

Fishery Management Report No. 08-56

**Fishery Management Report for Sport Fisheries in the
Upper Tanana River Drainage in 2006**

by

James F. Parker

December 2008

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye to fork	MEF
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	mid-eye to tail fork	METF
hectare	ha	at	@	standard length	SL
kilogram	kg	compass directions:		total length	TL
kilometer	km	east	E		
liter	L	north	N	Mathematics, statistics	
meter	m	south	S	<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	west	W	alternate hypothesis	H _A
millimeter	mm	copyright	©	base of natural logarithm	<i>e</i>
		corporate suffixes:		catch per unit effort	CPUE
Weights and measures (English)		Company	Co.	coefficient of variation	CV
cubic feet per second	ft ³ /s	Corporation	Corp.	common test statistics	(F, t, χ^2 , etc.)
foot	ft	Incorporated	Inc.	confidence interval	CI
gallon	gal	Limited	Ltd.	correlation coefficient (multiple)	R
inch	in	District of Columbia	D.C.	correlation coefficient (simple)	r
mile	mi	et alii (and others)	et al.	covariance	cov
nautical mile	nmi	et cetera (and so forth)	etc.	degree (angular)	°
ounce	oz	exempli gratia	e.g.	degrees of freedom	df
pound	lb	(for example)		expected value	<i>E</i>
quart	qt	Federal Information Code	FIC	greater than	>
yard	yd	id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
Time and temperature		monetary symbols		less than	<
day	d	(U.S.)	\$, ¢	less than or equal to	≤
degrees Celsius	°C	months (tables and figures): first three letters	Jan,...,Dec	logarithm (natural)	ln
degrees Fahrenheit	°F	registered trademark	®	logarithm (base 10)	log
degrees kelvin	K	trademark	™	logarithm (specify base)	log ₂ , etc.
hour	h	United States (adjective)	U.S.	minute (angular)	'
hour	h	United States of America (noun)	USA	not significant	NS
minute	min	U.S.C.	United States Code	null hypothesis	H ₀
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	percent	%
				probability	P
Physics and chemistry				probability of a type I error (rejection of the null hypothesis when true)	α
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	β
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			variance	
hertz	Hz			population	Var
horsepower	hp			sample	var
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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UPPER TANANA RIVER DRAINAGE IN 2006**

by

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December 2008

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

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PREFACE

This report provides information for the Upper Tanana Management Area (UTMA) and is one in a series of reports annually updating fisheries management information within Region III. The report is provided for the state Board of Fisheries, Fish and Game Advisory Committees, the general public, and other interested parties. It presents fisheries assessment information and the management strategies that are developed from that information. In addition, this report includes a description of the fisheries regulatory process, the geographic, administrative, and regulatory boundaries, funding sources, and other information concerning Sport Fish Division management programs within the area.

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

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

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

This area management report provides information regarding the Upper Tanana Management Area and its fisheries for 2006, with preliminary information from the 2007 season. This report is organized into two primary sections: a management area overview including a description of the management area and a summary of effort, harvest and catch for the area; and a section on the significant area fisheries including specific harvest and catch by species and drainage.

ABSTRACT

This document provides a wide array of information regarding the recreational angling opportunities that exist within Region III, specifically those within the Upper Tanana Management Area. Summaries of major fisheries within the area are detailed, including descriptions of recent performances, Alaska Board of Fisheries regulatory actions (with emphasis on proposals adopted by the Board of Fisheries at the February 2007 meeting), social and biological issues, and descriptions of ongoing research and management activities, and fish stocking information within the Upper Tanana River Management Area.

Key Words: Tanana River, Upper Tanana River Management Area, Delta River, Delta Clearwater River, Goodpaster River, Tangle Lake system, Fielding Lake, sport fisheries, commercial, subsistence, coho salmon, king salmon, burbot, lake trout, Arctic grayling, northern pike, stocked waters, Area Management Report.

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into eighteen regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47–70. The Division of Sport Fish within the Alaska Department of Fish and Game (ADF&G) divides the state into three administrative Regions with boundaries roughly corresponding to groups of the BOF regulatory areas. Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River drainage, Cook Inlet-Resurrection Bay Saltwater, Anchorage Bowl, Knik Arm, Susitna River drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes Upper Copper River and Upper Susitna River area and the Arctic-Yukon-Kuskokwim Region (including the North Slope, Northwestern, Yukon River, Tanana River, Kuskokwim-Goodnews regulatory areas).

Region III is the largest geographic region, encompassing the majority of the landmass of the State of Alaska (Figure 1). The region contains over 1,146,000 km² (442,500 mi²) of land, some of the state's largest river systems (the Yukon, the Kuskokwim, the Colville, Noatak, Upper Copper and Upper Susitna River drainages) thousands of lakes and thousands of miles of coastline and streams. Regional coastline boundaries extend from Cape Newenham in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River Valley. Fairbanks (population about 30,000) is the largest community.

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

The Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);

The Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);

The Upper Copper/Upper Susitna Management Area (the Copper River drainage upstream of Canyon Creek and Haley Creek, and the Susitna River drainage above the Oshetna River);

The Upper Tanana River Management Area (the Tanana River drainage upstream from Banner Creek and the Little Delta River; Figure 2);

The Lower Tanana River Management Area (the Tanana River drainage downstream from Banner Creek and the Little Delta River; Figure 2); and,

The Kuskokwim Management Area (the entire Kuskokwim River drainage and Kuskokwim Bay drainages).

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

THE ALASKA BOARD OF FISHERIES

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

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

ADVISORY COMMITTEES

Local Fish and Game Advisory Committees have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes. Advisory committee members are nominated from the local public and voted on by all present during an advisory committee meeting. Most active committees in urban areas meet in the fall and winter on a monthly basis. Rural committees generally have only one fall and one spring meeting due to funding constraints. Advisory meetings allow opportunity for direct public interaction with department staff attending the meetings that answer questions and provide clarification concerning proposed regulatory changes regarding resource issues of local and statewide concerns. The Boards Support Section within the Division of Administration provides administrative and logistical support for the BOF and Fish and Game Advisory Committees. During 2006, the department had direct support responsibilities for 81 advisory committees in the state.

Within the Upper Tanana Management Area there are two advisory committees, the Delta and Upper Tanana/Forty Mile committees. In addition, the Paxson and Fairbanks advisory committees often comment on proposals concerning Upper Tanana Area fisheries.

RECENT BOARD OF FISHERIES ACTIONS

The BOF meets annually, but deliberates on each individual regulatory area on a 3-year cycle, most recently for the Upper Tanana Area in February 2007.

Fifty-five proposals regarding changes to the AYK subsistence, commercial, personal use, and sport fishing regulations were addressed by the BOF during the 2007 meeting, eighteen of which were directed at sport fisheries in the Tanana River drainage, nine specific to the UTMA fisheries. Five proposals were adopted by the BOF relating to the UTMA including; a no bait restriction for Fielding Lake, expanding the harvest dates for Arctic grayling on the Delta Clearwater River, removing the minimum size limit for lake trout in the Tangle Lakes System, modifying the bag limit in Koole Lake (stocked lake), and allowing catch-and-release (C&R) fishing for king salmon in the Goodpaster River. In addition, a Lake Trout Management Plan was adopted for the all of the AYK Region.

In 2003-2004 BOF actions added two regulatory plans one for the stocked waters and another for Arctic grayling in the AYK Region. Under the *Wild Arctic Grayling Management Plan* (5 AAC 70.055) the Delta Clearwater River was classified as a special management water. Under the *Arctic-Yukon-Kuskokwim Region Stocked Waters Management Plan* (5 AAC 70.065) UTMA stocked lakes, specifically Monte, Donnelly, and Rainbow lakes were classified under the special management approach (bag limit of 1 fish over 18 inches).

In January 2001, the BOF increased the minimum size limit of lake trout in Fielding Lake to 26 inches, established a spawning closure during September, and added a single-hook restriction. The no-bait restriction adopted in 2007 is consistent with the Lake Trout Management Plan to reduce hooking mortality of intentionally released lake trout (Parker 2006a). A proposal before the BOF in 2004 failed to establish a C&R fishery for king salmon on the Goodpaster River (Parker 2007) however, in 2007 a similar proposal passed and the opportunity to catch a king salmon in the first 25 miles of the river is now available.

ADF&G EMERGENCY ORDER AUTHORITY

ADF&G has emergency order (EO) authority (5 AAC 75.003, 2006) to modify time, area, and bag/possession limit regulations. Emergency orders are implemented to deal with conservation issues that are not adequately controlled by existing regulations. Once implemented, an EO deals with the situation until it is resolved or the BOF can formally take up the issue. Emergency orders are also used as a tool for “in-season” management of fisheries. In-season management is usually in accordance with a fisheries management plan approved by the BOF. There were no Emergency orders issued under this authority for the UTMA during 2006-2007.

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for rural residents on lands and waters for which the federal government asserts jurisdiction. The state of Alaska also has established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258), but cannot discriminate between residents (Alaska State Constitution Article VIII, sections 3 and 15). Since the state did not amend the Alaska Constitution to conform to federal regulations, the federal government has asserted authority to ensure a priority subsistence use of fish and game for rural residents on

federal lands and certain adjacent waters. On October 1, 1999 the federal government asserted management responsibilities for subsistence fisheries on federal public lands (includes non-navigable waters on public lands). Following the “Katie John” decision by the 9th Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which the federal agencies assert reserved water rights. Under current practice, the federal land management agencies assert management to protect the priority subsistence use by qualified rural residents in non-navigable waters within federal public lands (includes Bureau of Land Management (BLM) lands) and in navigable waters adjacent to or within federal conservation units (generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land.

The development of regulations for subsistence fisheries under federal management occurs within the established Federal Subsistence Board (FSB) process. The public provides their input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council meetings or by becoming council members. Ten Regional Advisory Councils have been established throughout Alaska to assist the FSB in determining local subsistence issues and providing recommendations on proposed fishing and hunting regulations on the fish and game populations under consideration. Each Regional Council meets twice a year, and subsistence users and other members of the public can comment on subsistence issues at these meetings.

Within the UTMA the subsistence fisheries under federal management include those in the 1) Tetlin Refuge (730,000 acres; Figure 3) which includes much of the Nebesna and Chisana rivers; 2) Delta River Wild and Scenic River Corridor (37,000 acres, 62 river miles); 3) the Tangle Lakes Archaeological District (460,000 acres); and, 4) the headwaters of the Chisana and Nabesna rivers are within the Wrangell-St. Elias National Preserve adjacent to the Tetlin National Refuge. The UTMA fisheries fall under the purview of the Eastern Interior Regional Advisory Council. The most recent meeting was held in March 2007 in Arctic Village. At this meeting, five federal fisheries proposals for the Eastern Interior unit were addressed and council recommendations were forwarded to the Federal Subsistence Board.

REGION III SPORT FISH DIVISION RESEARCH AND MANAGEMENT STAFFING

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

The research group consists of a research supervisor, a salmon research supervisor, a resident species supervisor, research biologists, and various field technicians. The research biologists plan and implement fisheries research projects in order to provide information needed by the

management group to meet divisional goals. The duties of the management and research biologists augment one another.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001a-d, Walker et al. 2003, Jennings et al. 2004, 2006a-b, *in prep a-b*). The survey is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. Two types of questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or non-resident). Information gathered from the survey includes participation (number of anglers, trips, and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaskan waters as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. The survey results for each year are not available until the following year; hence the results for 2006 were not available until fall 2007. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or in-season management.

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

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

SECTION I: MANAGEMENT AREA OVERVIEW

The Tanana River flows in a generally northwest direction for 917 km (Figure 2). Management of the Tanana River drainage is split into the Upper Tanana and Lower Tanana (LTMA) management areas because of the intensive effort and high sport fishery exploitation levels in this region of Interior Alaska.

UPPER TANANA RIVER MANAGEMENT AREA DESCRIPTION

The boundary between the Lower Tanana Area and the Upper Tanana Management Area is at Milepost 295 Richardson Highway (Figure 3). The Upper Tanana Management Area is defined by the Matanuska-Susitna, Denali, and Fairbanks North Star borough boundaries on the west, the Alaska portion of the White River to the east, and the Tangle Lakes System (Delta River) along the Denali Highway and the headwaters of the Nabesna River at the end of the Nabesna Road to the south. Communities located within the Upper Tanana River drainage are Big Delta, Delta Junction, Fort Greely, Dot Lake, Tanacross, Mansfield, Tok, Tetlin, Northway, and Nabesna. The UTMA affords unique fishing opportunities from lake trout fisheries in the high elevation lakes found along the Denali Highway to one of the few known Dolly Varden populations in the Tanana River drainage in the streams along the Tok Cutoff. In addition, numerous spring-fed waters near Delta Junction provide critical habitat for the largest known coho salmon spawning concentrations in the Yukon River drainage. Because spring-fed systems do not freeze, spawning coho provide the latest open-water fishing opportunity in the region. These spring-fed streams are also important to Arctic grayling fisheries in the area. Following spawning in adjacent streams in June, adult Arctic grayling migrate to feed in these spring-fed waters, attracted to the abundant aquatic invertebrates present. These Arctic grayling are larger than fish found in other area systems and attract anglers to the Delta Clearwater and Richardson Clearwater rivers.

Within the UTMA, the Tanana River from its confluence with the Gerstle River to the Little Delta River is crucial habitat for returning fall chum salmon. Alluvial aquifers associated with porous floodplain gravels store water and stabilize winter flows in this area near Delta Junction. All the large aquifers are located on the south side of the Tanana River. Groundwater seeps into the Tanana River, provide spawning habitat for fall chum and coho salmon, which are the last salmon species to spawn during the year.

FISHERY RESOURCES

There are 17 fish species known to inhabit the rivers and lakes of the UTMA, of which ten are commonly targeted by sport anglers. They include: Chinook (king) salmon *Oncorhynchus tshawytscha*, coho salmon *Oncorhynchus kisutch*, chum salmon *Oncorhynchus keta*, Arctic grayling *Thymallus arcticus*, burbot *Lota lota*, lake trout *Salvelinus namaycush*, Dolly Varden *Salvelinus malma*, round whitefish *Coregonus cylindraceum*, least cisco *Coregonus sardinella*, humpback whitefish *Coregonus pidschian*, and northern pike *Esox lucius*. Rainbow trout

Oncorhynchus mykiss are not native to the drainage, but have been stocked in numerous lakes. Arctic char *Salvelinus alpinus*, coho salmon, Arctic grayling and lake trout have also been stocked in select lakes of the UTMA.

COMMERCIAL SALMON HARVESTS

Most of the commercial harvest of salmon occurs outside of the Tanana River portion of the Yukon River drainage (Table 1). In 2006 a total of 377,429 salmon (all species) were harvested in the Yukon River drainage (including the Tanana River portion). The fall chum and coho salmon runs continue to recover from the very poor runs in 2000 and 2001 and were strong in 2006. The commercial harvest of 174,542 fall chum salmon was the second largest landing since 1995 and the harvest 64,942 coho salmon was the largest landing since 1991 (Bue 2007).

Tanana River stocks of chum, king, and coho salmon provide modest commercial fisheries in the Tanana River District (Y6). The primary focus of the commercial fishery is on fall chum salmon but management seeks to balance impacts on both fall chum and the smaller coho salmon stocks. Commercial fishery management has established a biological escapement goal (BEG) of 46,000 to 103,000 fall chum salmon for the Upper Tanana drainage (upstream of the Kantishna drainage). Overlapping run timing of fall chum and coho salmon together with market forces allowed only a modest harvest of 11,137 coho salmon in the Tanana River (Table 1) compared with over 21,000 fish the previous year (Parker 2006a). In recent years as a result of large returns, coho salmon were increasingly targeted by commercial and subsistence fisheries.

SUBSISTENCE AND PERSONAL USE SALMON HARVESTS

Subsistence salmon fishing occurs in the Yukon River, while subsistence and personal use salmon fishing occurs in the Tanana River (personal use fishing occurs only in the Fairbanks non-subsistence area). In 2006, the estimated subsistence and personal use salmon harvest in the Tanana River was 30,698 fish or 11.4% of the Yukon River total salmon harvest (subsistence and personal use; Table 2). In 2006, the number of coho salmon caught in the Tanana River subsistence and personal use fisheries was 10,850 fish or 54.3% of the total Yukon coho harvest and 4.0% of all species caught in the Yukon River total salmon harvest (Table 2). Subsistence fishing is closed in the Tanana River within the Fairbanks non-subsistence area (5 AAC 99.015, 1993). In the non-subsistence area, however, salmon can be taken under the authority of a personal use permit. The BOF in 1994 closed the Delta River to all forms of fishing including subsistence spearing for chum salmon carcasses, citing that the spawning area should be left undisturbed. Subsistence fishing occurs in the UTMA upstream of the Johnson River on the south side of the Tanana River and upstream of the Volkmar River on the north side of the Tanana River. Most of the subsistence catches occur on freshwater resident species such as whitefish in communities such as Dot Lake, Tanacross, and Northway.

CHINOOK (KING) SALMON

The farthest upriver system in the Tanana River drainage in which significant king salmon spawning occurs is the Goodpaster River. Teck-Pogo Inc., a mining corporation working within the Goodpaster River drainage conducted aerial surveys beginning in 1998-2003 as part of environmental assessment studies. Starting in 2004, Teck-Pogo Inc. contracted Tanana Chiefs

Conference (TCC) to monitor the Goodpaster River king salmon escapement for 20 years. TCC operated a counting tower on the North Fork Goodpaster River from July 1 to July 31, 2007. A preliminary estimate of total passage is 1,113 king salmon (Table 3; Mike Smith, Fisheries Biologist, Tanana Chiefs Conference, Fairbanks; personal communication). In 2007, the BOF adopted a proposal to allow catch-and-release fishing in the first 25 miles of river.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the UTMA are found in 5 AAC 70.001 through 5 AAC 70.006, 5 AAC 70.015, and 5 AAC 70.030 (sport fishing), 5 AAC 77.001 through 5 AAC 77.190 (personal use), and 5 AAC 01.200 through 5 AAC 01.249 (subsistence fishing). Management plans concerning specific sport fisheries that are in regulation are: the *AYK Region Wild Lake Trout Management Plan* (5 AAC 70.040), the *Wild Arctic Grayling Management Plan* (5 AAC 70.055) and the *AYK Region Stocked Waters Management Plan* (5AAC 70.065).

Management plans not in regulation but used as annual planning and evaluation tools by the management staff are in place for significant fisheries. Each January the management staff discusses the trends and objectives of each fishery and any management actions or research needs based upon these plans. The Upper Tanana Management Area plans and the date finalized are as follows:

1. Quartz Lake Stocked Lake Sport fishery, June 1992, *draft revision March 2005*;
2. Delta Clearwater River Coho salmon fishery, *draft revision March 2007*;
3. Upper Tanana Northern pike sport fishery, *draft revision March 2007*;
4. Upper Tanana Arctic Grayling sport fishery, June 1993, *revised November 2002*;
5. Fielding Lake sport fishery, *draft revision March 2007*; and,
6. Tanana River Burbot sport fishery, June 1993.

MAJOR ISSUES

GROUND-BASED MIDCOURSE MISSILE DEFENSE

The Ground-based Midcourse Missile Defense (GMD) Test and Evaluation (T&E) program began construction in August of 2001. The test-bed was operational in December 2004. Further construction including additional missile silos will be phased in over the next few years as the program continues to expand. In 2007, two additional missile beds were installed. Construction of the project employs several hundred personnel and has relocated Army national guardsmen to Fort Greely to operate the GMD. This has led to an expansion of recreational use, especially fishing on stocked lakes in the Fort Greely area. Currently the Sport Fish Division is stocking additional catchable size fish into the Fort Greely lakes along Meadows Road. This strategy appears to be working as fishing pressure is contained closer to the work project. Heavy use of the lakes has occurred from 2004 to 2007 (Jeff Mason, LCTA Coordinator - Donnelly Training Area, USARMY, Delta Junction, personal communication).

ENVIRONMENTAL ASSESSMENT “RANGE EXPANSION PROJECTS DONNELLY TRAINING AREA, ALASKA”

U.S. Army Alaska (USARAK) is constructing a combined arms collective training facility (CACTF), a battle area complex (BAX), and a collective training range (CTR) at the Donnelly training area. During the Environmental Impact Study ADF&G opposed an option that would select the Meadow Road (Texas Range) as a construction/training facility site. ADF&G stocks 14 lakes in this area and these fishing sites are popular with civilian and military anglers. In 2007, extensive excavation and construction occurred within the general Eddy Drop zone study area (CACTF and BAX). The construction closed the 33-mile Loop Road, a trail normally used to access the upper Jarvis Creek area which includes a lake stocked by ADF&G (Kenna Lake). Alternate trails around the CACTF area are developing allowing recreational use of the area. For the time being public access to Meadows Road stocked lakes is preserved. These lakes are important recreational opportunities to the public and especially to the army, missile defense, and construction workers.

STATE LAND SELECTION-DENALI BLOCK/TANGLE LAKES AREA

The Denali Block is the unofficial name given to about five million acres of largely federal land along the Denali Highway between Paxson and Cantwell. In 2003, BLM conveyed to the State of Alaska a 235,000 acre block in the Tangle Lake region, an area north of the Denali Highway between miles 12 and 41. In 2004 the State of Alaska selected a second block of land (117,337 acres) which is located east and west of the Susitna River. The conveyance process for the second block will be completed by 2009. There has been a great deal of mineral exploration in this area in recent years. These explorations have shown the potential for a significant deposit of rare minerals of the platinum group. This area includes the Tangle Lake System which is rich in sport fishing opportunity and annually averages 5,000 angler-days of use. The Delta River National Wild Scenic River Corridor is excluded from the state's conveyance and will continue to be managed by BLM. State of Alaska Department of Natural Resources (DNR) will establish a special-use area over the portions of the Archaeological District to protect the historical and recreational value. DNR will eliminate conflict with property rights to the minerals and surface disturbance. DNR will also afford the same protections that BLM provided for the use of off-road vehicles in the area. BLM and ADF&G are planning a cooperative research project in the near future to establish baseline data on Arctic grayling in the Upper Delta River.

ALASKA RAILROAD

The Alaska Railroad (ARRC) seeks to extend its mainline track from the crossing at Moose Creek/Richardson Hwy, near Eielson Air Force Base, 80 miles southeast to Fort Greely near Delta Junction. The extension includes a 15-mile spur from Flag Hill to Blair Lakes Military Training Area. The extension requires an extensive environmental process as required by National Environmental Policy Act (NEPA). There are three routes under consideration; all routes crossing the Tanana River at Flag Hill near Harding Lake are on the south side until the routes cross the Delta River near Fort Greely. ADF&G and DNR have been involved with evaluating the numerous stream crossings along the proposed routes; ten waterbodies are affected in the UTMA. As part of the Environmental Impact Statement (EIS) a private contractor (ENTRIX) is surveying habitat areas and sampling streams along the routes and

reporting results. In addition, ARRC is delineating a proposed transportation corridor between North Pole to the Canadian border in order to reserve the land until completion of the railroad improvement.

POGO MINE

Gold exploration has led to the development of large-scale mining operations in the Tanana River drainage. The Pogo mine site on the Goodpaster River includes nearly 200 square miles of claims. The areas surrounding these claims are watersheds that influence important fish streams, and there are concerns about water quality and access issues with this large mine. A permanent road from the Richardson Highway from the mouth of Shaw Creek to the mine was completed by June 2004. The Camp Creek Fire in the summer of 2004 burned nearly 200,000 acres in Shaw Creek and Upper Goodpaster River. A final feasibility study was issued in May 2004. In 2006, a 2,500 ton/day underground mine and mill is under operation.

Beginning in 1998, Teck-Pogo Inc., developers of the mine site, have provided annual funding for population studies on spawning Arctic grayling in the Lower Goodpaster River. In 2003 and 2004, these monies were directed towards a study of the summer resident Arctic grayling population in 27 miles of the North Fork Goodpaster River (between Barbara Creek and Indian Creek). Tack (1974) described a similar study area for his study conducted in 1973. Density of Arctic grayling ≥ 300 mm FL in 1973 was estimated at 98 fish/mile which was similar to the density of 88 Arctic grayling ≥ 300 mm FL per mile estimated for 2003 (Parker 2006b). Monies have recently been dedicated to enumerating Chinook salmon in the North Fork Goodpaster River.

ACCESS PROGRAM

The Wallop-Breaux amendment to the Federal Aid in Sport Fish Restoration Act (D-J) mandates that at least 15% of the federal funds collected from taxes on boat gas and sport fishing equipment be used by the states for the development and maintenance of motorized boating access facilities. A broad range of access facilities can be approved for funding if they are constructed to achieve a state fishery management objective. These facilities can include boat ramps and lifts, docking and marina facilities, breakwaters, fish cleaning stations, rest rooms, and parking areas.

Currently ADF&G is investigating a purchase of land to provide a boat launch at Shaw Creek. A public access cabin was completed in 2007 for recreational use at George Lake. Other past projects include a public access cabin on Lisa Lake, various trail improvement to stocked lakes, and minor improvement to the boat ramp at George Lake Landing on the Tanana River. The history of major and small access projects completed in the Tanana drainage from 1988 to 1994 can be found in Burr et al. (1998).

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and emergency orders for the Upper Tanana Management Area can be found at the ADF&G Division of Sport Fish website (www.sf.adfg.state.ak.us/statewide/SF_home.cfm). The following informational brochures were developed to provide information on stocked lakes in the UTMA: “Coal Mine Road Lakes”, “Fishing the Stocked Lakes of Donnelly Training Area”, “Roadside Fishing of the

Eastern Interior Alaska”, and “Fishing Quartz Lake”. The Area Management Biologist (AMB) assists in providing coho salmon eggs from the Delta Clearwater River to several school districts. Schools from Fairbanks to Tok participate in this aquatic educational program. The coho eggs are raised and hatched in classroom incubators. A fish transport permit (FTP) is required for collection and return of these fish to the Delta Clearwater River. BLM provides information on the Delta Wild and Scenic River. A listing of the addresses, contact numbers, and websites for this and other information sources can be found in Appendix A.

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

SPORT FISHING EFFORT, HARVEST AND CATCH

The proportion of sport fishing effort, harvest, and catch in each of the Tanana management areas (LTMA and UTMA) has been estimated since 1996. In 2006, 26,271 angler-days of effort were reported from the Upper Tanana Management Area. This is approximately 92% of the recent five-year average of 28,663 (Table 4). A total of 13,850 fish were harvested and 78,815 fish were caught in the UTMA during 2006 (Table 5 and 6). The 2006 harvest was 63% of the recent five-year average, while 2006 catch represented 72% of the recent five-year average catch. Since 1996, it appears that anglers are releasing more of their catch; from 1996 to 2005 anglers in the UTMA kept 23% of their catch and from 2001 to 2005 anglers kept 20% of their catch (Table 4). Anglers in the UTMA kept 18% of their catch in 2006 (Table 4).

In 2006, Arctic grayling was the most caught species, a total of 40,233 fish were caught (Table 6). Rainbow trout was the second most caught species with 18,670 rainbow trout caught (Table 6). The harvest rate is much greater for rainbow trout in the UTMA (38.2%) compared to 6.5% for Arctic grayling (Table 5 and 6). UTMA burbot which are typically harvested, rather than released, were harvested at a rate of 50.2% (Table 5 and 6).

SECTION II: FISHERIES

COHO SALMON

BACKGROUND AND HISTORICAL PERSPECTIVE

All five species of salmon enter the Yukon River. Of these only Chinook (king), chum and coho salmon enter the Tanana River drainage and are present in the UTMA. Coho salmon migrate to spawn in small spring-fed tributaries in the south side of Tanana River drainage. Such springs are known to exist in the Nenana River drainage and the south side of the Tanana River near Big Delta, specifically, Five-mile Creek, Richardson Clearwater River, Providence Creek, Blue Creek and the Delta Clearwater River.

The Delta Clearwater River (DCR) supports the largest documented spawning concentration of coho salmon in the Yukon River (Parker 1991). The DCR is about 20 miles in length, is road accessible (Figure 4), and supports the largest recreational fishery for coho salmon in the Tanana River drainage (ADF&G 1993). Effort estimates for just coho salmon are not available from the Alaska Statewide Harvest Survey (SWHS); however data from mail-out surveys conducted in 1994 and 1995 indicate that 72% of the effort for the Delta Clearwater was directed at Arctic grayling in 1995 (Howe and Fleischman 2001). From 2001 to 2005, an average of 677 coho salmon were harvested of the 6,414 caught annually in the DCR (Table 7). In 2006, the harvest of 580 fish was 86 percent of the 5-year average (Table 7).

Annual escapement index counts of coho salmon are accomplished by a boat survey. Escapement counts are completed on 18 miles of navigable water from an elevated platform on a riverboat. Aerial counts for coho salmon in the non-navigable portions of the DCR were conducted from 1994 to 1998. These counts comprised 21.9%, 23.8%, 19%, 17.1%, and 20.0% (averaging 20.4%) of the expanded escapement, respectively (Evenson 1995-1996, 1997a; Stuby and Evenson 1998; and Stuby 1999). The results of this study suggest that on average 20.4% of the fish escaping to the DCR use these smaller tributaries. With the assumption that this estimated proportion is representative, an escapement estimate for the indexed (boat counted) and non-indexed portions of the DCR can be obtained by increasing the boat counts by 20.4% (Table 8). The average total escapement based on this expansion of coho salmon in the Delta Clearwater River from 1994 to 2007 is 36,747.

Coho salmon have an overlapping, but somewhat later, run timing with fall chum salmon. Coho salmon are the last of the salmon species to enter the Yukon River and begin to enter the DCR in mid-September. The peak of the run is by mid-October. Property owners living near the spring have reported coho salmon spawning as late as January. The springs provide favorable overwintering habitat for coho salmon that rear in the river for 1-3 years. Carcass sampling over several years showed that an average of 79% of the returning coho salmon were 4-years of age, 14% were 3 years and the remaining 7% were 5-years of age (Parker 1991). The majority of the coho fingerlings rear in the DCR for 3-years before smolting, and spend 1-year in the ocean before returning (Parker 1991).

Coho salmon in the DCR provide the last open-water fishery of the year attracting both local and non-local anglers who want the opportunity to catch a salmon (ADF&G 1993). Anglers fish from shore or by boat near the State Park campground and boat launch at river mile 8.5. Coho salmon are caught from mid-September through October with rod and reel using various spoons or large spinners. Approximately 3.6% of the escapement index was harvested in 2006 by sport anglers (Table 7).

RECENT FISHERY PERFORMANCE

The coho salmon fishery on the DCR is relatively recent, growing in popularity since 1984. Angler effort on the DCR for coho salmon increased as the Arctic grayling population began to decline (Parker and Viavant 2000) about the same time coho escapements increased. For a number of years angler effort remained consistent between the two species; however, more effort appeared to be directed on coho salmon when grayling abundance was at its lowest point. As the Arctic grayling population rebounded, the angler effort appears to again be directed primarily at grayling (Table 7).

Initially coho salmon harvest rates were high, with more than 16% of the escapement index harvested in 1990. Beginning in 1992, coho salmon harvests dropped below 1,000 until 2003 when 1,272 coho salmon were harvested and 14,665 were caught, the catch in 2003 is the largest ever recorded. These high harvest and catch numbers corresponded with the record escapement index in 2003 (Table 8). The majority of coho salmon are released; the quality of the salmon flesh is not as desirable as fish caught at the mouth of the Tanana River. This demonstrates that anglers remain interested in participation and less in keeping their catch.

FISHERIES OBJECTIVES AND MANAGEMENT

The escapement assessment for coho salmon in the Yukon drainage is quite limited and relies heavily on information from commercial and personal use harvests. The Pilot Station sonar is terminated during the coho run as are many of the other assessment projects due to expense and/or icing conditions. The only escapement goal that is presently in place for the Yukon drainage is the Delta Clearwater in the Tanana River drainage. The current escapement goal (5,200–17,000), was established by the BOF in 2004, and replaced the previous minimum goal of 9,000 fish. The goal continues to be based on a boat survey during peak spawning. These boat counts are conducted on the navigable portion of the river from the confluence with the Tanana River upstream approximately 18 river miles. The average count from 1996 to 2005 in the DCR is 31,392 fish (Table 7).

It is unknown what proportion of coho salmon caught in the lower river Yukon are DCR stock. Recent examination of the 29 years of escapement and recruitment data and applying various proportions of harvest Bue and Hasbrouck¹ provided an estimated maximum sustained yield for the DCR coho salmon stock of between 9,000 and 12,000 fish. The DCR sport harvests of coho salmon have remained well below this level and it is assumed that current harvests of the DCR stock in all Yukon River fisheries is sustainable.

¹ Bue, B. G. and J. J. Hasbrouck. *Unpublished*. Escapement Goal Review of Salmon Stocks of Upper Cook Inlet. Alaska Department of Fish and Game, Report to the Board of Fisheries, 2001, Anchorage.

ADF&G monitors the escapement between mid-September and early October to determine if any in-season management action is necessary. If 2,500 fish are found in the river between September 15 and October 1 in the lower eight miles of river it would appear that the escapement goal would be met and no management action would occur. However, if less than 1,500 fish are found to be in the river during the same time period then the sport fishery would be closed by emergency order. The present bag limit is three coho salmon per day and three in possession. Yukon River sonar counts and Nenana test wheel catches can be used as a preliminary index of DCR coho run strength, alerting the manager if a problem exists. With these data and a preliminary river count, the department has reasonable tools to predict if the coho salmon sport fishery needs to be closed to the retention of coho salmon. No management actions were taken on DCR coho salmon in 2006 or 2007.

CURRENT ISSUES AND FISHERY OUTLOOK

Between 2001 and 2005, large numbers of coho salmon returned to the DCR. However, in 2006 there was a significant decrease in the run size because of large harvests in the lower river (Table 9). The next several years' escapement runs will be based upon high parent escapement runs. These large anticipated runs should allow targeted commercial and subsistence fishing, as occurred in 2005 and 2006, to harvest the coho salmon surplus.

Unless there are lower-river fisheries that target coho salmon in the future, additional sport harvests could be sustained in the DCR coho salmon sport fishery. Harvest rates are low and more anglers are practicing catch-and-release. In years of high returns an EO could implement an increase in the bag limit, but few anglers are likely to take advantage of it. DCR coho salmon eggs are increasingly needed for aquatic education and broodstock purposes. Over 20 adult coho salmon were taken by permit in 2007 for these purposes.

RECENT BOARD OF FISH ACTIONS

The latest BOF action affecting salmon sport fishing in the DCR was in 1998 when a three fish combination daily bag and possession limit for coho and chum salmon was established drainage wide.

CURRENT OR RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

The preliminary lower DCR survey (mid-September) and peak DCR coho salmon survey are done on an annual basis to manage for the 5,200–17,000 fish escapement goal. Aerial surveys of other important coho salmon producing streams in the area should be conducted. For example, periodic data has been collected by ADF&G on the Richardson Clearwater River. An estimated 8,626 coho salmon were counted on the Richardson Clearwater River by aerial survey in October 2004. Estimates on the Richardson Clearwater River have been done in 20 of the past 34 years. The average escapement for years in which surveys were conducted is 1,300 fish (Bue 2007).

A foot survey was conducted on Blue Creek for the first time on October 10, 2007 from the mouth to head of the springs (approximately 1.2 miles). A total of 1,175 chum salmon were counted. No coho salmon were observed in the creek, but coho salmon were holding at the mouth in the Tanana River. On the 23rd of October, twenty coho salmon were observed in the upper portion of Blue Creek in select habitat associated with spring upwelling. On November 6th, 102 coho salmon and 2,000–2,200 chum salmon were counted.

ARCTIC GRAYLING

BACKGROUND AND HISTORICAL PERSPECTIVE

Arctic grayling are the most widely distributed species of fish sought by anglers in the UTMA and Region III. Arctic grayling are ecologically diverse, and populations vary greatly in abundance, size structure, and productivity. ADF&G developed an Arctic grayling management plan which was adopted by the BOF at its 2004 meeting. The plan was created to simplify and standardize regulations, establish criteria and thresholds for management decisions, and to direct research needs (5 AAC 70.055, 2004). The plan is based on three management approaches; *regional*, *conservative*, and *special*. Under the *regional* approach fisheries are managed under regional background regulations and are the most liberal (Swanton and Wuttig *In prep*). The *conservative* approach is a transitional grouping in which fisheries are managed more conservatively in order to maintain certain characteristics of the stock or fishery. Fisheries may be placed in the *conservative* approach while existing regulations are being evaluated or when research findings or public input indicates that more conservative regulations are appropriate. Fisheries under the *special* management approach would be managed to maintain, enhance, or develop characteristics of the Arctic grayling fisheries most desired by the public or with the most conservative measures possible to preserve the integrity of the Arctic grayling stocks.

In the UTMA, all Arctic grayling fisheries are managed under the *regional* approach with the exception of the Delta Clearwater River which is managed under the *special* management approach. Arctic grayling fisheries in order of importance in the UTMA include: Delta Clearwater River, Tangle Lakes System, Fielding Lake, Delta River, Goodpaster River, Tok River drainage and the Richardson Clearwater River.

The Delta Clearwater River (DCR) is the largest of several spring-fed streams near Delta Junction (Figure 4). These clear springs maintain cool water temperatures in the summer and provide ideal habitat for adult Arctic grayling. In UTMA rivers and streams, grayling spawn during the early spring. When spawning is complete, some adults leave for summer feeding waters such as the DCR or the Richardson Clearwater River (RCR). Grayling are not known to spawn in the DCR or the RCR. It is unclear how grayling recruit to spring-fed systems; however, fidelity to the DCR and other spring systems is strong. The abundance of grayling populations within the spawning streams determine how many fish migrate to spring systems. The majority of the DCR Arctic grayling population is fish age-5 and older. Based upon catch-at-age estimates of abundance, the DCR grayling population declined from 1984 to 1996 (Parker 2006a). Abundance declined to a low of 2,490 fish in 1996 (Ridder 1998a). The population has increased since 1996, likely a result of restrictive regulations, to 6,891 fish in 2000 (Gryska 2001, Table 10). Estimates of total catch have ranged from 4,665 fish in 1997 to 19,922 in 2005 (Table 10).

Average exploitation on the DCR grayling population from 1977 through 1990 was 37.8% (Figure 5, Parker and Viavant 2000). As indicated by the steady decline in Arctic grayling abundance in the DCR, this high exploitation level probably exceeded sustainability. High exploitation on the DCR was thought to be sustainable because this population was composed of at least 8 different stocks of Arctic grayling (Parker and Viavant 2000), the largest contributor being the Goodpaster River at nearly 60% (Ridder 1998b). In 1995, the bag and possession limit was reduced to two fish by EO, resulting in an exploitation rate of 25%. However, the

population continued to decline and exploitation in 1996 was up to 49% (Table 10). In 1997, an EO was issued for catch-and-release angling only. The BOF implemented a catch-and-release only regulation in 1998. Because of the catch-and-release restriction, the DCR has been transformed into a trophy catch-and-release Arctic grayling fishery. Beginning in 2001 and amended in 2007, the BOF has allowed a small level of harvest with a regulation that allows a daily bag limit of one fish, less than 12 inches, from June 1 to December 31. Models have estimated that a harvest of 900 small fish (< 12 inches) would be sustainable but these harvests have not occurred (Roach *unpublished*).

RECENT FISHERY PERFORMANCE

Angler effort has been increasing in the DCR in recent years, likely a result of the increasing grayling population. Angler effort over the past 10 years averaged 4,047 and the recent 5 year average from 2001 to 2005 averaged 4,623 days, a majority of which is believed to target Arctic grayling. In 2006, Arctic grayling effort on the DCR (4,850 days) was 5% above the five year average (2001–2005) of 4,623 angler days (Table 10).

Harvest in the DCR averaged a modest 55 fish from 2001 to 2005 (grayling <12 inches; Table 10). In 2005, a record 19,922 grayling were caught in the DCR. In 2006, of the 12,542 grayling caught 3,189 were less than 12 inches. While small fish are available to anglers in the DCR, anglers apparently have little desire to harvest them.

FISHERIES OBJECTIVES AND MANAGEMENT

Current management objectives which were updated in 2003 (Parker 2003) for the Delta Clearwater River Arctic grayling recreational fishery are:

- 1. To maintain a fishery in which at least 40% of the measurable population of Arctic grayling exceeds 14 inches in length (TL).**

In 1999, 48% of the estimated population (> 10.5 inches TL) was 14 inches (TL) or greater (Ridder and Gryska 2000). In 2000, 54% of the estimated population (> 10.5 inches TL) was 14 inches or greater (Gryska 2001). Based upon these size compositions in the DCR and the public desire to maintain the presence of large fish, it is reasonable to manage this fishery in such a way which ensures that over 40% of the measurable population will be of fish greater than 14 inches. Current regulations passed by the BOF in 2000 are based on maintaining or increasing the current numbers of large fish.

- 2. To allow a harvest not to exceed 900 fish less than 12 inches in length.**

In addition to maintaining large fish in the DCR, the BOF regulations adopted in 2001 and amended in 2007 were designed to allow a small harvest of fish less than 12 inches. Simulations show that a harvest of 900 fish or fewer is sustainable in the DCR (Roach *unpublished*). Simulations also indicated that the current length structure would only be affected minimally by a harvest of fewer than 900 fish that are less than 12 inches (Roach *unpublished*). The number of fish harvested is estimated by the SWHS. Specifically, the current regulations allow for a harvest of one fish per day, less than 12 inches TL in size, from June 1 to December 31. The largest harvest since 2001 was in 2004, when 111 Arctic grayling were harvested (Table 10). The average harvest from 2001 to 2005 was 55 Arctic grayling less than 12 inches. The low

harvest of small fish can be explained by the evident preference to release fish. In 2006, anglers caught 3,189 grayling but only 85 were harvested.

3. To prosecute the fishery in such a way as to provide for a minimum catch rate of one Arctic grayling per angler-day.

Data to determine angler-days of effort, and catch are compiled from the SWHS. Angler-days on the DCR ranged from 2,161 in 1997 to 6,261 in 1995 (Table 10). The average number of angler-days from 2001 to 2005 was 4,623 with an average catch rate of 3.3 fish per angler-day. This is one of the highest estimated catch rates anywhere in the Interior. If catch rates fall below a threshold level of one fish per day, and then the department would determine cause and seek a remedy if possible.

Following the implementation of catch-and-release regulations and without the opportunity to harvest Arctic grayling, fishing effort in the DCR initially declined (Parker and Viavant 2000; Clark and Ridder 1994). More recently, fishing effort has increased. Since harvest is very small it is likely that anglers are attracted to the catch-and-release quality of the fishery. The catch in 2005 (19,922) is the highest on record and is considerably higher than the last 5-year average (15,439; Table 10).

CURRENT ISSUES AND FISHERY OUTLOOK

Concerns about enforcement have been raised from the public who feel that violations will increase when harvest is allowed with restrictive bag, size, and season limits. Catch rates are very high in the DCR averaging over 15,000 over the past five years (Table 10). The catch is nearly equal to the 2006 estimated population size, indicating many fish may be caught multiple times. The high catch is probably responsible for some level of mortality, although probably low (McKinley 1993), but even a low hooking mortality rate, e.g. 5% could be significant (660 fish) with such high catch rates. Yet based on the recent abundance estimate in 2006 (14,799) the current catch rate and associated hooking mortality appears to be sustainable.

In 2006, the preliminary abundance of Arctic grayling over 12 inches in the DCR was 14,799 (SE=2,204; Gryska *in prep.*). Even if the true estimate were on the lower end estimate as suggested by the standard error (11,184), it is significantly larger than the estimate of 6,891 in 2000 (Table 10).

RECENT BOARD OF FISH ACTIONS

The BOF adopted a proposal at the December 1997 meeting for the DCR fishery. This proposal changed Arctic grayling regulations in the DCR to catch-and-release only with unbaited, single-hook artificial lures from January 1 through August 31. Unbaited, artificial lures are permitted the remainder of the year to allow the use of this gear during the coho salmon fishery. This regulation includes the Delta Clearwater River and the Clearwater Lake drainage to avoid enforcement issues.

The BOF adopted a proposal during January 2001 to allow a one fish daily bag and possession limit for the Delta Clearwater River. The open season for Arctic grayling was July 10–August 9, catch-and-release only from August 10 to July 9. The maximum size limit of Arctic grayling is 12 inches (total length) or less. Gear restrictions remained the same. This proposal was adopted due to large public support to allow some harvest opportunity for Arctic grayling in the Delta

Clearwater River. In 2007, the BOF expanded the harvest dates for small grayling to June 1–December 31 recognizing that the previous narrow harvest window resulted in low harvests.

In 2004 the BOF adopted a management plan for Arctic grayling fisheries within the Arctic-Yukon-Kuskokwim Region (Swanton & Wuttig, *in prep*). The DCR falls under the special management approach of the Arctic grayling plan whereas, the fishery is managed to provide high catch levels and a desired size composition.

CURRENT OR RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

Management activities should ensure protection of aquatic habitat for healthy fish production. In 1999, the National Resource Conservation Service (NRCS) implemented a watershed project that was designed to prevent sediment-bearing waters from the Granite Mountains from entering the DCR (Salcha/Big Delta Soil and Water Conservation District, 1987). The first phase of construction was completed in the summer of 2000. Some major and minor modifications to the project were done in 2002-2003. Ongoing plans for the watershed are pending because of flaws in the engineering of the dikes.

NORTHERN PIKE

BACKGROUND AND HISTORICAL PERSPECTIVE

The major northern pike sport fisheries for the Upper Tanana area occur in George, Volkmar, Deadman, and Healy lakes, and also the Goodpaster and Volkmar rivers (Table 11). George Lake, the largest northern pike fishery in the Upper Tanana area, is accessed by boat, snowmachine, and float or ski equipped airplane, allowing the fishery to occur year-round. Volkmar Lake is accessed primarily by snowmachine, but also by float and ski equipped airplane, and the fishery there occurs primarily in the winter. There are several lakes and creeks in the Tetlin National Wildlife Refuge that also have abundant northern pike resources but effort is too low for these fisheries to be included in the SWHS. Scottie and Moose creeks and Deadman Lake near the Canadian Boarder are the only road accessible northern pike fisheries in the Upper Tanana area. Most remote northern pike fisheries are accessed by plane or boat, and primarily during open-water. Other lakes in the Upper Tanana area with northern pike populations are Sand, “T”, Mansfield, Dog, Island, Tetlin, Takomahto, Jatahmund, Island, and Wellesley lakes. Many of these lakes and streams have been lumped together as “Tok Area” lakes in Table 11.

Although effort is not estimated by species targeted, it is thought that the majority of the effort at George and Volkmar lakes is directed toward northern pike. Lately, total fishing effort at George and Volkmar lakes has been more variable, particularly at George Lake (Table 12). Low snowfall, low creek levels, and open water on the Tanana River during the winter make access to these lakes difficult.

Anglers use hook-and-line gear all year to harvest northern pike. In addition, spears are used during the ice-cover months. Anglers fishing in lakes are very successful in the spring when northern pike have concentrated for spawning (Hallberg and Bingham 1992). In 1993, 549 households responded to a northern pike survey to gather information on the distribution of participation and harvest, and kinds of gear used by successful northern pike anglers. Results showed that 84% of participation and 82% of the harvest occur in the open-water months

(Bingham and Parker 1995). Open-water fishing occurs slightly more on rivers (51%) than on lakes (49%). Only 14% of the total participation occurred during the ice-covered season, of which 86% of effort was on lakes. Winter anglers harvested 40% of their northern pike using spears (Bingham and Parker 1995). Stock assessment of northern pike populations in the Tanana drainage were conducted at George Lake from 1987 through 1991, and 2006; in Volkmar Lake from 1985 through 1994, 2000, and 2005 (Pearse and Hanson 1993; Scanlon 2001; Wuttig and Reed *in prep*).

George Lake is a semi-remote lake located about 35 miles southeast of Delta Junction (Figure 6) and about 5 miles northeast of the Alaska Highway. All of the shoreline is privately owned; the Healy Lake and Dot Lake Native Corporations own all but about 15 acres of the shoreline. The lake is large, over 4,500 acres, but shallow, maximum depth is only 35 feet. The lake has one major inlet, six smaller inlets, and a navigable outlet, George Creek, which flows to the south into the Tanana River. Near shore waters are shallow with large beds of aquatic vegetation. George Lake is typically ice-free from late May to mid-October. Fish species present include northern pike, burbot, Arctic grayling, humpback whitefish, least cisco, round whitefish, longnose suckers, and slimy sculpins.

RECENT FISHERY PERFORMANCE

Much of the effort directed towards pike in the UTMA is non-consumptive fishing. Only 12.7% of the total catch of northern pike in the Upper Tanana River drainage was harvested in 2006 (Table 11). Harvests for northern pike in the UTMA have varied greatly since 1996 ranging from 588 to 2,060 fish per year (Table 11). The UTMA 5-year average catch of 6,695 northern pike is consistent with the 10-year average catch of 6,866 (Table 11). Harvests in the UTMA have also been consistent; the 5-year average of 1,115 fish is similar to the 10-year average of 1,125 fish (Table 11). The 2006 harvest of 217 northern pike in George Lake was 42% lower than the five-year average of 515 fish (Table 11).

George Lake recreational fishing effort and harvests have been monitored since 1977 by the Statewide Harvest Survey. Since 1977, fishing effort has ranged from 377 angler-days in 2004 to 1,957 angler-days in 1986 (Table 12). Effort may be greater in some years because water level is high enough to allow anglers boat access into George Creek, the only open water access to the lake. Northern pike catch in George Lake increased dramatically as more anglers were able to access the lake via boat in 2000 and 2001, but declined in 2002 because the outlet was nearly dry. In 2003, catch increased at George Lake because the outlet was boat accessible during the spring. Catch of northern pike in George Lake have been consistent averaging 3,640 over the past 10 years and 3,728 over the past 5 years. In 2006 the catch of 2,958 northern pike was 79% of the 5-year average of 3,728. Harvests of burbot, Arctic grayling and whitefish in George Lake are also found in Table 12.

Fishing pressure at George Lake is heaviest from June 1 when the season opens through mid-July. Little ice fishing occurs before late December or early January because of ice conditions on the Tanana River preventing snow-machine access. The ice fishery lasts until March 31 when the northern pike season closes. During the ice fishery, northern pike and burbot are taken with hook and line gear as well as with spears. ADF&G has issued between 1 and 6 ice house permits per year for George Lake since the early 1980s.

FISHERIES OBJECTIVES AND MANAGEMENT

George Lake

The management objective since 1993 has been to ensure that harvests and incidental mortality of northern pike by the recreational fishery are sustainable by limiting exploitation to 10%–20% annually. A draft management plan for George and Volkmar Lakes was submitted in 2007. The revised management objective for George Lake is:

In George Lake maintain a population size of 9,200 adult northern pike > 18 inches in size.

An abundance of less than 9,200 fish \geq 18 inches TL (450 mm FL) is the threshold at which a management action to restrict harvest would be taken by the department. The objective is based on the most recent 5-year SWHS reporting period (2001-2005) for fish. This conservative threshold was calculated based upon the highest reported harvest within the past 5 years (862; Table 12) and applying a 10% mortality rate on the highest catch within the past 5 years (10% of 5,146 or 515) for a total fishing mortality of 1,377. This harvest of 1,377 was expanded by a sustainable exploitation rate of 15% to calculate the management objective.

ADF&G estimated northern pike levels in May 2006 and estimated the population size to be 16,178 fish \geq 18 inches TL (450 mm FL; Table 13) with an additional 4,268 fish between 12 and 18 inches (Wuttig and Reed, *in prep*). The population estimate exceeds the department's objective for a sustainable fishery on George Lake.

The sport fishing regulation of only one fish 30 inches or longer in the daily bag and possession limit of five fish potentially affects only about 6% of the northern pike population in George Lake (based on the 2006 abundance estimate). The regulation helps maintain a few large northern pike in the population and prevents anglers from targeting these large fish, thereby spreading the availability of these large fish among as many anglers as possible.

A substantial level of catch-and-release fishing for northern pike occurs at George Lake. In a 1991 study of the mortality to northern pike after these fish were captured with sport tackle and released, ADF&G concluded that catch-and-release mortality of northern pike was less than 10% (Burkholder 1992). Based on current abundance, harvest and catch levels of northern pike in George Lake, it appears that catch-and-release fishing practices are not having a negative effect upon the northern pike population.

Volkmar Lake

The management objective was made for Volkmar Lake is:

In Volkmar Lake maintain a population size of 2,000 or greater adult northern pike > 18 inches in size.

Although no formal abundance or exploitation-based management plan exists for Volkmar Lake, 2,000 was selected as the population size at which any regulatory change would be considered to increase harvest. This corresponds to the maximum sustainable population in Volkmar of 2,000 northern pike spawners (age 5+ or over 18 inches) and we can expect a 30% natural mortality and 850 recruits from a population this size (Pearse and Hanson 1993). If abundance is greater than 2,000 spawners there appears to be a negative correlation to the number of recruits. The numbers of spawning recruits into the population begin to decline (Pearse and Hanson 1993). A change in the regulation to increase harvest is recommended if the population rises above 2,000.

In 1995, a record 1,263 angler-days occurred on Volkmar Lake with a harvest of 1,085 northern pike, which was not sustainable. Anglers testified that effort in 1996 was high and harvest was poor, with few large fish. In 1996, effort and harvest fell to the lowest recorded level (191 angler-days and 9 fish harvested). Since 1996, anglers perceived that size and abundance of northern pike in Volkmar Lake had declined. The BOF supported the bag reduction to one fish proposed in 1997 as a conservation measure. In 2000, abundance was only 615 fish >450 mm (Scanlon, 2001). Angler effort and harvest have been minimal with the new regulations and angler perception of low northern pike abundance. In 2005, the population of fish >450 mm had increased to 1,630 fish (Wuttig and Reed, *in prep.*), not enough to trigger a change in the current regulations.

CURRENT ISSUES AND FISHERY OUTLOOK

Access to George Lake is difficult because of the Tanana River crossing. In 1994, a road construction company using the George Lake access property, paved the access road to the river and made a launch skirt that will help recreational users to launch their boats. This launch is still considered very dangerous and is used at the boater's own risk. Property around George Lake is privately owned. ADF&G Division of Sport Fish purchased about ten acres for public camping and has built four tent platforms and a small cabin.

Based on recent population estimates, the northern pike population in George Lake is thought to be healthy. Higher lake water levels over the past 2-years is providing access in George Creek for anglers to fish the early season, whereas in the previous 10 years drought-like conditions left the creek nearly dry and nearly impassable. During the late 1980s and 1990s George Lake had a reputation of supporting a large population of small fish (e.g., 20 inches and under). Recently anglers and the local Fish and Game Advisory Committee have expressed their satisfaction in the improved quality of their fishing experience at George Lake because of good catch rates, particularly of larger-sized fish (e.g., >24 in).

A comparison of lengths collected during 2006 to lengths collected in 1987 indicates a higher proportion of larger fish in the population. In 1987, 48% (8,495) fish were over 18 inches and in 2006, 79% were over 18 inches in size (Clark et al, 1988). In 2006, it was estimated there were 1,013 northern pike over 30 inches in length or about 6% of the population over 18 inches in length. In 1987, only 300 fish over 30 inches in length were estimated or about 3.4% of the population.

RECENT BOARD OF FISHERIES ACTIONS

During the 1997 meeting the BOF reduced the northern pike bag and possession limit in Volkmar Lake to one fish with no size limit. The intent of this bag limit reduction was to reduce effort and harvest to acceptable levels. Population abundance of northern pike has increased under this regulation (1,630 fish > 450 mm FL) as of 2005.

In 1997, the Board adopted a department proposal to remove the area-wide spring spawning closure for flowing waters (except the Tolovana drainage) and relax the drainage-wide spawning closure to increase the season by 20 days (moving the spring closure from April 1 to April 21), with the exception of popular fisheries such as Harding, George (including its outlet), and Volkmar lakes.

In 2001, the BOF adopted a proposal for the Chisana River drainage upstream from the Northway bridge that reduced the northern pike daily bag and possession limit to two fish, with only one fish over 30 inches. This regulation will provide protection to stocks of fish in streams that cross the Alaska Highway from the Canadian border to Northway.

In 2007 the BOF considered two proposals submitted by the Delta ADF&G Advisory committee to restrict the George Lake pike fishery. The first proposal reducing the bag limit from 5 to 3 fish was submitted as a placeholder until the department completed the stock assessment during the summer of 2006. As a result of the stock assessment determining the northern pike abundance exceeded the management objective no action was taken by the BOF on this proposal.

The second proposal would have established a statewide measure to establish minimum spear size requirements. The intent of this proposal was to reduce injury and associated fishing mortality to northern pike during the winter spear fishery. Due to lack of information supporting this proposal, no action by the BOF was taken on this proposal.

CURRENT OR RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

A creel census was conducted at George Lake from February 9 until the end of the fishing season on March 31, 2006. We believe that most of the winter fishery was examined by the survey because poor ice conditions prevented access to the lake during January. A total of 185 fishers were interviewed. A total of 474 northern pike were caught of which 237 were harvested. The average length of 190 pike sampled from the catch was 26.4 inches (671 mm FL). Sex composition of the catch was determined from a sample of 164 fish; 133 (81%) were females and 31 (19%) were males. The average length of 133 females was 27.1 inches and of the 31 males was 24.6 inches (Parker 2006a). A majority (75%) of the anglers interviewed approved of the current regulations (Parker 2006a).

LAKE TROUT

BACKGROUND AND HISTORICAL PERSPECTIVE

Since 1986, the department has conducted research on lake trout populations due to overexploitation that had occurred in many UTMA lakes. Today, lake trout regulations region-wide are restrictive to protect existing lake trout populations. Specific life history features (slow growth, delayed maturity and non-consecutive spawning) combined with the short growing season at higher altitudes increases the vulnerability of the species to overharvest (Burr 1987, 2006). The impact of even modest fishing pressure can be significant.

Lakes containing lake trout in the Upper Tanana area include Fielding, Two Bit, Landmark Gap, Glacier, Sevenmile, 14-Mile, and the Tangle lakes system. Recent BOF action established a Lake Trout Management Plan which manages this species with uniform regulations across the AYK region. Lake trout regulations for Fielding Lake are an exception to the Management Plan largely due to prior regulatory attempts to restrict bag and size limits to reduce harvest (Parker 2006a).

RECENT FISHERY PERFORMANCE

UTMA lake trout harvest in 2006 was 19.7% (612 of 3,103) of the statewide harvest (Jennings et al. *in prepb*). In 2006, most of the UTMA effort on lake trout is non-consumptive fishing, only 24% of the catch was harvested (Table 14). The Tangle lakes drainage has consistently produced the highest lake trout harvest in the UTMA. In 2006, the number of lake trout harvested from this drainage was 292 with a catch of 1,076 fish (Table 14). The 2006 lake trout harvest in the Tangle Lake drainage is slightly below (93%) the recent 5-year average of 315 fish. In Fielding Lake, harvests have increased over the past 5 years; the average harvest is 62 lake trout with 108 harvested in 2006 (Table 15). Total catch has also increased, the 5-year average is 410 with 634 lake trout caught in 2006 (Table 15).

FISHERY OBJECTIVES AND MANAGEMENT

In 2007, the BOF adopted a Regional Lake Trout Management plan which provides guidelines for regulations based upon current effort and harvest levels, specific population data, and biological characteristics of the water body (Burr 2006). The objectives for lake trout fisheries are based upon a harvest guideline to prevent excessive harvest and allow recovery of heavily fished populations. It provides criteria for the Board, public and department to address future proposals directed towards lake trout fisheries. The lake area model (LA model) is the primary tool for determining if fishing mortality estimated by the SWHS for specific lakes is acceptable. The LA model will be used as a benchmark and regulatory actions will be introduced when harvests have exceeded the target threshold.

In the Tangle Lake drainage average harvest from 2001-2005 is 315 lake trout (Table 14), greater than 18 inches. The catch in the Tangle Lakes drainage is high and a 10% hooking mortality on catch is combined with harvest when examining total mortality. Average catch over the past 5 years is 1,704 fish or an additional mortality of 139 fish ($1,704 - 315 = 1,389$; Table 14). The hooking mortality combined with harvest is about 454 fish per year. The sustainable lake trout yield for the Tangle Lakes district is about 521 fish per year for fish greater than 18 inches based upon an estimated annual yield (Burr 2006).

A sustainable lake trout harvest for Fielding Lake is about 78 fish for fish over 26 inches per year based upon the LA model (Burr 2006). From 2001 to 2005, the harvest of lake trout averaged 62 fish per year (Table 15). Catch of lake trout has averaged 410 fish from 2001 to 2005 with a high catch in 2005 of 862 fish (Table 15). An additional 35 fish ($410 \text{ catch} - 62 \text{ harvest} = 348 \times 10\%$) is added to the average 5-year harvest of 62 fish (total of 97) to account for hooking mortality. Given the low abundance of lake trout and the high proportion that are caught and released, the continued use of bait in this fishery likely would result in total lake trout mortality exceeding the estimated sustained yield. To reduce fishing mortality the Lake Trout Management Plan (LTMP) recommends no use of bait with length limits to reduce the mortality of released fish. Additional management options include extending the length of seasonal closures and eliminating intentional harvest with a catch-and-release only regulation.

CURRENT ISSUES AND FISHERY OUTLOOK

During the 2001 BOF meeting the department did not support a bait restriction in Fielding Lake because it would reduce the opportunity to catch burbot. In 2007, the BOF eliminated the use of bait because lake trout harvests continued to exceed estimates of MSY. The burbot population,

which has increased from overfishing in the 1980's, was estimated to be 600 fish (TL > 18 inches) in 1999 and 759 fish in 2000 (Parker 2001). The burbot population has had low harvests (averaging 13 fish over the past 5 years; Table 15) and has likely increased in abundance. Given maximum utilization of lake trout by the fishery the burbot may have a competitive edge over lake trout. The biological ramifications may keep the lake trout suppressed. There is a need to examine the population dynamics of both populations. Opportunity to harvest burbot is limited due to the bait restriction.

RECENT BOARD OF FISH ACTIONS

The BOF in January 2001 increased the minimum size limit to 26 inches for lake trout in Fielding Lake. In addition, the open season for lake trout and burbot in Fielding Lake was restricted from October 1 to August 31 to protect spawning lake trout. In addition, a single-hook restriction when fishing for lake trout or burbot was established. In 2007, bait was eliminated from Fielding Lake to further reduce lake trout harvests. Also at the 2007 meeting, the maximum length limit of 18 inches in the Tangles Lakes system was removed since harvests were below the sustainable yield of 521 fish over 18 inches per year. Without the length limit, the sustainable yield for the Tangle Lakes system increased to 731 fish because all lake trout in the system are available for harvest.

ONGOING OR RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

The last population estimate for lake trout in Fielding Lake was in 1999 when 264 adults were estimated (Parker et al. 2001). If the population is the same size today current harvest levels would indicate that higher than sustainable harvest are still occurring. There is a clear need for quality estimates of abundance and harvest regarding the lake trout population in Fielding Lake.

BURBOT

BACKGROUND AND HISTORICAL PERSPECTIVE

Before restrictive regulations were put into effect, burbot fishing in lakes occurred primarily in Fielding, Harding, and Tangle lakes. Now very little harvest occurs in these lakes. Since 1987, bag limits in these lakes were reduced to two fish daily, and the use of setlines was eliminated. Burbot stocks in the Tanana River are exploited most heavily near population centers such as Fairbanks, Delta Junction, and near Northway. Burbot movements within the Tanana River tend to minimize effects of concentrated local fishing effort, and stocks in the Tanana River appear to be lightly exploited (Evenson 1997b).

RECENT FISHERY PERFORMANCE

The 2006 estimated harvest of burbot in the UTMA by sport anglers was 598 (Table 16). Harvests for burbot in the UTMA have varied since 1996 ranging from 515 in 2001 to 2,432 in 1997 (Table 16). The Tanana River is split into three statistical areas; lower, middle, and upper Tanana River. A portion of the Middle Tanana River and the Upper Tanana River is included in the UTMA, for reporting purposes, 33% of the harvest and catch of the Middle Tanana River is attributable to the UTMA. The middle section begins in Nenana, ends at Delta Junction and includes popular areas near the mouth of the Chena River and near Shaw Creek. It was estimated based on the relative

size of the respective fisheries that about 70% of the burbot harvest is taken in the Fairbanks area while 30% occurs in the Upper Tanana area (Parker and Viavant 2000). In 2006, the Tanana River component of burbot harvest in the UTMA was 451 (Table 16). In 2006, anglers in the UTMA harvested 50.2% of the burbot they caught (Table 16).

Harvest from area lakes has declined since 1987 when restrictions on number of hooks, set lines, and seasons for many lakes were enacted. From 1981 to 1984 harvests of burbot at Fielding Lake averaged 330 per year and caused a decline in the adult population. Due to low recruitment, a cycle of high and low abundance has occurred thereafter (Parker 2001). In 1994 the department issued an EO to close the Fielding Lake burbot fishery until further notice. The population has since stabilized and in 2001 the burbot fishery was reopened and there was opportunity under restrictive regulations to harvest a burbot in Fielding Lake for the first time in 7 years. Harvests from the SWHS were reported beginning in 2003 with 11 fish harvested (Table 15). In 2006, 51 burbot were harvested in Fielding Lake and 76 in George Lake (Table 16).

FISHERY OBJECTIVES AND MANAGEMENT

The management objective for the Fielding Lake burbot fishery is to ensure harvests and incidental mortality of burbot is less than 10% of the population size. Fielding Lake a popular angling destination has received restrictive regulations over the years to prevent overharvest.

- 1. In Fielding Lake maintain a population size of 1,000 adult burbot > 18 inches in size.**

Simulations show an optimum population size of about 1,000 burbot over 18 inches in size and that 10% exploitation can be sustained. The population abundance was last estimated at 750 fish > 18 inches in 2000.

- 2. In Fielding Lake maintain a harvest level on the adult burbot population not to exceed 10%.**

Annual harvests of burbot under 75 fish should be sustainable. Burbot harvests are obtained from the SWHS, if harvests are greater than 100, further restrictions will be required.

Sustainable levels of harvest in small, high elevation lakes such as Fielding and the Tangle lakes are thought to be low and if harvests should reach 100 fish per year, impacts upon the population should be investigated.

CURRENT ISSUES AND FISHERY OUTLOOK

Abundance and CPUE have been estimated for burbot in Fielding Lake from 1985 to 2000. For 1999, the estimated abundance of fully recruited burbot (>450 mm TL) in Fielding Lake was 598 (SE = 62). The index of abundance for 2000 was 760 fish (Parker 2001). The population currently can sustain a small <75 per year harvest. In the past 5 years anglers have reported harvesting from 0 to 51 burbot in Fielding Lake (Table 15).

RECENT BOARD OF FISH ACTIONS

In 2001, the BOF adopted a daily bag and possession limit of one burbot in Fielding Lake. In addition, when fishing for burbot or lake trout bait could only be used on a single hook, and fishing for burbot or lake trout was closed from September 1 to 30. Regulations on Fielding

Lake have changed from a 10 fish bag limit to total closure to a very conservative bag limit of one fish. The BOF in 2007 further restricted the regulations for Fielding Lake by prohibiting the use of bait to protect the lake trout population, most anglers fishing burbot use bait.

CURRENT OR RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

Exploitation rates of burbot in the Upper Tanana River are not considered excessive. Burbot stock assessments carried out by ADF&G during the late 1980s indicated that the uppermost river section near Northway supported the lowest density of large burbot among the river sections sampled (Evenson 1991). Subsistence and personal use fisheries for burbot are known to occur in the Upper Tanana, but harvests in these fisheries may be underreported. Current estimates of stock status or of total harvest for the Upper Tanana drainage are unavailable. However, since this part of the river showed low relative abundance of burbot compared to other river sections and has seasonally intense effort and harvest, there is concern for local depletion.

Low productivity of burbot in most of the lakes may result in overexploitation. Population density of burbot in lakes declined dramatically in the early 1980s due to unsustainable exploitation rates in the sport fisheries. Stock assessment studies in the 1980s conducted in lakes of the Upper Susitna Upper Copper River drainages and the Tanana River drainage (Lafferty et al. 1992), confirmed that several lake stocks in the Tanana drainage showed evidence of high exploitation. More recent stock assessment studies conducted in lakes of the Tanana River drainage demonstrate the detrimental effects of long-term high exploitation rates (Parker 2001). Stock assessment of the burbot population is recommended for 2008 to determine if this population has recovered.

STOCKED WATERS

BACKGROUND AND HISTORICAL PERSPECTIVE

The ADF&G stocks game fish in 48 lakes in the Upper Tanana Management Area (UTMA). The stocking program is designed to provide additional fishing opportunities near communities and popular recreational destinations where fish resources and angling opportunity are limited and where fishing effort and harvest are highest. Remote lakes also are stocked to provide opportunities for anglers who want a more challenging experience or those who want to enjoy more tranquil settings. Lakes in the stocking program range in size from a few acres to several hundred acres and are accessible by road, trail, ATV or aircraft. Most of the fisheries are year-round and half of the angling effort on some lakes occurs during winter. State hatcheries at Ft. Richardson and Elmendorf AFB located near Anchorage provide most of the fish for the UTMA. An experimental hatchery in Fairbanks is producing small numbers of fish until it becomes full scale in the near future.

RECENT FISHERY PERFORMANCE

From 1997 through 2006, the stocking program in the UTMA generated from 9,390 to 23,126 angler-days annually and averaged 13,650 angler-days (Table 17). From 1997 to 2006 harvests of stocked fish ranged from 8,143 to 32,187 averaging 19,499 fish (Table 17). From 1997 to 2006 catch of stocked fish ranged from 23,320 to 95,263 fish averaging 57,085 fish (Table 17). In 2006, days of effort on stocked waters were 37% of the total estimated fishing effort for

both stocked and wild species in the UTMA. From 1997 to 2006 the ratio of stocked fish harvested versus wild fish averaged 44% and ranged from 36% to 51% of the total annual harvest in the UTMA. Effort, harvest, and catch in stocked waters have generally declined over the past 10 years (Table 17).

Rainbow trout have averaged 68% of the harvest and 61% of the catch over the last 10 years of stocked fish in the UTMA (Table 17). Coho and king salmon (landlocked silver and king salmon) were next significant in numbers of fish caught and harvested followed by Arctic char, Arctic grayling, and lake trout in decreasing order.

In 2006, the average catch rate per angler-day of effort for stocked fish in the UTMA was 2.8 fish and the recent 10-year average was 4.2 fish (Table 17). Fish stockings for 2005 through 2007 are summarized in Table 18.

ADF&G will continue to stock lakes that provide fishing opportunities and where stocked fish exhibit good survival and growth, or provide put and take fisheries. New lakes will be evaluated as candidates in the stocking program based on public requests for new fisheries.

FISHERIES OBJECTIVES AND MANAGEMENT

In January 2004, the BOF adopted a Regional Stocked Waters Management Plan (SWMP; 5 AAC 70.065, 2004). The SWMP created three management approaches; regional (high yield), conservative, and special management. Almost all stocked lakes in Region III are categorized under the regional approach. The BOF directs the department to manage the stocked waters according to a framework designed to meet public demand and provide diversity of opportunity. The department may manage specific fisheries to provide or maintain qualities desired by the angling public.

The regulations adopted by the board are designed to maintain the characteristics of each fishery category. Waters stocked in the UTMA are classified as high yield with two categories of exceptions; conservative yield and special management. Koole Lake in the UTMA is the only lake that is categorized under the Plan as Conservative Yield. Under special management, there are three lakes in the UTMA which are Monte Lake, Donnelly Lake, and Rainbow Lake.

Stocked waters may be reclassified into a different category only by the Board through proposals from the public, department, or Board and if the proposals meet the criteria established for the proposed category. Requests for reclassification and special management will be submitted to the Board during the appropriate cycle.

Currently, ADF&G provides diverse year-round sport fishing in the UTMA for rainbow trout, coho salmon, Arctic grayling, and Arctic char. Goals of the fish-stocking program in the UTMA are to:

- Reduce harvest pressure on wild stocks;
- Provide angling opportunity for increasing numbers of anglers;
- Diversify angling opportunity by stocking popular species and species not typically found along the road system;
- Stock a variety of lakes;
- Improve access; and,
- Rehabilitate depleted wild stocks when required.

Meeting public demand for recreational fishing opportunities in Alaska while at the same time maintaining and protecting the wild fishery resources has become increasingly complex. Today, Alaska is experiencing increased tourism and continued forest, mineral, and petroleum development. All of these activities impact Alaska's wild fish stocks and the fisheries that depend on them.

The Statewide Stocking Plan including Region III and the UTMA is updated annually. The fish stocking plan is a comprehensive list of the species, life stage, stocking frequencies, maximum numbers of fish that can be stocked for lakes, and projected numbers of fish to be stocked for a five-year period in the UTMA. Comments received from the public and current policies are reviewed to determine what changes will be required to update the stocking plan each year. The updated stocking plan for Region III is submitted to the Sport Fish regional office in Anchorage in November for inclusion into the draft Five Year Statewide Stocking Plan for Recreational Fishing. After a comment period the finalized plan is usually published and available by 1 February. The five-year stocking plan can be accessed via the internet at: <http://www.sf.adfg.state.ak.us/statewide/hatchery/pdfs/06regioniii.pdf>

CURRENT ISSUES AND FISHERY OUTLOOK

Sport Fish Region III staff has pursued establishing a full size fish hatchery in Fairbanks for stocking lakes in the Interior. Fish production at Fort Richardson and Elmendorf hatcheries are dependant on surface and ground water supplies as well as waste heat from military power plants. Both power plants at Fort Richardson and Elmendorf Air Force Base were shut down. Boilers have been installed at the Fort Richardson hatchery to heat water for the broodstock, incubation, smolt, and fingerling programs. The catchable rainbow trout program at the Elmendorf Air Force Base hatchery has been curtailed.

RECENT BOARD OF FISHERY ACTIONS

In January 2004, the BOF adopted a Regional Stocked Waters Management Plan (SWMP).

In 2007, the Board adopted a proposal to change the management category of Koole Lake from the Regional Management Approach to the Conservative Management Approach under the AYK Stocked Waters Management Plan. This change reduces the bag and possession limit from 10 fish (all species combined), of which only one may be 18 inches or greater in length to 5 fish (all species combined), of which only one may be 18 inches or greater in length.

CURRENT OR RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

The ongoing strategy is to stock species most suited to a particular lake's physical characteristics and at a size to account for lake productivity, harvest pressure, and to minimize transport costs. Rainbow trout and Arctic grayling do well in most lakes in the UTMA and support summer fisheries. Coho and king salmon also do well in most lakes and provide an aggressive fish during winter when other species are less active. Arctic char and lake trout are long lived and grow to large size which makes them attractive to anglers. In some lakes more than one species is stocked to provide diversity and to take advantage of different seasonal behavior. The most popular combination is rainbow trout and coho salmon. In the UTMA several lakes are suitable habitat for lake trout. It is recommended that once the new hatchery in Fairbanks is online that a lake trout egg-take be added to the stocking program.

Fingerling coho salmon are stocked in Quartz Lake because the lake produces sufficient numbers of catchable fish from fingerling stockings. However, recent population assessments in Quartz Lake have shown that the survival of rainbow trout fingerlings from August through June is less than 1%. For this reason, ADF&G is now stocking sub-catchable rainbow trout into Quartz Lake. This problem with survival can be averted if stocking of fingerlings can occur earlier in the summer.

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TABLES AND FIGURES

Table 1.–Commercial salmon harvest (preliminary) in Tanana River drainage and percent of Yukon River drainage harvest in 2006 (Bue 2007).

Species	2006		
	Tanana Total	Yukon Total	% Tanana
King	84	46,829	0.2%
Summer chum	44,621	92,116	48.4%
Fall chum	23,353	174,542	13.4%
Coho	11,137	64,942	17.1%
Total	79,195	377,429	21.0%

Table 2.–Subsistence and personal use salmon harvest (preliminary)^a in the Tanana River drainage and percent of Yukon River drainage harvest in 2006.

Species	2006		
	Tanana River Salmon Harvest Total	Yukon River Salmon Harvest Total	% Tanana
King	1,318	48,682	2.7%
Summer chum	1,272	115,255	1.1%
Fall chum	17,258	84,320	20.5%
Coho	10,850	19,985	54.3%
Total	30,698	268,242	11.4%

^a William Busher, Commercial Fish Biologist, ADF&G, Fairbanks; personal communication.

Table 3.—Estimated abundance, maximum aerial survey counts, and aerial survey conditions for king salmon escapement in the Goodpaster River, 1998–2007.

Year	Estimated Abundance ^a	SE	Estimation Method ^b	Aerial Survey Count	Survey Conditions ^c	Survey Completed by
1998			Helicopter	477	Good	Teck-pogo
1999			Helicopter	1,743	Good	Teck-pogo
2000			Helicopter	2,175	Good	Teck-pogo
2001			Helicopter	1,457	Good	Teck-pogo
2002			Helicopter	1,440	Excellent	Teck-pogo
2003			Helicopter	3,004	Fair	Teck-pogo
2004	3,674	106	Tower	480	-	Tanana Chiefs and Teck-pogo
2005	1,113	54	Tower	-	-	Tanana Chiefs
2006	2,440	98	Tower	884	Good	Tanana Chiefs and ADF&G
2007	1,113	54	Tower	-	-	Tanana Chiefs

^a Details of aerial survey estimates can be found in memos from John Morsell of Northern Ecological Services to Teck Resources, Inc., 3520 International Street, Fairbanks, AK 9970; and tower counts are from email communications with Mike Smith of Tanana Chiefs Conference, Fairbanks, AK.

^b “Helicopter” indicated aerial surveys using helicopter, “Tower” indicates tower-counts.

^c During these aerial surveys, conditions were judged on a scale of "poor, fair, good, excellent" unless otherwise noted.

Table 4.–Number of angler days, harvest and catch in the Upper Tanana River drainage (UTMA) 1996–2006.

Year	Number of angler-days (effort) in UTMA Area	Total harvest in UTMA area	Total catch in UTMA area	Percent of fish harvested in UTMA area
1996	35,616	39,791	144,084	28%
1997	30,536	30,009	125,366	24%
1998	31,412	37,561	148,258	25%
1999	46,809	38,103	161,328	24%
2000	34,956	39,316	138,658	28%
2001	28,150	23,112	94,747	24%
2002	31,145	31,941	141,838	23%
2003	29,036	22,267	121,585	18%
2004	25,523	16,040	90,254	18%
2005	29,309	16,631	95,358	17%
2006	26,271	13,850	78,815	18%
Average				
10-year (1996-2005)	32,249	29,477	126,148	23%
5-year (2001-2005)	28,663	21,998	108,756	20%
2006 as % of 5-year Average	92%	63%	73%	90%

Source: Howe et. al 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, *in prepa-b*.

Table 5.—Number of fish by species harvested by recreational anglers fishing UTRD waters, 1996–2006.

Year	SALMON				NON-SALMON									Total
	Chinook	Coho ^a	Coho ^b	Chum	Rainbow Trout	Lake Trout	Arctic Char ^c	Arctic Grayling	Northern Pike	Whitefish	Burbot	Sheefish	Other	
1996	31	951	7,907	34	17,183	436	1,103	8,342	2,060	204	971	0	0	39,222
1997	10	895	3,129	0	12,688	476	740	8,273	1,035	289	2,432	0	43	30,010
1998	6	479	7,228	5	19,463	426	1,594	5,944	857	362	1,189	9	78	37,640
1999	21	322	6,016	85	21,178	818	2,332	5,225	1,016	16	1,074	0	0	38,103
2000	0	272	10,720	12	19,854	619	1,510	3,824	704	79	1,672	29	22	39,317
2001	0	940	5,118	0	8,384	267	1,787	4,527	1,012	563	515	0	0	23,113
2002	0	517	5,625	0	14,937	624	2,270	4,972	1,380	280	1,289	48	0	31,942
2003	17	1,306	2,017	17	9,731	793	1,732	4,532	924	0	1,189	0	9	22,267
2004	4	532	1,939	56	8,046	457	799	2,602	636	241	675	39	15	16,041
2005	25	267	1,002	0	6,336	569	463	5,242	1,646	60	1,021	0	0	16,631
2006	0	586	828	52	7,132	612	753	2,602	587	57	598	0	43	13,850
Average 10-year (1996-2005)	11	648	5,070	21	13,780	549	1,433	5,348	1,127	209	1,203	13	17	29,429
5-year (2001-2005)	9	712	3,140	15	9,487	542	1,410	4,375	1,120	229	938	17	5	21,999
2006 as % of 5-year Average	0%	82%	26%	347%	75%	113%	53%	59%	52%	25%	64%	0%	860%	63%

Source: Howe et al. 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, *in prepa-b*.

^a Wild coho salmon.

^b Stocked or landlocked salmon.

Table 6.—Number of fish by species caught by recreational anglers fishing UTMA waters, 1996–2006.

Year	SALMON				NON-SALMON									Total
	Chinook	Coho ^a	Coho ^b	Chum	Rainbow Trout	Lake Trout	Arctic Char ^c	Arctic Grayling	Northern Pike	Whitefish	Burbot	Sheefish	Other	
1996	37	2,924	18,082	1,362	36,390	3,578	2,705	59,677	10,623	384	1,675	13	0	137,450
1997	127	4,067	9,207	53	34,021	4,093	1,573	62,542	4,965	954	3,295	0	472	125,369
1998	19	1,980	15,924	5	48,838	2,225	4,195	66,844	5,419	585	1,719	26	480	148,259
1999	45	1,941	16,960	588	61,372	3,424	9,475	58,671	7,044	377	1,431	0	0	161,328
2000	11	2,124	29,026	12	48,893	2,806	3,802	42,314	7,134	93	2,366	44	36	138,659
2001	13	5,892	11,420	575	22,538	1,150	2,621	41,175	7,584	914	699	0	168	94,749
2002	9	5,442	16,079	102	39,330	3,840	6,073	63,422	5,542	387	1,565	48	0	141,839
2003	157	14,744	7,059	278	26,341	2,946	5,126	56,064	6,611	283	1,475	0	501	121,585
2004	21	4,390	4,862	154	25,057	2,265	4,197	42,359	5,538	316	848	68	183	90,258
2005	25	2,830	2,973	686	17,355	3,651	1,453	55,943	8,299	455	1,370	0	321	95,361
2006	96	4,876	2,487	533	18,670	2,514	3,125	40,233	4,604	436	1,191	7	43	78,815
Average 10-year (1996-2005)	46	4,633	13,159	382	36,014	2,998	4,122	54,901	6,876	475	1,644	20	216	125,486
5-year (2001-2005)	45	6,660	8,479	359	26,124	2,770	3,894	51,793	6,715	471	1,191	23	235	108,758
2006 as % of 5-year Average	213%	73%	29%	148%	71%	91%	80%	78%	69%	93%	100%	30%	18%	72%

Source: Howe et al. 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, *in prepa-b*.

^a Wild coho salmon.

^b Stocked or landlocked salmon.

Table 7.—Delta Clearwater River, coho salmon escapement effort, harvest and catches from the Statewide Harvest Survey, 1977–2007.

Year	Coho Salmon Escapement ^a	DCR Angler-Days	Coho Angler Days ^b	Coho Harvest	Coho Exploitation	Coho Catch	% Released
1977	4,793	6,881	83	31	0.6%		
1978	4,798	7,210	337	126	2.6%		
1979	8,970	8,398	0	0	0.0%		
1980	3,946	4,240	67	25	0.6%		
1981	8,563	4,673	120	45	0.5%		
1982	8,365	4,231	56	21	0.3%		
1983	8,019	5,867	169	63	0.8%		
1984	11,061	5,139	1,528	571	5.2%		
1985	5,358	8,722	1,932	722	13.5%		
1986	10,857	10,137	7,270	1,005	9.3%		
1987	22,300	5,397	2,274	1,068	4.8%		
1988	21,600	5,184	2,092	1,291	6.0%		
1989	12,600	5,368	2,868	1,049	8.3%		
1990	8,325	4,853	2,590	1,375	16.5%	3,271	58
1991	23,900	5,594	2,989	1,721	7.2%	4,382	61
1992	3,963	3,756	1,991	615	15.5%	1,555	60
1993	10,875	4,909	2,602	48	0.4%	1,695	97
1994	62,675	3,984	956	509	0.8%	3,009	83
1995	20,100	6,261	1,503	463	2.3%	5,195	91
1996	14,070	3,424	822	983	7.0%	2,435	60
1997	11,525	2,161	519	866	7.5%	4,174	79
1998	11,100	3,415	820	603	5.4%	2,350	74
1999	10,975	5,705	1,141	76	0.7%	1,634	95
2000	9,225	2,647	529	255	2.8%	1,911	87
2001	46,875	4,670	934	816	1.7%	5,393	85
2002	38,625	4,580	916	517	1.3%	5,311	90
2003	102,800	6,006	1,201	1,272	1.2%	14,665	91
2004	37,550	3,357	671	511	1.4%	4,061	87
2005	31,175	4,504	901	267	0.9%	2,639	90
2006	15,950	4,850	970	580	3.6%	4,864	88
2007	14,650						
Average							
10-year (1996-2005)	31,392	4,047	845	617	3.0%	4,457	84
5-year (2001-2005)	51,405	4,623	925	677	1.3%	6,414	88
2006 as % of							
5-year average	31%	105%	105%	86%		76%	

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

^a Estimates of escapement from river boat only.

^b ADF&G Arctic Grayling Management plan Delta Clearwater River (Parker 2003).

Table 8.—Boat count surveys and aerial surveys of the non-navigatable portion of the Delta Clearwater River for 1994–1999.

Year	Boat Count Escapement	Aerial Count Tributaries	Total Count	Percent in Tributaries
1994	62,675	17,565	80,240	21.9%
1995	20,100	6,283	26,383	23.8%
1996	14,070	3,300	17,370	19.0%
1997	11,525	2,375	13,900	17.1%
1998	11,100	2,775	13,875	20.0%
1999	10,925	2,967 ^a	13,942	21.3%
Average 1994-1998	23,894	6,460	30,354	20.4%

^a Expansion factor (20.4%) applied to average boat survey counts.

Table 9.—Commercial, subsistence, personal use, sport fish coho salmon harvests for the Tanana and Yukon rivers from 1977–2006, and Delta Clearwater River (DCR) escapement.

Year	Commercial Fish ^a		Subsistence and Personal Use ^a		Tanana Sport	Tanana Total	Yukon Total	DCR Coho Escapement
	Yukon	Tanana	Yukon	Tanana	Harvests	Harvests	Harvests	
1977	38,863	1,284	16,333	4,030	94	5,408	55,290	4,793
1978	26,152	3,066	7,787	4,709	139	7,914	34,078	4,798
1979	17,165	2,791	9,794	4,612	25	7,428	26,984	8,970
1980	8,745	1,226	20,158	5,163	67	6,456	28,970	3,946
1981	23,680	2,284	21,228	9,261	45	11,590	44,953	8,563
1982	37,176	7,780	35,894	7,418	52	15,250	73,122	8,365
1983	13,320	6,168	23,895	6,932	63	13,163	37,278	8,019
1984	81,940	7,688	49,020	14,785	662	23,135	131,622	11,061
1985	57,672	11,762	32,264	11,761	796	24,319	90,732	5,358
1986	47,255	441	34,468	13,321	1,349	15,111	83,072	10,857
1987	0	0	48,678	24,195	1,231	25,426	49,909	22,300
1988	86,612	13,972	70,826	31,348	1,818	47,138	159,256	21,600
1989	83,353	16,084	41,714	19,572	1,577	37,233	126,644	12,600
1990	45,511	11,549	44,623	18,768	1,648	31,965	91,782	8,325
1991	106,686	6,268	37,388	21,561	2,345	30,174	146,419	23,900
1992	7,979	6,556	51,980	17,554	1,115	25,225	61,074	3,963
1993	0	0	15,812	4,304	278	4,582	16,090	10,875
1994	4,452	120	41,775	26,489	1,111	27,720	47,338	62,675
1995	47,013	5,826	28,794	19,219	1,101	26,146	76,908	20,100
1996	55,982	3,803	30,602	15,091	1,341	20,235	87,925	14,070
1997	35,320	0	24,295	11,945	1,338	13,283	60,953	11,525
1998	1	0	18,130	7,481	762	8,243	18,893	11,100
1999	1,601	0	21,038	9,541	451	9,992	23,090	10,975
2000	0	0	14,939	5,150	261	5,411	15,200	9,225
2001	0	0	22,156	9,034	1,122	10,156	23,278	46,875
2002	0	0	15,509	9,519	541	10,060	16,050	38,625
2003	25,243	15,119	24,128	11,461	1,314	27,894	50,685	102,800
2004	20,232	18,649	21,028	12,022	716	31,387	41,976	37,550
2005	58,349	21,831	27,871	20,169	267	42,267	86,487	31,175
2006	64,942	11,137	19,650	10,850	629	22,895	85,221	15,950
2007								14,650
Average								
10 year (1996-2005)	19,669	6,269	21,608	10,883	811	17,963	42,088	31,392
5 year (2001-2005)	20,765	11,109	21,704	12,065	792	23,966	43,253	51,405
2006 as % of 5-year	313%	100%	90.5%	90%	79%	95%	197%	31.0%

^a Data from Fred Bue and William Busher, Yukon Area, Fall Chum and Coho Salmon Fishery Season Summary, 2006. ADF&G informational letter. Fairbanks, Alaska.

Table 10.–Number of Arctic grayling harvested and caught by recreational anglers fishing the Delta Clearwater River from 1977–2006.

Year	Angler-days	Harvest Grayling <12"	Harvest Grayling >12"	Total Harvest Grayling	Catch of Grayling <12"	Catch of Grayling >12"	Total Catch Grayling	Arctic Grayling Abundance ^a	SE
1977	6,881	...	...	6,118	...	...	...	9,702	1,234
1978	7,210	...	...	7,657	...	...	...	8,826	1,279
1979	8,398	...	...	6,492	...	...	...	6,258	885
1980	4,240	...	...	5,680	...	...	...	6,175	832
1981	4,673	...	...	7,362	...	...	...	9,829	1,461
1982	4,231	...	...	4,779	...	...	...	9,369	1,159
1983	5,867	...	...	6,546	...	...	...	12,760	1,746
1984	5,139	...	...	4,193	...	...	...	11,063	1,276
1985	8,722	...	...	5,809	...	...	...	10,767	1,388
1986	10,137	...	...	2,343	...	...	...	7,840	1,148
1987	5,397	...	...	2,005	...	...	...	7,684	1,289
1988	5,184	...	...	2,910	...	...	...	8,845	1,962
1989	5,368	...	...	3,016	...	...	...	6,482	1,751
1990	4,853	...	...	1,772	...	...	12,424	4,477	1,766
1991	5,594	0	2,165	2,165	3,033	4,965	7,998	4,420	---
1992	3,756	0	797	797	2,669	3,417	6,086	4,210	---
1993	4,909	0	437	437	3,074	2,638	5,712	3,972	---
1994	3,984	375	1,036	1,411	4,269	5,037	9,306	4,059	---
1995	6,261	0	926	926	1,620	4,354	5,974	3,700	---
1996	3,424	0	1,218	1,218	3,354	5,624	8,978	2,490	310
1997	2,161	0	54	54	2,980	1,685	4,665	4,600	590
1998	3,415	0	0	0	4,842	11,293	16,135	4,500	630
1999	5,705	0	0	0	2,444	9,328	11,772	6,271	369
2000	2,647	0	0	0	2,339	6,351	8,690	6,891	821
2001	4,670	47	44	91	3,554	9,020	12,574		
2002	4,580	51	0	51	3,180	9,733	12,913		
2003	6,006	0	0	0	3,729	13,847	17,576		
2004	3,357	111	0	111	5,805	8,407	14,212		
2005	4,504	65	75	140	2,985	16,987	19,922	14,799	2,204
2006	4,850	85	0	85	3,189	11,599	12,542		
Average									
10 year (1996-2005)	4,047	27	139	167	3,521	9,228	12,744		
5 year (2001-2005)	4,623	55	24	79	3,851	11,599	15,439		
2006 as % of 5-year	105%	155%	0%	108%	83%	81%	81%		

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

^a Arctic grayling population of fish 5 years and older from 1977-2000 (Parker 2003) and for 2005, (Gryska *in prep*)

Table 11.–Sport harvest and catch for northern pike in selected waters within the Upper Tanana River drainage (UTMA), from 1996–2006.

Year	George Lake		Healy Lake		Deadman Lake		Volkmar Lake		Tanana River ^a		Tok Area ^b		Other lakes/streams		Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1996	1,289	4,487	0	355	129	268	9	280	131	237	323	3,031	179	1,965	2,060	10,623
1997	302	1,940	41	117	153	599	82	239	133	239	222	905	102	926	1,035	4,965
1998	418	2,995	27	449	121	350	34	384	27	237	119	329	111	675	857	5,419
1999	344	3,380	0	330	122	424	18	85	78	448	404	1,985	50	392	1,016	7,044
2000	259	4,957	86	248	123	432	10	10	88	353	59	634	79	500	704	7,134
2001	610	5,146	0	0	28	379	40	390	51	193	158	907	125	569	1,012	7,584
2002	223	2,149	39	255	35	571	127	304	18	218	128	1,071	810	974	1,380	5,542
2003	738	4,097	0	449	0	546	24	339	16	124	81	290	65	766	924	6,611
2004	149	2,723	45	151	76	754	30	603	119	254	151	1,721	66	902	636	5,538
2005	853	4,484	0	0	23	1,079	12	280	121	243	594	1,728	19	384	1,622	8,198
2006	217	2,958	9	27	42	179	55	186	104	244	133	586	28	424	588	4,604
Average 10 year (1996-2005)	519	3,636	24	235	81	540	39	291	78	255	224	1,103	161	805	1,125	6,866
Average 5 year (2001-2005)	515	3,720	17	171	32	666	47	383	65	206	222	829	217	719	1,115	6,695
2006 as % of 5-year	42%	80%	53%	16%	130%	27%	118%	49%	160%	118%	60%	71%	13%	59%	53%	69%

Source: Howe et al. 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, *in prepa-b*.

^a Includes that portion of the Tanana River within the UTMA.

^b Tok Area, includes lakes and streams such as Mineral Lake, Tok River, Fish Creek, Moose Creek, Mansfield Lake, Wellesley Lakes, and Island Lake.

Table 12.—Estimates of effort, harvest, and catch for northern pike and other species in the George Lake, from the Statewide Harvest Survey, 1977–2006.

Year	Angler Days	Total	Northern	Northern	Northern	Northern	Northern	Burbot Harvest	Burbot Catch	Grayling Harvest	Whitefish Harvest
		Northern Pike Harvest	Pike Harvest <18 "	Pike Harvest >18 "	Pike Catch	Pike Catch <18"	Pike Catch >18"				
1977	854	1,227						5		0	12
1978	1,271	1,392						0		27	0
1979	903	2,018						64		9	9
1980	1,057	1,395						0		17	0
1981	1,351	2,236						68		6	0
1982	989	1,635						31		0	0
1983	860	1,322						105		0	0
1984	1,254	1,700						143		65	65
1985	1,127	2,670						105		0	70
1986	1,957	3,076						32		134	0
1987	1,467	2,229						0		0	0
1988	964	1,837						0		0	0
1989	610	882						20		10	0
1990	1,540	945			3,950			34	34	17	0
1991	1,931	1,264	1,086	178	5,096	4,684	312	11	11	24	182
1992	1,067	529	446	83	2,861	2,657	204	110	110	23	0
1993	772	442	316	126	2,620	2,339	281	43	43	59	0
1994	594	948	835	113	4,377	3,962	415	52	73	0	0
1995	708	531	415	116	1,582	1,360	222	220	220	81	0
1996	577	1,289	1,093	196	4,487	4,203	284	0	0	0	0
1997	629	302	254	48	1,940	1,665	275	64	90	0	0
1998	829	603	344	74	2,995	2,661	334	8	8	136	0
1999	1,417	344	307	37	3,380	3,195	185	0	13	0	0
2000	734	259	168	91	4,957	4,015	942	0	0	0	0
2001	1,128	610	584	26	5,146	5,067	79	0	0	69	0
2002	700	223	203	20	2,149	1,897	252	0	0	0	7
2003	716	738	516	222	4,097	3,781	316	47	47	12	0
2004	377	149	149	0	2,723	2,512	211	0	0	0	0
2005	1,939	862	762	100	4,527	4,236	291	149	248	16	0
2006	601	217	182	35	2,958	2,877	81	76	76	0	0
Average 10-year (1996-2005)	905	538	438	81	3,640	3,323	317	27	41	23	1
5-year (2001-2005)	972	516	443	74	3,728	3,499	230	39	59	19	1
2006 as % of 5-year	62%	42%	41%	47%	79%	82%	35%	195%	129%	0%	0%

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

Table 13.–Abundance, harvest, and exploitation of northern pike (>18 inches) in George Lake (1987–1992 & 2006).

Year	Northern Pike Abundance ^a	George Lake Harvest ^b	George Lake Catch ^c	10% catch Mortality Plus harvest	Exploitation of Assessed Pike population
1987	8,495	2,229	...	...	...
1988	16,680	1,837	...	...	...
1989	12,354	882	...	...	...
1990	8,107	945	3,950	1,246	15.4%
1991	10,939	1,264	5,096	1,647	15.1%
1992	7,001	529	2,861	762	10.9%
Average					
1987-1992	10,336	1,281	3,969	1,218 ^c	11.8% ^d
2006	16,178	853	4,236	1,191	7.4%

^a Spring abundance for George Lake for fish > 18 inches or ≥ 450 mm FL, using the “Darroch” estimator in 1987-1988; the “Peterson” estimator in 1989-1991; and using the unstratified “Program Capture” estimator from 1992-1993 (Pearse and Burkholder 1993).

^b (Mills 1988-1993) catch rates were not reported until 1990.

^c Average is based on years 1990-1992 only.

^d Exploitation based on average harvest of 913 fish for years 1990-1992.

Table 14.—Sport harvest and catch for lake trout in selected lakes within the Upper Tanana River drainage (UTRD), from 1996–2006.

Year	Fielding Lake Drainage ^a		Tangle Lakes Drainage ^b		Delta River		Stocked lakes		Other UTMA lakes		UTMA waters	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1996	42	608	268	2,693	0	0	44	163	82	114	436	3,578
1997	55	270	310	3,453	0	0	76	248	35	122	476	4,093
1998	19	302	305	1,574	0	0	7	128	95	221	426	2,225
1999	43	293	519	2,202	14	81	73	667	169	181	818	3,424
2000	36	313	394	1,930	0	0	180	471	9	92	619	2,806
2001	17	129	149	716	0	0	5	74	96	231	267	1,150
2002	13	521	414	2,464	48	157	128	484	21	214	624	3,840
2003	83	423	516	2,037	68	90	126	384	0	12	793	2,946
2004	101	520	270	976	30	91	0	284	56	393	457	2,264
2005	112	862	224	2,327	0	0	32	202	201	260	569	3,651
2006	108	634	292	1,076	0	125	203	670	9	9	612	2,514
Average												
10-year (1996-2005)	52	424	337	2,037	16	42	67	311	76	184	548	2,997
5-year (2001-2005)	65	491	315	1,704	29	68	58	286	75	222	542	2,770
2006 as % of 5-year	166%	129%	93%	63%	0%	184%	350%	234%	12%	4%	113%	91%

Source: Howe et al. 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, *in prepa-b*.

^a Fielding Lake drainage includes, Crystal, Two-bit, and Sevenmile Lakes.

^b Tangle Lakes District includes, Glacier, and Landmark Gap lakes.

Table 15.—Summary of sport harvest and catch of Arctic grayling, burbot, and lake trout in Fielding Lake from 1981–2006.

Year	Angler-Days	Lake Trout Harvest	Lake Trout Catch	Lake Trout Abundance ^a	Burbot Harvest	Burbot Catch	Burbot Abundance ^b	Arctic Grayling Harvest	Arctic Grayling Catch
1981	1,369	295			249			1,913	
1982	2,764	346			365			3,044	
1983	1,737	294			367			2,035	
1984	871	169			0			935	
1985	1,023	347			0		325	1,023	
1986	1,682	136			32		334	1,329	
1987	1,032	127			12		234	910	
1988	1,728	364			36		426	1,492	
1989	1,664	195			0		581	1,283	
1990	1,255	186	321		0	0	698	1,097	2,802
1991	1,572	295	870		0	0	617	1,284	3,815
1992	1,910	170	247		51	51	347	548	2,585
1993	1,827	276	939		32	32	337	1,055	7,670
1994	2,129	52	213		73	73	445	1,244	8,901
1995	3,575	44	486		0	0	447	944	3,811
1996	960	42	222		0	0	483	599	3,114
1997	1,259	55	245		0	0	405	1,133	1,612
1998	1,602	19	341		0	25	421	851	2,165
1999	1,154	43	279	264	0	15	598	645	3,050
2000	827	18	221		0	48		705	2,594
2001	525	12	106		0	0		424	2,028
2002	826	0	137		0	0		587	2,932
2003	840	83	423		11	11		351	1,989
2004	1,010	101	520		30	30		491	2,802
2005	1,248	112	862		25	55		623	4,437
2006	1,034	108	634		51	85		56	952
Average 10-year (1996-2005)	1,025	49	336		7	18		336	2,672
5-year (2001-2005)	890	62	410		13	19		410	2,838
2006 as % of 5-year	116%	174%	155%		392%	447%		14%	34%

Source: Mills 1982–1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, *in prepa-b*.

^a Population estimate of abundance of lake trout 22 inches (legal size limit) and larger (Parker et al. 2001).

^b Population estimates of abundance of burbot 18 inches total length and larger (Parker 2001).

Table 16.—Sport harvest and catch of burbot in select waters of the UTMA from 1996–2006.

Harvest Year	Fielding Lake		Tangle Lakes		George Lake		Shaw Creek		Tanana River		Other Lakes		UTMA waters	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1996	0	0	0	0	0	0	24	81	720	1,241	228	353	972	1,675
1997	0	0	52	52	64	90	52	180	2,058	2,458	206	515	2,432	3,295
1998	0	25	0	0	8	8	71	79	863	1,292	247	316	1,189	1,720
1999	0	15	8	28	0	13	127	127	761	994	178	254	1,074	1,431
2000	0	48	0	0	0	0	557	582	867	1,305	248	431	1,672	2,366
2001	0	0	29	29	0	0	72	72	378	562	36	36	515	699
2002	0	0	22	22	0	0	168	183	824	1,059	275	323	1,289	1,565
2003	11	11	9	19	47	47	32	32	1,079	1,355	11	11	1,189	1,475
2004	30	30	0	0	0	0	0	0	645	818	0	0	675	848
2005	25	50	0	34	149	248	50	62	773	905	24	71	1,021	1,370
2006	51	89	0	0	76	76	20	20	451	860	0	146	598	1,191
Averages														
10-year (1996-2005)	7	18	12	18	27	41	115	140	897	1,199	145	231	1,203	1,644
5-year (2001-2005)	13	18	12	21	39	59	64	70	740	940	69	88	938	1,191
2006 as % of 5-year	392%	494%	0%	0%	195%	129%	31%	29%	61%	91%	0%	166%	64%	100%

^a Howe et al. 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006 a-b, 2007, *in prepa-b*.

Table 17.—Effort, harvest, and catch statistics by species for stocked fisheries in the UTMA 1997–2006.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Ave. "97-06
	Effort^a										
Number of anglers	7,128	7,696	8,461	7,259	6,180	5,952	3,424	2,493	2,797	2,238	5,363
Days fished (SW effort) ^a	12,278	13,613	23,126	17,243	12,642	15,800	10,528	12,065	9,390	9,816	13,650
Days fished (UTMA effort)	30,536	31,412	46,809	34,956	28,150	31,145	29,036	25,523	24,141	26,271	30,798
Percent of stocked water effort	40%	43%	49%	49%	45%	51%	36%	47%	39%	37%	44%
	Harvest^a										
Rainbow trout	12,394	19,303	21,914	19,854	9,063	17,762	9,657	8,046	6,336	7132	13,146
Coho/King salmon	3,129	6,710	6,533	10,720	5,123	8,684	2,010	1,939	1,002	828	4,668
Arctic grayling	322	123	135	33	720	387	175	97	193	94	228
Arctic char	688	1,409	2,356	1,498	1,575	2,268	1,668	723	355	702	1,324
Lake trout	111	7	300	82	37	144	126	56	257	212	133
Total	16,644	27,552	31,238	32,187	16,518	29,245	13,636	10,861	8,143	8,968	19,499
Harvest / effort	1.4	2.0	1.4	1.9	1.3	1.9	1.3	0.9	0.9	0.9	1.4
	Catch^a										
Rainbow trout	32,652	49,049	63,723	48,663	24,461	44,606	26,230	25,057	17,355	18,670	35,047
Coho/King salmon	9,207	15,924	18,201	29,026	11,429	23,816	7,052	4,862	2,973	2,487	12,498
Arctic grayling	1,939	3,097	3,145	1,059	3,333	3,294	991	1,833	1,262	2,238	2,219
Arctic char	1,342	3,400	9,200	3,507	2,323	6,001	4,923	3,089	1,236	2,993	3,801
Lake trout	370	136	994	340	218	886	390	677	494	679	518
Total	45,510	71,606	95,263	82,595	41,764	78,603	39,586	35,517	23,320	27,067	57,085
Catch / effort	3.7	5.3	4.1	4.8	3.3	5.0	3.8	2.9	2.5	2.8	4.2

^a Howe et al. 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, *in prepa-b*.

Table 18.—Summary of stocking activities for the UTMA, 2005–2007.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
2005					
Arctic grayling				5,950	5,950
Arctic char			12,986		12,986
King salmon		5,805			5,805
Coho salmon				51,392	51,392
Rainbow trout		18,939		120,122	245,567
Total	0	24,744	12,986	106,506	321,700
2006					
Arctic grayling				52,592	52,592
Arctic char			2,076		2,076
King salmon		0			0
Coho salmon				70,826	70,826
Rainbow trout		29,477		94,273	94,273
Total	0	9,232	3,000	195,331	207,563
2007					
Arctic grayling				2,016	2,016
Arctic char		2,925	15,223		18,148
King salmon		9,334			9,334
Coho salmon				105,956	105,956
Rainbow trout		32,981	30,523	302,487	365,991
Total		45,240	45,746	410,459	501,445

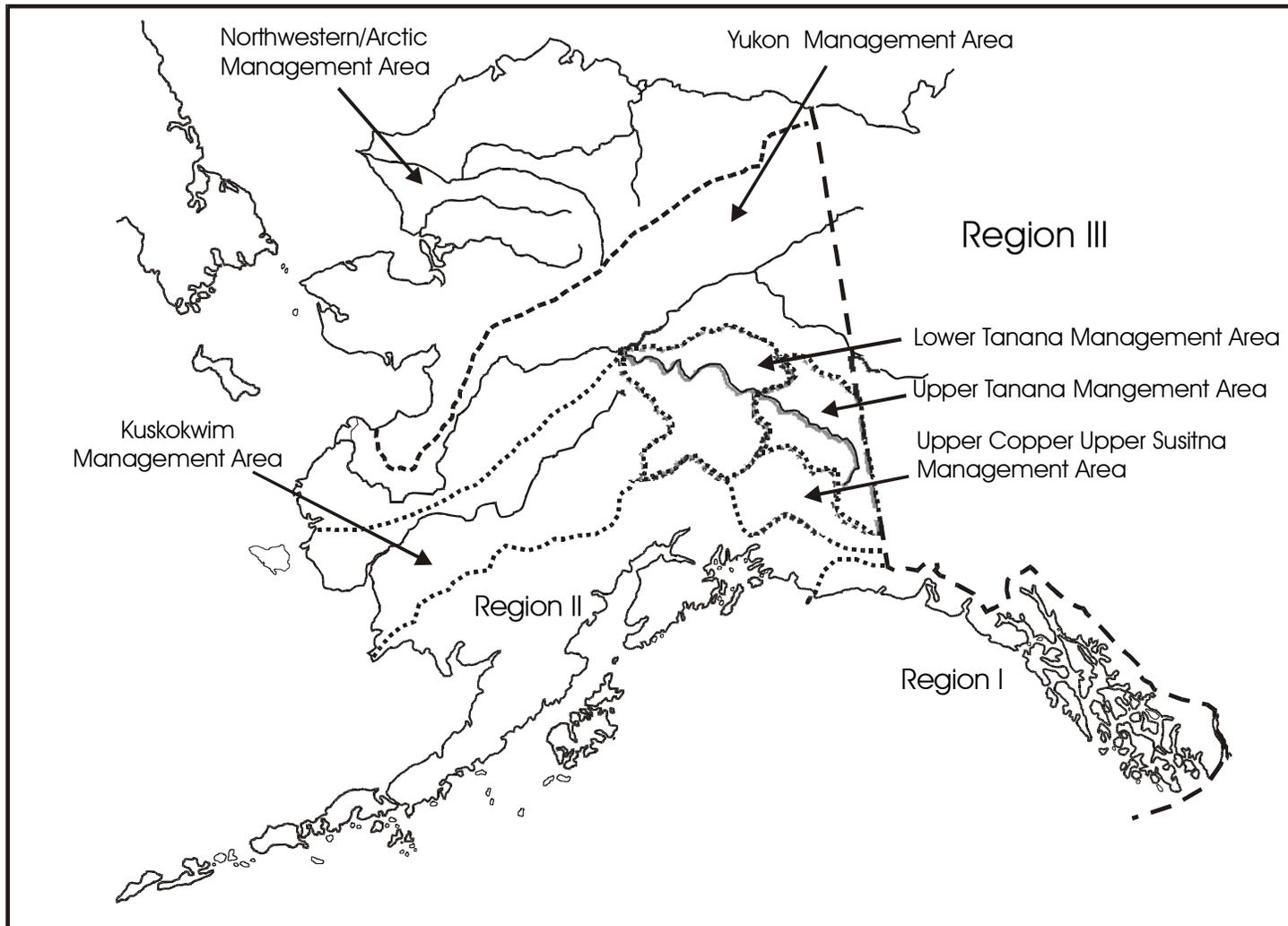


Figure 1.—Map of the sport fish regions in Alaska and the six Region III management areas.

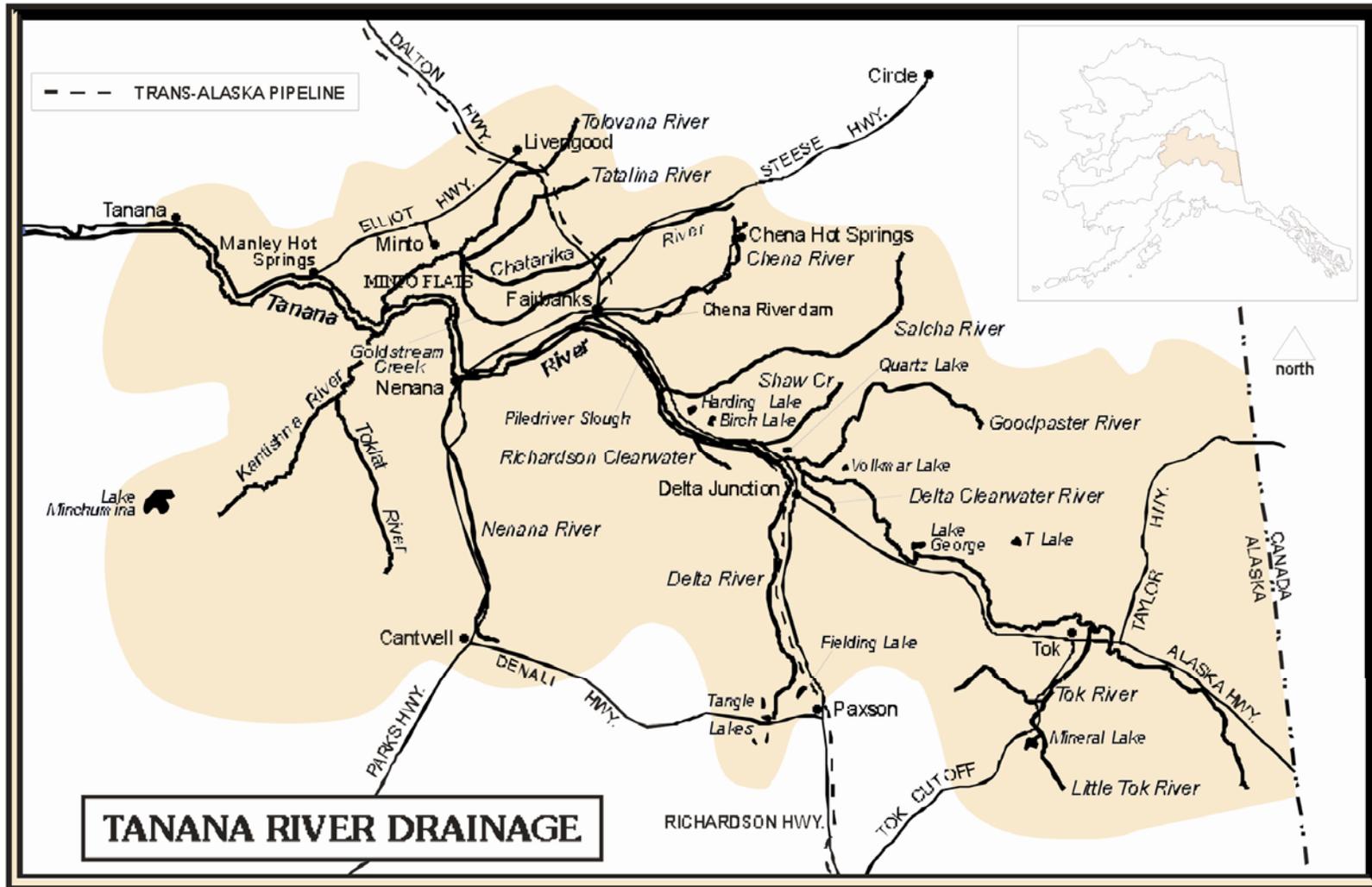


Figure 2.—Map of the Tanana River drainage.

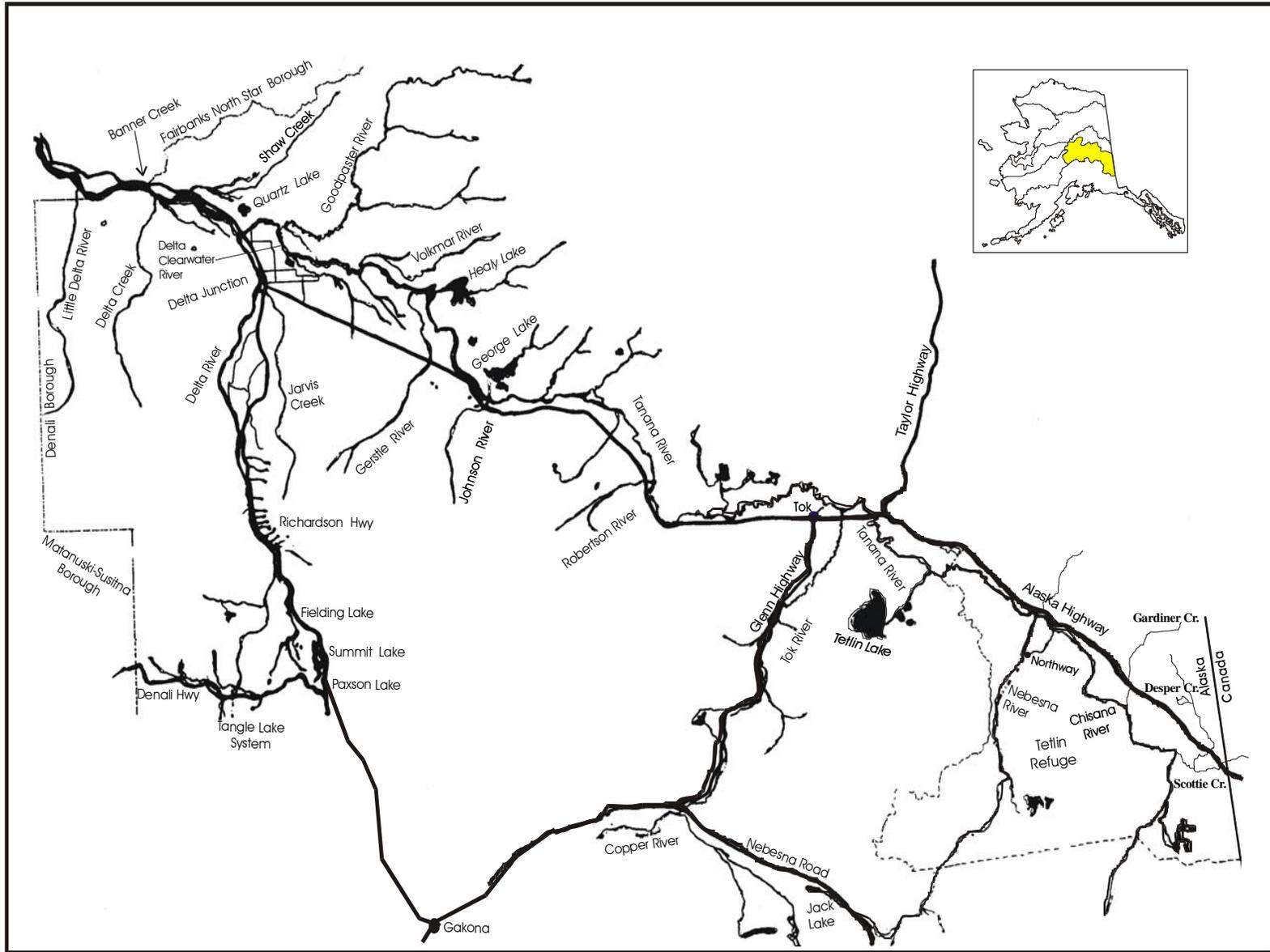


Figure 3.—Map of the Upper Tanana Management Area within the Tanana River drainage.

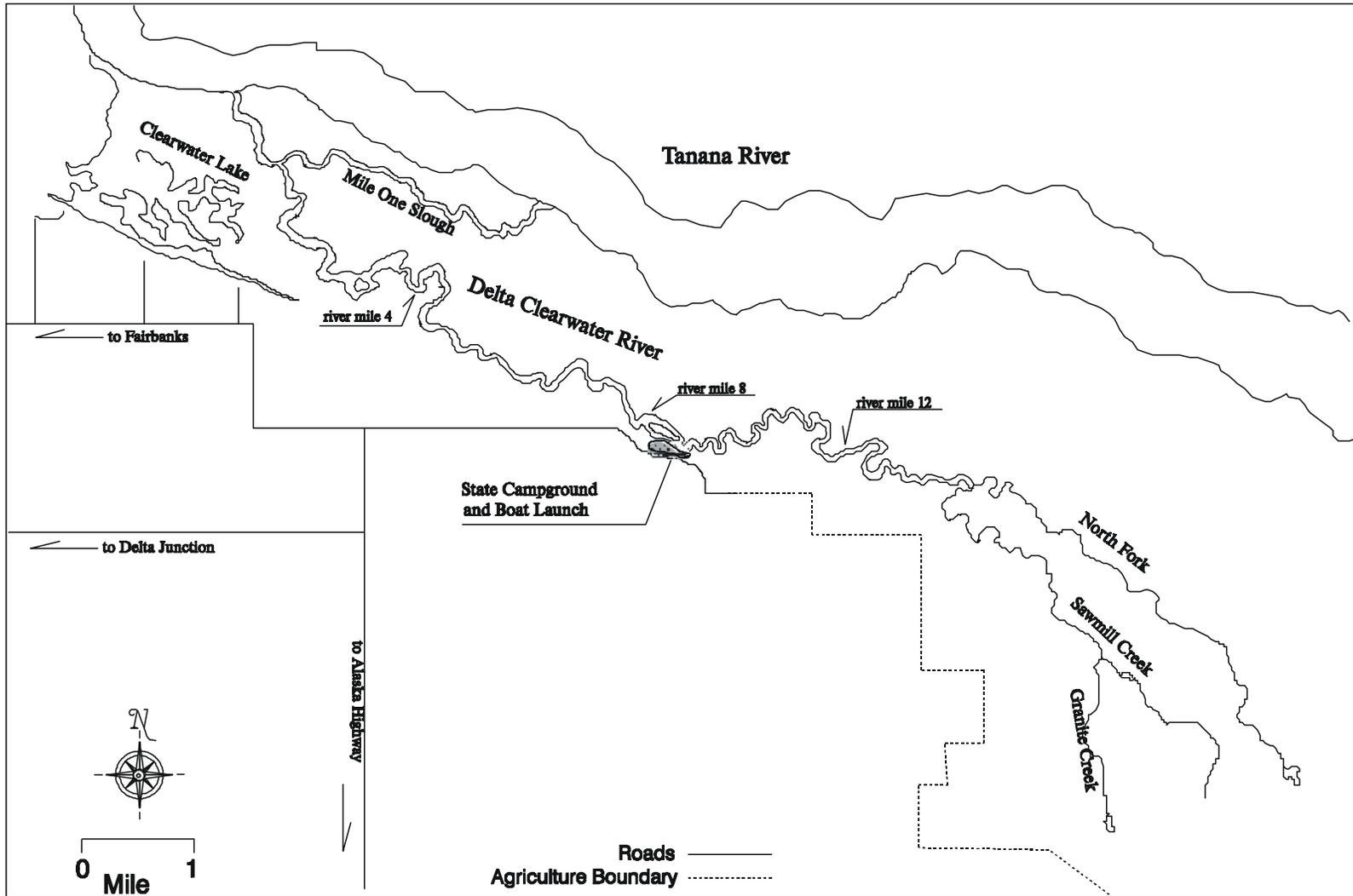


Figure 4.—Map of the Delta Clearwater River.

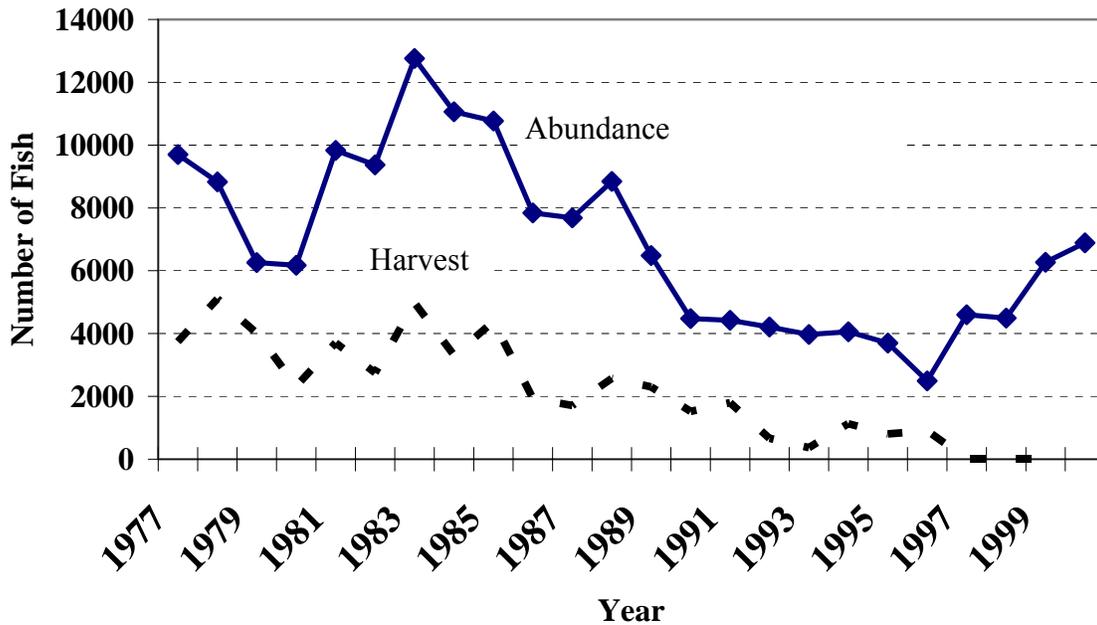


Figure 5.—Abundance of age-5 Arctic grayling in the Delta Clearwater River from 1977–2000.

Note: Estimates for 1977–1990 are from CAGEAN modeling (Clark and Ridder 1994) and reflect population at start of fishing season. Estimates for 1996 - 1999 are from mark-recapture experiments and reflect the population in July (Ridder 1998b; 1999; Ridder and Gyska 2000; and Gyska 2001). Harvest Data from Mills (1979-1994), Howe et al. (1995, 1996, 2000a-d), and Walker et al. (2003).

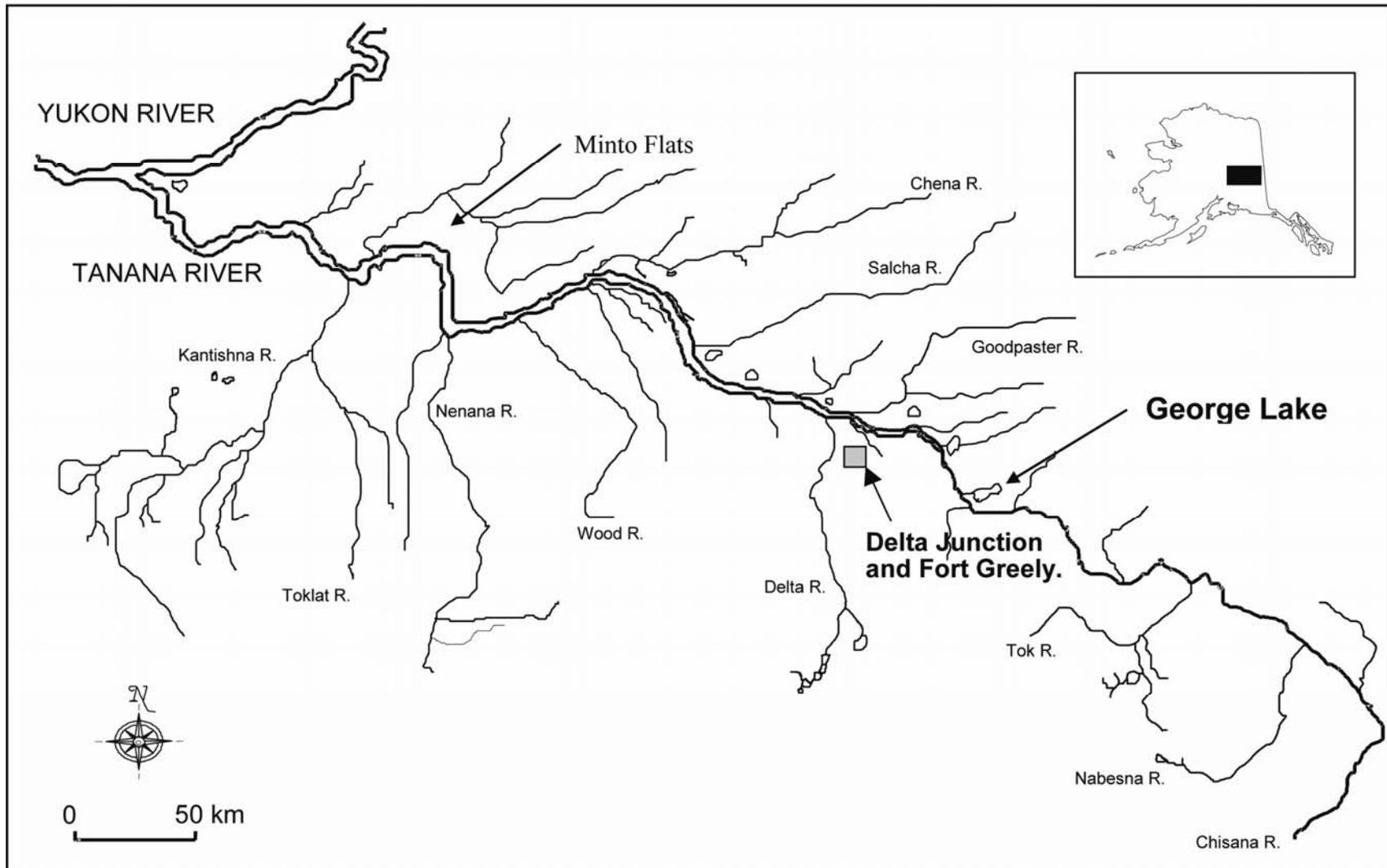


Figure 6.-Map of the Tanana River drainage and location of George Lake.

APPENDIX A

Appendix A1.–Web based sites for recreational information in the Upper Tanana River drainage.
Information of interest for anglers fishing Upper Tanana River Management Area.

1. Information regarding regulations, publications, stocking and fishing reports, news releases and emergency orders. **link:** www.sf.adfg.state.ak.us/region3/index.cfm
Contact information for ADF&G public use cabins: (907) 459-7228
2. Upper Tanana River Management Area. **link:** www.sf.adfg.state.ak.us/Management/areas.cfm/FA/upperTanana.overview Contact information: (907) 895-4632.
3. Sport fishing brochures. **Link:** <http://www.sf.adfg.state.ak.us/region3/pubsR3.cfm>
4. Tok ADF&G field office contact information (907) 883-2971
5. USARMY, access and recreational information for Donnelly Training Area. **Link:** http://www.usarak.army.mil/conservation/REC_USARTRAK.htm
6. Alaska Public Lands Information office in Tok. **Link:** http://www.nps.gov/aplic/about_us/taplic.html
7. Bureau of Land Management (BLM) Delta National Wild, Scenic, and Recreational River. http://www.blm.gov/ak/st/en/fo/gdo/delta_wild_and_scenic.3.html
8. State Parks, campground, cabin rentals (including ice houses on Quartz Lake). link: <http://www.dnr.state.ak.us/parks/> Contact information (907) 895-4599
9. USF&WS Tetlin Refuge: **link:** <http://alaska.fws.gov/nwr/tetlin/index.htm>