Eagle sonars during 2003–2022.

	Pilot Station Sonar					Eagle Sonar	
Year	Chinook	Summer chum	Fall chum	Coho	Pink	Chinook	Fall chum
2003	318,088	1,183,009	923,540	280,552	11,370	–	–
2004	200,761	1,344,213	633,368	207,844	399,339	–	–
2005	259,015	2,570,696	1,893,688	194,372	61,091	81,528	–
2006	228,763	3,780,760	964,238	163,889	183,006	73,691	245,290
2007	170,246	1,875,491	740,195	192,406	126,282	41,697	265,008
2008	175,046	1,849,553	636,525	145,378	580,127	38,097	185,409
2009	177,796	1,477,186	274,227	240,779	34,529	69,957	101,734
2010	145,088	1,415,027	458,103	177,724	917,731	35,074	132,930
2011	148,797	2,051,501	873,877	149,533	9,754	51,271	224,355
2012	127,555	2,136,476	778,158	130,734	420,344	34,747	153,248
2013	136,805	2,849,683	865,295	110,515	6,126	30,725	216,791
2014	163,895	2,020,309	706,630	283,421	679,126	63,482	172,887
2015	146,859	1,591,505	669,483	121,193	39,690	84,015	125,095
2016	176,898	1,921,748	994,760	168,297	1,364,849	72,329	161,027
2017	263,014	3,093,735	1,829,931	166,320	166,529	73,313	419,099
2018	161,831	1,612,688	928,664	136,347	689,607	57,893	168,798
2019	219,624	1,402,925	842,041	86,401	42,353	45,560	113,256
2020	162,252	692,602	262,439	107,680	207,942	33,550	23,512
2021	124,845	153,718	146,197	37,255	22,181	31,796	23,170
2022[a]	44,581	437,032	236,953	92,101	151,737	12,025	22,075

Source: JTC 2022.

[a] Numbers are preliminary.

Appendix B3.–Emergency orders issued for Tanana River Management Area sport fisheries, 2021–2022.

Year	Emergency Order number	Explanation
2021	3-R-U-01-21	Extended the provisions of Emergency Orders 3-R-U-01-20, 3-R-U-02-20, 3-R-U-03-20, and 3-R-U-02-20 closing Kimberly Lake to sport fishing and restricting Bear, Moose and Polaris Lakes and Bathing Beauty Pond to catch-and-release fishing for all fish species effective 12:01 AM, Wednesday, January 27, 2021.
	3-R-U-02-21	Restricted Pile Driver Slough and Moose Creek to catch-and-release fishing for all fish species effective 12:01 AM, Thursday, April 1, 2021.
	3-NP-U-01-21	Reduced the bag and possession limit for northern pike in all lakes and flowing waters of the Minto Flats area to 2 fish, only 1 of which may be 30 in or greater in length, effective, 12:01 AM, Tuesday, June 1, 2021.
	3-KS-U-05-21	Closed all waters of the Tanana River drainage to sport fishing for Chinook salmon effective 12:01 AM, Thursday, June 24, 2021.
	3-CS-U-02-21	Closed all waters of the Tanana River drainage to sport fishing for chum salmon effective 12:01 AM, Thursday, July 1, 2021.
	3-SS-U-02-21	Rescinded 3-CS-U-02-21 and closed all waters of the Tanana River drainage to sport fishing for chum and coho salmon effective 12:01 AM, Thursday, August 26, 2021.
2022	3-R-U-01-22	Rescinded 3-R-U-01-21 and 3-R-U-02-21, closed Kimberley Lake to sport fishing, and restricted Bear, Moose, and Polaris Lakes, Bathing Beauty Pond, Piledriver Slough, and Moose Creek to catch-and-release fishing for all fish species effective 12:01 AM, Friday, February 11, 2022.
	3-NP-U-03-22	Reduced the bag and possession limit for northern pike in all lakes and flowing waters of the Minto Flats area to 2 fish, only 1 of which may be 30 in or greater in length, effective, 12:01 AM, Wednesday, June 1, 2022.
	3-CS-U-12-22	Closed all waters of the Tanana River drainage to sport fishing for chum salmon effective 12:01 AM, Monday, June 20, 2022.
	3-KS-U-13-22	Closed all waters of the Tanana River drainage to sport fishing for Chinook salmon effective 12:01 AM, Monday, June 20, 2022.
	3-SS-U-25-22	Closed all waters of the Tanana River drainage to sport fishing for chum and coho salmon effective 12:01 AM, Thursday, September 8, 2019.