Fishery Management Report No. 15-51

Fishery Management Report for Sport Fisheries in the Yukon Management Area, 2014

by

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and

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December 2015

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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

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ABSTRACT

Information specific to recreational fisheries in the Yukon Management Area in 2014 and preliminary information for 2015 is presented. Estimates of fishing effort, total catch, and harvest is summarized through the 2014 season. This information is provided to the Alaska Board of Fisheries (BOF), as well as to the general public and interested parties. Summaries of major fisheries within the area are detailed, including descriptions of the performance of these fisheries, regulatory actions by the BOF, social and biological issues, and descriptions of ongoing research and management activities. The waters of the Yukon Management Area supported approximately 12,900 angler-days of sport fishing in 2014. Non-salmon species dominated the total catch of 68,000 fish, and a harvest of approximately 6,200. Arctic grayling *Thymallus arcticus*, northern pike *Esox lucius*, Dolly Varden *Salvelinus malma*, Arctic char *Salvelinus alpinus*, and sheefish *Stenodus leucichthys* comprised more than 80% of the total catch.

Key words: Yukon, sport fisheries, sport fishery management, fisheries management plan, Anvik River, Nowitna River, Dall River, Innoko River, Dalton Highway, northern pike, Dolly Varden, Chinook salmon, coho salmon, Arctic grayling, sheefish.

INTRODUCTION

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

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

A regional review is conducted annually, during which the status of important area fisheries is considered and research needs are identified. Fisheries stock assessment 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 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 as the Dingell–Johnson Act or D–J Act). D–J funds are provided to states at a match of up to 3-to-1 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 YMA and its fisheries for 2014, with preliminary information from the 2015 season. This report is organized into 2 primary sections: a management area overview, including a description of the management area and a summary of effort, harvest, and catch for the area; and a section on significant area fisheries, including specific harvest and catch by species and drainage.

The BOF divides the state into 18 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 47–74. The Division of Sport Fish of ADF&G divides the state into 3 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 Drainages, Knik Arm Drainages, Susitna River Drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes the Upper Copper River and Upper Susitna River area and the Arctic–Yukon–Kuskokwim (AYK) Region (including the North Slope, Northwestern, Yukon River, Tanana River, and Kuskokwim-Goodnews regulatory areas).

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 442,500 mi^2 (1,146,000 km^2) of land, some of the state's largest river systems (Yukon, Kuskokwim, Colville, Noatak, and the Upper Copper and Upper Susitna River drainages), thousands of lakes and streams, and thousands of miles of coastline. 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 35,000; the Fairbanks North Star Borough has a population of about 99,000) is the largest community.

For administrative purposes, Sport Fish Division has divided Region III into 5 fisheries management areas (Figure 1):

- Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);
- Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);
- 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);
- Tanana River Management Area (the Tanana River drainage); and
- Kuskokwim–Goodnews Management Area (the entire Kuskokwim River drainage and Kuskokwim Bay drainages).

Area management biologists for the 5 areas are located in Nome/Fairbanks, Fairbanks, Glennallen, Fairbanks/Delta Junction, and Bethel/Fairbanks, respectively.

ALASKA BOARD OF FISHERIES

The BOF is a 7-member board that sets fishery regulations and harvest levels, allocates fishery resources, and approves or mandates fishery conservation plans for the State of Alaska. BOF members are appointed by the governor for 3-year terms and must be confirmed by the legislature.

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 ACs, and special interest groups such as fishermen's associations and clubs. The public provides input concerning regulation changes and allocation by submitting written proposals and testifying directly to the BOF, by participating in local AC meetings, or by becoming members of local ACs.

ADVISORY COMMITTEES

Local ACs have been established throughout the state to assist both the Board of Game and BOF of Fisheries and Game in evaluating fisheries and wildlife issues and proposing attendant regulatory changes. AC meetings allow opportunity for direct public interaction with ADF&G staff attending the meetings, where they are available to answer questions and provide clarification about proposed regulatory changes that affect resource issues of local and statewide concern. The Boards Support Section, within the ADF&G's Division of Administrative Services, provides administrative and logistical support for the BOF and ACs. During 2014, the department had direct support responsibilities for 84 ACs in the state.

Within the YMA there are 10 ACs: Eagle, Upper Tanana/40-Mile, Yukon Flats, Central, Tanana-Rampart-Manley (TRM), Middle Yukon, Koyukuk, Grayling-Anvik-Shageluk-Holy Cross (GASH), Ruby, and Lower Yukon. In addition, the Delta and Fairbanks ACs often comment on proposals concerning fisheries in the YMA.

ADF&G EMERGENCY ORDER AUTHORITY

ADF&G has emergency order (EO) authority (5 AAC 75.003) to modify time, area, and bag/possession limit regulations. EOs are implemented to address conservation issues for resident species. EOs are also implemented as a tool for inseason management of salmon fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the BOF. EOs issued under this authority for the YMA during 2014 and 2015 are summarized in Appendix A.

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for federally qualified rural residents on lands and waters for which the federal government asserts jurisdiction. The State of Alaska has also established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258) on all lands and waters, but it cannot discriminate between rural and urban residents (Alaska State Constitution Article VIII, sections 3 and 15). Because of this difference, the federal government asserted authority to ensure a priority subsistence use of fish and game for rural residents on

federal lands and certain adjacent waters. On October 1, 1999, the federal government asserted regulatory authority for assuring the rural priority for subsistence fisheries on federal public lands, which includes nonnavigable waters on public lands. Following the *State of Alaska v. Katie John* decision by the Ninth Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which the federal agencies assert federal reserved water rights. Under current practice, the federal land management agencies adopt regulations to provide for priority subsistence use by qualified rural residents in nonnavigable waters within federal public lands (including Bureau of Land Management [BLM] lands) and in navigable waters adjacent to or within federal conservation system units (which generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land.

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

Within the YMA, the subsistence fisheries for which the federal government asserts management responsibility include those within and adjacent to the Gates of the Arctic National Park, Yukon-Charley Rivers National Preserve, Steese National Conservation Area, White Mountain National Recreation Area, Innoko National Wildlife Refuge (NWR), Kanuti NWR, Koyukuk NWR, Nowitna NWR, Yukon Flats NWR, Yukon Delta NWR, Beaver Creek National Wild and Scenic River (NW&SR), Birch Creek NW&SR, and Fortymile NW&SR. Subsistence fisheries within these areas fall under the purview of the Eastern, Western, and Yukon-Kuskokwim Delta RACs. The most recent meeting of the Yukon–Kuskokwim Delta RAC was in Bethel (October 2015); the Western Interior RAC met in Galena (November 2015); and the last meeting of the Eastern Interior RAC took place in Fairbanks (October 2015). At these meetings, federal fishery proposals concerning additional subsistence fishing time, restricting drift gill net use in lower river districts and authorizing dip net use in Federal subsistence fisheries were discussed. The RAC recommendations were forwarded to the FSB.

REGION III SPORT FISH DIVISION RESEARCH AND MANAGEMENT STAFFING

The Region III Division of Sport Fish 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 5 management areas, 1 or more assistant area management biologists, and 2 stocked waters biologists. 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 consists of interaction with the BOF, ACs, and the general public. Stocked waters biologists plan and implement the regional stocking program for recreational fisheries. The regional management supervisor also supervises the regional fishing and boating access program.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey. The Statewide Harvest Survey (SWHS) is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific catch-per-unit effort (CPUE) information can seldom be derived from the report. Questionnaires are mailed to a stratified random sample of households containing at least 1 individual with a valid fishing license (resident or nonresident). Information gathered from the survey includes participation (number of anglers and 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 (Mills 1993). Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. Survey results for each year are available the following year; hence, the results for 2014 were available fall 2015. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or inseason management.

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

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

For purposes of reporting and organizing statistics in the SWHS, the YMA is designated as survey area Y.

SPORT FISH GUIDE REGISTRATION AND LOGBOOK PROGRAM

Since 1998, the Division of Sport Fish has operated a program to register and/or license both sport fishing guides and sport fishing guide businesses, and to collect information on sport fishing participation, effort, and harvest by saltwater and freshwater guided clients (Sigurdsson and Powers 2009). In 1998, the BOF adopted statewide sport fishing guide regulations (5 AAC 75.075) that required all sport fishing guides and businesses to register annually with ADF&G. At this time, the BOF also adopted statewide regulations that required logbooks for saltwater charter vessels. The logbooks collected information on charter activity (location, effort, and harvest) that was necessary for the BOF for allocation and management decisions specific to Chinook salmon *Oncorhynchus tshawytscha*, rockfish *Sebastes* spp., and lingcod *Ophiodon elongatus*, and for the North Pacific Fishery Management Council (NPFMC) for allocation of Pacific halibut *Hippoglossus stenolepis*.

In 2004, the Alaska Legislature adopted House Bill 452, which established licensing requirements for sport fishing guide business owners and sport fishing guides on a statewide basis (effective 2005). This legislation also required logbook reporting for all freshwater guiding businesses, in

addition to the existing saltwater reporting requirements. The logbook data provides location of fishing effort, level of participation, and number of species kept and released by clients. This information is used for the regulation, development, and management of fisheries and has been published annually since 2009 (data since 2006) in a Fishery Data Series report (Sigurdsson and Powers 2009–2014).

SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The YMA consists of approximately 157,475 miles^2 (407,858 km^2) of extremely varied topography, climate, and zoogeography. The Yukon River is the largest river in Alaska, and its drainage is the 5th largest in North America. The YMA (Figure 2) includes all of the Yukon River drainage in the United States, except for the Tanana River drainage. The area, as a whole, is sparsely populated. The communities within the management area are invariably located near water because of the importance of fish and/or marine mammals as a food source to local people.

Access to most of the area is limited to water or air travel. Major river systems provide transportation corridors during winter, as well as during open-water months. Road access to the Yukon River is provided by the Dalton Highway, by the Steese Highway at Circle, and by the Taylor Highway at Eagle. With the exception of the Dalton Highway, these gravel roads are not maintained during winter.

Land ownership and jurisdictions fragment this large area into a complex mosaic. The federal government is the major land manager through its jurisdiction over lands in 2 National Parks and Preserves (Yukon-Charley and Gates of the Arctic), 5 National Wildlife Refuges (Yukon Flats, Kanuti, Koyukuk, Nowitna, and Innoko), the White Mountains National Recreation Area, the Steese National Conservation Area, and numerous Wild and/or Scenic Rivers, as well as other classifications of federal lands. Lands held by the State of Alaska, Native corporations, and other private landowners compose the remaining landmass. Arvey et al. (1995) provides a detailed description of the geology of the YMA.

FISHERY RESOURCES

Virtually all freshwater and migratory fish species sought by anglers in Alaska are available in the YMA. All populations are wild; there is presently no enhancement of fish populations in the management area. Five species of Pacific salmon are available in tributaries of the Yukon River, including Chinook salmon, coho salmon *O. kisutch*, chum salmon *O. keta*, sockeye salmon *O. nerka*, and pink salmon *O. gorbuscha*.

Unique opportunities to fish for freshwater resident species in remote wilderness settings exist throughout this management area. Exceptionally large northern pike *Esox lucius* and sheefish (inconnu) *Stenodus leucichthys* are available in the Innoko, Kaiyuh, and Nowitna river drainages. Opportunities to fish for Arctic grayling *Thymallus arcticus*, Dolly Varden *Salvelinus malma*, northern pike, burbot *Lota lota,* and lake trout *Salvelinus namaycush* are very widespread and sport fishing pressure on these wild stocks is very light. The Dalton Highway is a popular destination, providing road access to adjacent lakes and streams that support stocks of Arctic grayling, northern pike, and Dolly Varden. Wild stocks of rainbow trout *Oncorhynchus mykiss* do not occur naturally in drainages north of the Kuskokwim River and are currently not stocked

in waters within the YMA. Additional species of whitefish that are of importance to fisheries in the YMA include broad whitefish *Coregonus nasus* and Bering cisco *C. laurettae*.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the YMA are found in 5 AAC 73.005 through 5 AAC 73.065 (sport fishing), in 5 AAC 01.200 through 5 AAC 01.249 (subsistence fishing), and in 5 AAC 05.001 through 5 AAC 05.380 (commercial fishing).

Fisheries-specific management objectives for the management area have been identified in management plans for Arctic grayling and lake trout. In addition, a series of general divisional criteria have been prepared to guide establishment of fishery objectives, including the following:

1. **Management and protection of existing fish resources**. Divisional activities should strive to manage and protect Alaska's wild fish stock resources for future generations.
2. **Public use and benefits of existing fish resources**. Alaska's fishery resources should be made available for public use and benefit on a sustained yield basis.
3. **Rehabilitation of depressed stocks and damaged habitat**. Divisional activities should strive to restore and maintain fish stocks and habitat damaged by human activities.
4. **Enhancement of natural production or creation of new opportunities**. The division should pursue creation of new sport fishing opportunities through rehabilitation of natural stocks or creation of new fisheries where these opportunities do not negatively impact other fisheries.

Two management plans for resident fishes apply to the entire YMA. A regional management plan for Arctic grayling was adopted by the BOF in January 2004 (5 AAC 70.055, 2004). This plan supersedes a previous Yukon River drainage management plan for Arctic grayling. A management plan for lake trout in the AYK region was adopted by the BOF for the Upper Copper/Upper Susitna Management Area in December 2005. The *Wild Lake Trout Management Plan* (5 AAC 70.040, 2007) was adopted for the remainder of the AYK region by the BOF in February 2007 (Burr 2006). Revision of existing plans, as well as development of additional fisheries management plans, will occur as needed in response to changes in use patterns as new quantitative information becomes available.

A cooperative planning effort for the Dall River northern pike fishery provided a management plan for this fishery (Burr 2001). Cooperators include the department, the Stevens Village Natural Resources Office, the Yukon Flats NWR, and members of the Fairbanks AC.

MAJOR ISSUES

1. Dalton Highway recreational fisheries. The opening of the entire length of the Dalton Highway (North Slope Haul Road) to public travel in 1994 provided new access to lakes and streams along the route. Increases in recreational fishing effort and harvest have resulted in reductions in bag limits for northern pike and Arctic grayling. The State of Alaska is in the continual process of upgrading and paving the Dalton Highway north of the Yukon River. Sport fishing by road construction crews and by increasing numbers of visitors will probably bring greater fishing effort to fish stocks in the highway corridor. Due to the unproductive fisheries habitat in the region, the potential for overexploitation of these stocks is considered

high and has resulted in adoption of restrictive bag limits or catch-and-release regulations for fisheries within the corridor.

2. Development of new sport fisheries in rural Alaska. Relatively rapid development of sport fisheries in remote areas has resulted in friction between local residents and nonlocal anglers. In many instances, local people have historically enjoyed nearly exclusive use of fishery resources. Sport fishing guides and other anglers seeking less crowded fishing opportunities in wilderness settings continue to "discover" less well known but potentially high-quality fisheries. As currently popular fishing destinations in other parts of Alaska become increasingly crowded, anglers and guides are likely to continue to travel farther to participate in Alaska's fisheries. The department will be increasingly expected to provide information on the status of stocks for which there is currently only the most rudimentary information. This is likely to be the biggest challenge in management of sport fisheries in the YMA. Experiences at the Dall and Innoko rivers are examples of the type of challenges that should be anticipated (see pages 21–22).

3. Hook-and-line subsistence. In 2000, the BOF included hook and line attached to a rod or pole as a legal subsistence fishing method for harvest during the open-water season in the Association of Village Council Presidents' area of the Lower Yukon and Kuskokwim rivers. Until this action was taken, hook and line fishing for subsistence in the YMA was permitted only through the ice under state regulations. The primary concern with this change is how to manage for sustainable fish populations with the legalization of hook and line gear for subsistence fishing. It is likely that rural resident use patterns have incorporated hook and line in past subsistence harvests, and legalization of this gear will not greatly affect local use patterns. Because all Alaskans qualify for subsistence, resident anglers could choose to fish with hook and line under subsistence regulations instead of sport fish regulations. The greatest management concerns relate to changes in urban resident behavior in regard to reduced license sales, the participation by these urban residents in rural fisheries and harvests of fish populations under subsistence regulations, and the inability to measure these harvests without harvest surveys or permits.

4. Rural resentment of sport fishing and sport anglers. At public meetings in this area, local residents sometimes express resentment toward "outsiders" who come into remote areas traditionally used by local people for subsistence hunting or fishing. They explain that there is a cultural proscription against the concept of "sport fishing" in that people do not have the right to "play" with food resources. This point of view can be particularly strong toward catch-and-release practices and has led to some resentment directed towards sport anglers who wish to fish in remote waters of YMA, and to proposals before the BOF that would have eliminated catch-and-release in some fisheries.

5. Federal fishery management for subsistence in Alaska's navigable waters. In October 1999, federal fishery managers assumed responsibility for ensuring a rural subsistence priority on navigable waters adjacent to, or within, the boundaries of federal conservation units. There is continued concern that a result of this action will be reduced opportunity for sport fishing throughout the state. Because of the large amount of federal public land within the YMA and because of the high proportion of subsistence users, this potential loss of opportunity is a continual concern for sport fishermen in the area.

ACCESS PROGRAM

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

To date, relatively few access projects have been proposed for rural YMA. Access funds were used for construction of a concrete boat launch to the Yukon River in cooperation with the city of Galena. Another concrete boat launch was completed in 2013 at Birch Creek on the Steese Highway.

INFORMATION AND EDUCATION

Information regarding regulations, publications, fishing reports, news releases, and EOs for the YMA can be found from the *Fishing* and *Sport* links at the ADF&G website (http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main). Information on rivers and lakes is also available from the Alaska Department of Natural Resources' website (http://dnr.alaska.gov/parks/aktrails/index.htm). Federal agencies provide information on water bodies in National Parks and Preserves, National Wildlife Refuges, and Wild and Scenic Rivers.

There are 3 regional information and education (I&E) staff located in the Fairbanks office. An Information Officer II and a seasonal Fisheries Biologist I 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 and fishing regulations; manage the regional webpage; and coordinate the Fairbanks Outdoor Show booth, Kid's Fish and Game Fun Day, and the Becoming an Outdoors-Woman 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

Effort, harvest, and catch statistics for YMA sport fisheries have been estimated from response to the SWHS since 1977 and reported under the headings of the "Yukon River drainages" (Area Y)[1]. Estimates of angling effort in the YMA averaged approximately 9,800 and 10,700 angler-days during the last 5- (2009–2013) and 10-year (2004–2013) periods respectively. Angling effort in the region and statewide has also, on average, remained relatively stable during this period.

The vast majority of the YMA and its fishable waters are located away from highways and roads of any kind. Small communities are scattered along major river systems of Interior Alaska and along the western coast. Communities are invariably located near water to facilitate

[1] Alaska Sport Fishing Survey database [Internet]. 1996–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

transportation and because of the importance of fish as a food source to local people. Residents of these rural communities harvest a substantial amount of fish and game resources for subsistence use, and fishing is usually conducted with high catch-per-unit-effort gear types such as fish wheels and gillnets. In 2000, hook and line fishing gear was added to the types of legal subsistence fishing gear in the lower portion of the Yukon River drainage. Sport fishing with hook and line is practiced to some extent by rural residents, but it is often done as an extension of subsistence activities and less for recreational purposes. Consequently, harvest estimates of sport-caught fish from rural Alaska are generally low because local residents usually fish under subsistence regulations and, because the small amount of fishing done using hook and line, is usually conducted as a subsistence activity. Since statewide harvest estimates are based upon surveys of licensed sport anglers, rural harvests are not fully documented in the SWHS.

Sport harvest of all species combined from the YMA averaged more than 12,000 fish until the early 1990s, with the peak harvest of 14,720 in 1989 (Burr 2004). Since that time, annual harvests have declined; harvests averaged just more than 5,000 fish in the most recent 5-year period (Table 1). The most recent estimate (6,225 fish in 2014), is consistent with the last 5- and 10-year averages. The harvest in the YMA has been dominated by freshwater resident species, primarily Arctic grayling, northern pike, and sheefish. Pacific salmon (all species combined) compose about 16 percent of the total sport harvest in the management area.

Sport catch of all species in the YMA has been estimated since 1990. Numbers reported as catch include fish that are caught and kept (harvested), and those that are caught and released. During the most recent 5-year period, approximately 86% of all fish caught in the YMA were released. The percentage of catch-and-release activity varies by species. For example, only 20% of burbot caught from 2009–2013 were released, compared with 90% of northern pike, 87% of Arctic grayling, 71% of lake trout, and 83% of Chinook salmon.

The Freshwater Sport Fish Guide Logbook Program has provided an additional measure of fishing effort, catch, and harvest by guided anglers since 2006. The number of fish reported as harvested and released by guides provides a check on results from the SWHS in areas where sport fishery guides are operating businesses. For species for which most fishing effort is by guided fishermen, results are comparable (Appendix B). For example, Chinook salmon harvest and fish released from the guide logbook reports for the Yukon River area 2006–2014 have averaged about 81 and 332 (fish harvested and fish released equaled a catch of 413 fish) fish per year, respectively, compared with 149 and 894, respectively, from the SWHS for 2006–2014 (Appendix B; Table 2). It should be noted that the SWHS reports catch (fish harvested and released), while the guide logbook reports fish released. Additionally, the SWHS reports estimates, while the guide logbook attempts to report actual number of fish kept and released.

OTHER USER GROUPS – COMMERCIAL AND SUBSISTENCE FISH HARVESTS

Important subsistence and commercial fisheries exist in the Yukon River drainage. Commercial fisheries provide an economic base for income and employment in many local communities. Commercial and subsistence harvests for all species of salmon are much larger than sport harvests (Appendix C; Estensen et al. 2012). In contrast to fisheries for salmon, the majority of the harvest of freshwater fish is by subsistence and sport users. Currently, there are very limited commercial fisheries for whitefish, and lamprey *Lampetra camtschatica*.

In the Yukon River drainage, salmon harvests have historically been dominated by chum salmon (Estensen et al. 2012). Chinook salmon, while less abundant, are an important species for

commercial sale and are a preferred subsistence food in many parts of the area. Between 1998 and 2004, the number of Chinook salmon harvested in the commercial fishery exceeded the combined number of chum salmon (summer and fall), primarily due to reduced opportunities for chum salmon roe sales and poor chum salmon runs between 1998–2002 (Bue et al. 2011). From 2008–2014, commercial fisheries directed at Chinook salmon had been eliminated by measures to conserve Chinook salmon, and most of the commercial catch has been incidental to the fishery directed at summer chum salmon. In 2014 and 2015 no sale of Chinook salmon incidentally caught in commercial fisheries was permitted. The commercial harvest of coho salmon is primarily incidental to the fall chum salmon fishery. Pink salmon occur in streams near the coast of the YMA, although the species is not exploited to a great extent in commercial or subsistence fisheries.

Commercial harvests of all salmon species in the Yukon River combined averaged more than 1 million salmon annually from 1977–1996. Weak returns of Chinook and chum salmon since 1997, particularly through 2002, resulted in much lower than average commercial harvests (Appendix C; Estensen et al. 2013). Recently, commercial harvests of chum salmon have increased but have not reached historical levels (Estensen *In prep*).

SECTION II: FISHERIES

Waters within the YMA offer some of the most remote and diverse sport fishing opportunities in Alaska. Opportunities to catch trophy northern pike, sheefish, Dolly Varden, lake trout, and Arctic grayling within wilderness settings are well known. Sport fishing opportunities for salmon are currently not as well developed. However, angling for Chinook and coho salmon has increased during recent years in the Yukon River drainage as pressure on other popular sites outside the YMA continues to increase. Marine sport fisheries within the boundaries of the YMA are rare.

This section provides a summary of significant sport fisheries by species in the YMA in 2014 and 2015. Discussion of each fishery will include 1) historical perspective, 2) recent fishery performance (stock status), 3) fishery objectives and management, 4) current issues, 5) recent actions by the BOF, and 6) ongoing and recommended management and research activities. Recent fishery performance will focus on data from 2014. Information regarding the 2015 season will be included as available, but estimates of sport effort and harvest are not yet available for the 2015 season. A summary of recent sport fish harvests by species are provided for reference (Table 1). For a complete list of sport harvest and catch since 1977 for the Yukon River drainage, see Burr 2012.

YUKON RIVER DRAINAGE SALMON

Chinook, chum, and coho salmon are important subsistence and commercial species in the Yukon River drainage. However, harvest by sport anglers has, to date, been minimal (Table 1; Appendix C1).

Background and Historical Perspective

Chinook salmon are found throughout the Yukon River drainage. Chum salmon, composed of a summer run and a fall run, are numerically the most abundant species and are distributed throughout the drainage. Coho salmon are less abundant and spawn in large numbers in only a few identified streams. Pink salmon are locally abundant in some years but typically are less

abundant upstream of the Anvik River (approximately 300 river miles from the Bering Sea). Sockeye salmon occur occasionally, but only a few fish are taken annually in commercial or subsistence harvests.

Sport harvests of salmon in the Yukon River drainage have historically been, and continue to be, primarily from streams of the Tanana River drainage. Sport fisheries in the Tanana River drainage are discussed within the *Fishery Management Report for Recreational Fisheries in the Tanana River Management Area* (Brase and Baker 2015). Sport harvests are reported from other streams and drainages in the Yukon River watershed, primarily from the Andreafsky and Anvik, rivers and their tributaries (Table 2). Approximately 12,000 people live along the Yukon River and its tributaries (excluding the Tanana River; US Census Bureau 2010). Most of these people depend to some extent on salmon for livelihood, subsistence, or both. Rural residents customarily use high yield fishing methods, such as gillnets and fish wheels, where a larger volume harvest can be taken in the turbid mainstem of Yukon River. Hook and line fishing for salmon is practiced in clearwater tributaries of the Yukon River drainage by some rural residents and by nonlocal residents who visit for the purpose of sport fishing. Consequently, the reported sport harvest does not accurately reflect the abundance of salmon in the drainage.

Recent Fisheries Performance

A period of increased variability in run strength of Yukon River Chinook and chum salmon began in 1999 with runs in 2000 the lowest up to that time on record for both species. In September 2000, the BOF classified the Yukon River Chinook salmon stock as a yield concern, the Yukon River summer chum salmon stock as a management concern, and most of the Yukon River drainage fall chum salmon stock as a yield concern. Fall chum salmon stocks in the Toklat and Fishing Branch rivers were classified as management concerns. The *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) defines a yield concern as an inability to maintain expected yields or harvestable surpluses above the stock's escapement needs, despite the use of specific management measures. A management concern is defined as the chronic inability to meet existing escapement goals for the stock. Between 2001 and 2003, increases in escapements were due primarily to more conservative management. Through 2007, Chinook and chum salmon runs continued to improve over the very poor runs of 1999–2000. However, in 2008 and continuing through 2013, the number of Chinook salmon returning to the Yukon River drainage was less than expected. The 2014 Chinook salmon run was better than expected but remained well below average.

Summary of Yukon Chinook Salmon Runs 2014 and 2015

In 2014, the drainagewide Chinook salmon run was projected preseason to be 64,000–121,000 fish, far below average in size, and weaker than the 2013 run (JTC 2015). In recent years, total run sizes have fallen near the lower range of preseason projections and a similar trend was anticipated in 2014. Achieving escapement objectives with a run of this size was expected to be very challenging and severe conservation steps were deemed necessary.

Subsistence fishing closures and gear restrictions were implemented early in the 2014 season in an effort to protect migrating Chinook salmon. These conservation measures were chronologically instated before or as Chinook salmon entered each fishing district. Closures remained in place for most of the run through each section of the river and in the tributaries. During subsistence salmon closures, the use of 4-inch or smaller mesh gillnets 60 feet in length or less was permitted to provide harvest of non-salmon species. No targeting of Chinook salmon

with this gear was allowed. All other fisheries for Chinook salmon were closed. The sport fishery for Chinook salmon in the entire U.S. portion of the Yukon River drainage was closed on May 12, prior to the arrival of Chinook salmon, and remained closed for the season.

In contrast to the Chinook salmon run, the 2014 summer chum salmon run was expected to be above average with a projected escapement of 1.3 to 1.5 million fish. As the number of chum salmon in the river increased, subsistence and commercial fishing opportunities were provided for chum salmon using dip nets, beach seins, and manned fish wheels. All Chinook salmon were to be released alive when captured with these gear types. Fishermen were encouraged to avoid fishing when and where Chinook salmon were likely to be encountered. When the Chinook salmon run was more than 90% complete in a given district, subsistence fishing restrictions were incrementally relaxed. The use of 6-inch and smaller gillnets in the subsistence fishery and subsequent chum salmon commercial fishery was allowed once most Chinook salmon had passed through the fishing district. The sale of Chinook salmon incidentally caught in gillnet gear was prohibited; fish could be either released alive if unharmed or used for subsistence purposes.

A total of 5,971 Chinook salmon were captured and released during the 2014 chum salmon commercial fishery (Estensen *In prep*). Most of the Chinook salmon released (5,440) were caught in dipnet and beach seine gear, and the remainder were released from fish wheels. A total of 481 Chinook salmon were harvested but not sold in the chum salmon commercial fishery. All but 11 of the harvested Chinook salmon were taken with gill nets in lower river districts Y1 and Y2. The summer chum salmon commercial fishery harvested 530,644 fish, the largest harvest on record since 1989 (Estensen *In prep*).

As predicted, the Chinook salmon run in 2014 was smaller than average; however, due to early and drastic conservative management measures, escapement goals were largely attained throughout the Yukon River area (Estensen *In prep*). Sustainable escapement goals (SEG), based on aerial surveys, were achieved for the West Fork Andreasky River and Anvik River. The SEG for the East Fork Andreafsky River, based on weir counts, was also achieved. The Chena River tower was operational during the 2014 season and the biological escapement goal (BEG) was achieved. Aerial surveys were not conducted on the East Fork Andreafsky River, Nulato River, and Gisasa River and high water prevented the Salcha River tower project. The Interim Management Escapement Goal (IMEG) for the Canadian portion of the Yukon River drainage (42,500–55,000 fish) was achieved. The preliminary count at the sonar station near Eagle, and therefore the subsequent border passage, was approximately 64,500 Chinook salmon.

The 2015 preliminary subsistence harvest estimates will not be available until early in 2016. However, for a point of reference, more conservative management actions were taken in 2014 and resulted in an estimated harvest of approximately 3,300 Chinook salmon combined from the Coastal and Yukon River fishing districts. This was 94% less than the 2004-2008 average annual harvest of approximately 51,600 fish. It is likely that the 2015 Chinook salmon subsistence harvest will be higher than what was observed in 2014.

Preliminary reports indicate that 2015 Chinook salmon escapement targets were generally met throughout the Yukon Area. The preliminary cumulative passage of Chinook salmon past the sonar site near Pilot Station was 115,800 fish. Canadian border passage estimated from the sonar near Eagle Alaska was approximately 82,500 Chinook salmon, above the IMEG of 42,500–55,000 fish (Estensen *In prep*).

Summary of Catch and Harvests in Yukon Chinook salmon Sport Fisheries in 2014

Sport fishing for Chinook salmon was closed during the 2014 season and no Chinook salmon were harvested in the sport fishery (Tables 1 and 2). Sport fishing effort for Chinook salmon in the YMA is typically small and most effort occurs in Lower Yukon River tributaries. The Anvik River has been the predominant site for Chinook salmon sport fishing in recent years. Weak Chinook salmon runs experienced since 2007 resulted in restrictions to the sport fishery in 7 of the past 8 years (2008, 2009, and 2011–2015). Prior to these restrictions, relative to the size and the productivity of the Yukon River system, the estimated sport harvest of Chinook salmon in the YMA has been low and is represents less than 5% of the total harvest of Chinook salmon from the Yukon River population (Table 2).

Fishery Objectives and Management

Yukon River drainage commercial, subsistence, and personal use fisheries are managed by the Division of Commercial Fisheries. As with other fish and wildlife populations, subsistence use has been designated as the highest consumptive priority. Management of these fisheries is complex due to a wide range of stock-specific abundances, overlap of inter- and intra-specific run timing, the immense size of the Yukon River drainage, allocation between numerous user groups, and international treaty with Canada. The department is generally unable to manage individual stocks in this mixed stock fishery because of inadequate stock-specific information.

Guideline harvest ranges have been established for commercial fisheries targeting Chinook salmon throughout the Alaska portion of the Yukon River drainage (5 AAC 05.360). The department attempts to manage Chinook salmon commercial fisheries such that the harvest in each district is proportionally similar to respective guideline harvest ranges.

During the winter of 2000/2001, the BOF developed a rebuilding plan for Alaskan Yukon River Chinook salmon stocks in accordance with the *Policy for the management of sustainable salmon fisheries* (SSFP). This plan emphasizes improving salmon spawning escapements while providing opportunities to maintain subsistence uses when surpluses are available. The BOF developed a subsistence salmon fishing schedule. The purpose of the schedule was to provide more equitable allocation of fish among subsistence fishers throughout the drainage and to improve the quality of the escapement.

In January 2013, the BOF modified the *Yukon River King Salmon Management* plan by requiring protection of (no fishing on) the first pulse of Chinook salmon as the fish migrate upstream through the fishing districts. After initiating the pulse closure, the department may discontinue subsistence fishing closures based upon inseason run assessment. The plan was also modified to prohibit sale of Chinook salmon from the Yukon River drainage unless there is a directed Chinook salmon commercial fishery. Sale of Chinook salmon will be prohibited at the start of the commercial fishing season. The department may allow sale of Chinook salmon by emergency order based upon inseason run assessment. Also in January 2013, the BOF reviewed the status of Yukon River Chinook salmon and continued the *stock of yield concern* designation for Yukon River Chinook salmon.

ADF&G has developed a preseason management strategy, in cooperation with U.S. Fish and Wildlife Service (USFWS) staff, annually since 2001. This strategy is described and distributed annually in an information summary (Appendix C2).

Sport fisheries for salmon in the YMA have very limited impact on stocks of salmon due to low effort and harvest compared to commercial and subsistence fisheries. There is very little effect that management of the sport fishery can have on the annual status of the various salmon stocks. Therefore, the goal of sport fishery management is to maintain a sustainable level of opportunity for anglers to participate in the fisheries throughout the season. Therefore, emergency actions to restrict harvest and/or inseason regulations for the sport fishery are generally not considered unless it becomes apparent that the size of the run is so small that restrictions in the subsistence fishery will be necessary.

In both 2014 and 2015, the sport fishery for Chinook salmon in the Yukon River was closed in May prior to the arrival of the run (Appendix A1). In both years, the Chinook salmon sport fishery remained closed for the entire season in the entire US portion of the Yukon River drainage. This action was taken as part of a coordinated management effort to reduce harvest of Chinook salmon, particularly those migrating to Canadian waters.

Current Issues and Fishery Outlook

The primary issue concerning salmon fisheries is the uncertain run strength of salmon returning to the Yukon River drainage. Another issue affecting all users (including recreational anglers) of salmon in the YMA is dual management (state and federal). This continues to be an issue affecting all users because the state and federal governments define subsistence users differently, having real effects for various groups' access to fish. The State of Alaska provides for priority subsistence uses of these resources but does not distinguish between rural and urban users due to constitutional provisions. There continues to be concern that federal regulations will result in loss of opportunity for nonsubsistence uses of fish resources, particularly recreational uses. This concern was first realized in 2001 when federal personnel issued a special action prior to the beginning of the season. The action closed salmon fishing in all waters where federal regulations apply in the Yukon and Kuskokwim rivers to all but qualified rural residents. This action precluded all uses for commercial, recreational, and state subsistence purposes of salmon in waters in which the federal agencies have asserted jurisdiction.

The unanticipated closure of sport fisheries for Chinook salmon in the Yukon River in 2000 and 2001 placed a severe economic burden on fledgling local businesses that directly or indirectly support sport anglers, without any real biological benefit. Maintaining a constant level of fishing opportunity throughout the season is critical for local economic benefits that can accrue from these cottage industries. Complete closure of the recreational fishery should be contemplated only when substantial subsistence restrictions are needed, as in the 2014 and 2015 seasons.

The outlook for the 2016 Chinook salmon run shows signs of improvement. Juvenile Chinook salmon surveys in the Bering Sea, higher ocean catches of immature fish, and higher than average returns of age-4 fish to some river systems in 2015 indicate more Chinook salmon are in the marine environment and may possibly return to the Yukon River in the next 2–3 years[2]. The 2016 sport fishery will be managed in a manner consistent with run strength as directed by the *Yukon River King Salmon Management Plan*. Sport fishing closures or restrictions will be implemented if subsistence fishing is restricted. The intent of sport fishery management continues to focus on providing a predictable level of opportunity for anglers throughout the

[2] Unpublished ADF&G memo: Arctic-Yukon-Kuskokwim Area Escapement Goal Recommendations September 23, 2015.

season while providing for conservative management of Yukon River drainage Chinook salmon, particularly for fish bound for Canada.

Recent Board of Fisheries Actions

The BOF adopted the *Yukon River King Salmon Management Plan* in January 2001 and modified the plan in 2002, 2003, 2004, 2010, and 2013 (5 AAC 05.360). In this plan, the subsistence fishing schedule is described and guideline commercial fishing harvest ranges for Yukon River District are established. Two significant modifications to the plan were added in 2013. The first requires protection of (no fishing on) the first pulse of Chinook salmon. After initiating the pulse closure, ADF&G may allow subsistence fishing based upon inseason run assessment. The second change prohibits the sale of Chinook salmon from the Yukon River drainage unless there is a directed Chinook salmon commercial fishery. Sale of Chinook salmon will be prohibited at the start of the commercial fishing season.

Current or Recommended Research and Management Activities

Currently, there is no active research program concerning the Chinook salmon sport fishery in the Yukon River drainage.

The Anvik River is one of very few locations in the Yukon River drainage, outside of the Tanana River drainage, where catch and harvest of salmon has regularly been reported (Table 2). Up to 3 sport fish guiding businesses presently operate within this drainage. These sport fisheries target Chinook and coho salmon, primarily for catch-and-release. Resident species, including northern pike, Arctic grayling, and Dolly Varden, are sought as secondary targets. Most anglers participating in the fishery are guided and are nonresidents, although local residents do participate in the fishery. Current levels of harvest are low and are reflected in results from the SWHS, and more recently, by reports from the guide logbook program. Overflights of the Anvik River have been conducted periodically during early July to describe the distribution of angling effort during the peak of the Chinook salmon season.

YUKON RIVER NORTHERN PIKE

Background and Historical Perspective

Northern pike inhabit sloughs, interconnected lakes, and lower, slow-moving sections of large rivers throughout most of the Yukon River drainage. Many of the lowland area waters are particularly noted for large northern pike.

In the YMA, most fishing for northern pike occurs during the open water season. Northern pike are targeted in early summer immediately following spawning and throughout the summer months. Northern pike are often fished in the fall in combination with hunting activities. Some sport and subsistence harvest is taken during winter months through the ice with hook and line gear. Spearing and bow and arrow techniques are also legal means that account for a small proportion of the total harvest, but most sport harvest of northern pike is taken with rod and reel.

Historically, fishing for northern pike in the YMA has been conducted by Alaska residents near towns or villages or where access is provided by road or boat. Within the past 20 years, new or reestablished sport fish guiding businesses are promoting opportunities to catch trophy northern pike in the Dall, Nowitna, Koyukuk, Kaiyuh, Khotol, Anvik, and Innoko rivers (Table 3). In these remote locations where sport fish guiding services have become available, most of the angling effort is by guided anglers and most of the guided fishermen are nonresidents.

Within the YMA, most catch of northern pike has come from 5 primary locations: the Porcupine, Dall, Nowitna, Koyukuk, Innoko, and Andreafsky river drainages. The Porcupine and Koyukuk rivers are 2 of the largest tributaries of the Yukon River. Sport fishing within these drainages is dispersed and site-specific fishing effort is low. The level of effort directed at northern pike in the Dall, Nowitna, and Innoko rivers is relatively larger (Table 4).

Dall River

Northern pike populations situated near the Dalton Highway on the Yukon River have experienced more angling pressure than have populations in other parts of the drainage. Following construction of the highway in the mid-1970s, a summer season sport fishery targeting northern pike developed at the Dall River. Residents of Stevens Village, located near the mouth of the Dall River, expressed concern over encroachment by outside visitors and by what they perceived as a depletion of resources, particularly northern pike.

Because of these concerns and the increased use of this fish stock, a series of stock assessment projects and use survey studies were conducted on the population and the fishery between 1987 and 2001 (Arvey and DeCicco 1989; Arvey and Burkholder 1990; Burr and James 1996; Chythlook and Burr 2002). During this period, sport fishing regulations were changed from 10 per day, without a size limit, to 5 per day, with only 1 fish 30 inches or larger (Arvey and DeCicco 1989). During 1999 and 2000, ADF&G, Stevens Village Office of Natural Resources, and USFWS developed a management plan that describes an area for special management of northern pike designed to conserve the proportion of large fish in the population (Burr 2004). In 2001, the BOF adopted a special regulation for the Dall River management area consistent with recommendations of the management plan. For a more complete description of the issues, study results, planning efforts and management actions taken, refer to Burr (2004).

Nowitna River

The Nowitna River enters the Yukon River approximately 81 miles downstream from the outlet of the Tanana River. The Nowitna River was designated a National Wild River in 1980, and most of the mainstem of the river and its major tributaries are included within the boundaries of the Nowitna National Wildlife Refuge. The lower 50 miles of the river pass through a large wetland as a single-channel meander with numerous connected oxbow lakes and sloughs.

The Nowitna River offers one of the best opportunities in Alaska for sport anglers to catch large northern pike and sheefish in a wilderness setting. Most of the sport fishing effort occurs within the lower 30 miles of the river and connected waters. The fishery occurs almost entirely during the open water season, with a substantial portion of the fishing effort and harvest of northern pike occurring during September concurrently with hunting activities. Both guided and unguided anglers participate in the fishery. Since 2006, only 2 sport fishing guiding operations have registered with Nowitna NWR.

Innoko River

The Innoko River and its tributaries drain a large flat wetland area and the foothills of the Kuskokwim Mountains. The Innoko River enters the Yukon River near the village of Holy Cross. This river system, with its extensive wetlands, provides excellent habitat for whitefish and northern pike. The state record fish (38 lbs., 8 oz) was caught in the Innoko River in 1991. The Lower Innoko River continues to produce some of the largest northern pike in the state. There is one locally owned and operated land-based lodge on Reindeer Lake in the lower river that offers

guided sport fishing services in the area. In 1995, a sport fish guiding business catering to anglers seeking catch-and-release opportunities for trophy-sized northern pike began operating in the Lower Innoko River, using a large houseboat as a movable base of operations.

Recent Fisheries Performance

Little quantitative information is available concerning the status of northern pike stocks in much of the YMA, but because of limited access, fishing effort is light except on those stocks near towns and villages where angling and subsistence gillnetting effort may be more concentrated.

Harvest of northern pike in the YMA for 2014 was estimated to be 1,184 fish compared with 5- and 10-year (2009–2013, 2004–2013) averages of 956 and 1,433, respectively (Table 4). Estimated catch of northern pike in 2014 was 18,805 fish, well above recent averages. These results suggest that overall the northern pike fishery in the YMA remains stable.

Dall River

Recent estimates of fishing effort and harvest in the Dall River sport fishery are based on small numbers of respondents to the harvest survey. The limited data suggest that participation in this fishery continues to be at a low level and may have declined in recent years. During the last 5- and 10-year periods, fishing effort (for all species) by guided and unguided anglers at the Dall River averaged approximately 250–350 angler-days (Table 4). No respondents to the SWHS reported fishing at the Dall River during 2013 or 2014. Hence, no data are available on the level of participation in the Dall River fishery for these years. This fishery has historically provided, on average, more than 15% of all northern pike harvested from the YMA.

Nowitna River

The Nowitna River continues to account for more than 10% of the harvest and more than 20% of the total catch of northern pike in the YMA, however, no catch or harvest of northern pike was reported at the Nowitna River during 2014. In 2013, estimates of use of northern pike from the Nowitna River were 366 fish harvested with a total catch of 6,123 fish, providing 25% of the harvest and 59% of the total catch of northern pike in the YMA. Average estimated level of sport fishing effort (for all species) by guided and unguided anglers in the Nowitna River was approximately 631 angler-days in for 2004–2013 (Table 4).

A study was conducted in 1997 to assess stock status of northern pike in the Lower Nowitna River. The objectives of the study were to estimate abundance and size composition of northern pike in 3 sloughs connected to the river during early, mid, and late summer (Burr 1998; Burr and Roach 2003). In addition to obtaining current information on this northern pike stock, the goal of the study was to formulate a sampling protocol that would facilitate future sampling of this and other similarly situated northern pike stocks. The study found large numbers of northern pike in mature age and size categories. Although estimates of abundance were obtained, the magnitude of movement of fish in and out of these sloughs and between sloughs was far greater than anticipated and confounded application of the study findings to future sampling efforts. The movements of individually marked fish indicate that northern pike using the lower 20 miles of the river are part of a single large stock. The study concluded that the population is currently lightly exploited and levels of fishing pressure were within sustainable limits. A recommendation of the study was to conduct a radiotelemetry experiment in the lower Nowitna River in order to describe the timing and magnitude of seasonal movements of this stock (Burr and Roach 2003).

In 2005, a radiotelemetry study was initiated in the Lower Nowitna River. The research goal of the study was to obtain an understanding of the seasonal movements of northern pike over a 3-year period. Knowledge of seasonal movements would facilitate representative sampling of northern pike in the lower 25 miles of the drainage and assist in design of future mark-recapture experiments within an appropriately sized index area and within an appropriate time period. Movements of radiotagged northern pike in this study showed that some fish captured in the study area (lower 25 miles of the river) traveled upstream of the Titna River (more than 100 river miles) during late summer and remained there throughout the winter. Other fish remained within the study area, while still others traveled 50 or more miles up- or downstream from the outlet of the Nowitna River in the Yukon River (Brendan Scanlon, Fishery Biologist, ADF&G, Fairbanks, personal communication). These results show that northern pike inhabiting the Nowitna River use a very large portion of the Nowitna River drainage during the year and should be considered as a single stock for management purposes.

Innoko River

Estimates of sport fishing effort (for all species) in the Innoko River generally increased through 2004 concurrently with establishment of fishing guides in the area. Recent estimates of fishing effort are lower, averaging about 600 angler days in the most recent 5-year period (Table 4). In 2014, fishing effort was estimated at 1,242 angler-days, over twice the recent averages. Estimates of harvest of northern pike from the Innoko River have continued to remain very low, averaging less than 70 fish per year. In contrast, estimates of total catch increased to an average of about 10,000 fish between 2001 and 2006 but have been substantially lower in recent years. In 2014, total catch of northern pike was estimated to be about 9,500 fish, the largest estimated catch since 2004 (Table 4).

In 2000–2001, a need was identified for better information on the abundance and size composition of northern pike in the Innoko River drainage as well as patterns and levels of use by sport and subsistence fishers. Absence of current stock status studies was contributing to differing perceptions on the status and trends of the northern pike population in the area. Local perception by subsistence fishers was that reduced catch rates, fewer large fish, and a growing number of sport anglers indicated reduced abundance. ADF&G biologists believed that the northern pike stock was healthy based on the presence of exceptionally large fish, fish in old age classes, and low harvest levels.

A stock assessment project of northern pike inhabiting the Innoko River was conducted in 2002–2004 (Scanlon 2009). The project used radiotelemetry to describe seasonal movements and geographic area used by this stock. The project also provided information on the age and size composition of northern pike in the area. A separate but related project was also conducted in 2002–2004 (Brown et al. 2005). The purpose of this project was to describe current subsistence use patterns of freshwater fish, including geographic distribution of subsistence fishing for northern pike during winter and summer. The project also gathered information on size and sex composition of the winter subsistence catch and tag returns from fish tagged during the summertime sport fishery. These studies found that northern pike spawning in the Innoko River drainage travel extensively (> 200 miles seasonally) but generally remain within the Innoko River drainage during the open water season rather than traveling into the Yukon River or neighboring drainages. In contrast, during winter these fish were regularly found in the Yukon River near Holy Cross and in Paimiut Slough.

Sport fishing effort in the Innoko River drainage generally occurs during the open water season within the Innoko River and connected lakes and sloughs. The open water season subsistence fishery primarily occurs in the Yukon River or at the mouth of tributaries. The winter subsistence fishery for northern pike occurs in both the Innoko River and in the nearby Yukon River. Along with residents of the Yukon River communities, residents of Kuskokwim River communities were observed participating in this fishery during the study. Residents of communities situated on the Kuskokwim River travel across country during spring via snowmachine to harvest northern pike in the Lower Innoko River/Paimiut Slough area. The 2 fisheries (sport and subsistence) are, therefore, generally segregated in time and in geographic location. Annual movements of northern pike tracked with radiotelemetry, together with tag recoveries from the subsistence fishery of northern pike marked in the sport fishery, demonstrate that the fish targeted by these 2 user groups are from a single stock migrating seasonally throughout a very large open system.

Several residents of the area expressed concern that activities of the emerging guided sport fishery were resulting in declining numbers of large northern pike. Both sport and subsistence fisheries selectively catch large northern pike. The sport fishery targets large fish because they are highly valued by sport anglers. Fishing mortality is believed to be low because nearly all sport fish guides in the area insist that their clients practice only catch-and-release fishing. The level of incidental mortality from catch-and-release fishing is not known, but based on other studies (e.g., Burkholder 1992), it is believed to be less than 10%. The subsistence fishery also targets large northern pike preferred for traditional foods. It is assumed that nearly all northern pike caught in the subsistence fishery are killed. In 2004 northern pike sampled from the winter subsistence fishery near Holy Cross were large (24 to 41 inches), mostly females (62%), and nearly all fish (99%) were in prespawning condition (Brown et al. 2005). The proportion of northern pike in larger and older age classes may decrease if a substantial increase in fishing effort by one or both fisheries occurs.

Fishery Objectives and Management

The goal of management of northern pike in the YMA is to maintain naturally-reproducing populations of northern pike with characteristics that will provide sport fisheries with qualities that are desired by anglers. Management of northern pike in most of the YMA is structured to encourage participation in the fishery through liberal harvest limits. These regulations reflect the light level of use of northern pike within most of the YMA. Liberal regulations also provide harvest opportunity with hook-and-line gear for rural residents within the sport fish regulation framework. In areas where northern pike fisheries are more intensive, management seeks to provide consumptive use (harvest), while maintaining a modest proportion of large northern pike ($\geq$ 30 inches) . If fishing effort increases, management for continued harvests will be structured around a bag limit of more than 1 northern pike, with a size limit structured to limit harvest of northern pike in large size groups.

ADF&G monitors sport fisheries with the SWHS to track levels of harvest and effort at various sites and to detect changes in the distribution of fishing among sites. Using these harvest data, selected fisheries are periodically monitored with research projects. Length composition is used as an indicator of stock status for northern pike populations; the presence of large size fish within samples collected is used as an indicator of lightly exploited riverine populations. The department uses this information to remain responsive to changes in these fisheries.

A special regulation was established for the Dall River fishery following a public management planning effort. ADF&G, together with the Stevens Village Natural Resource Office and interested fish and game advisory committees, jointly developed a *Fisheries Management Plan for the Dall River Northern Pike Fishery*. The goal of this planning process is to maintain a high-quality northern pike stock for the benefit of local and nonlocal users. A summary of the current plan, including the shared policies, objectives, and issues/action items, is found in Burr (2004):

- The current objective for the Dall River northern pike fishery is to maintain the proportion of northern pike 30 inches and larger at 0.3 (30%) in the assessed population[3].

Current Issues and Fisheries Outlook

At the present time, all available information suggests that northern pike fisheries in the Yukon River drainage are sustainable. Levels of catch and harvest, although low, have remained stable or have increased modestly throughout the area. Where assessments of local stocks have been conducted, the presence of substantial portions of fish sampled in large size and old age categories further suggests light levels of exploitation.

Dall River

Current regulations for the Dall River fishery were adopted by the BOF during January 2001 and require release of all northern pike ≥ 30 and < 48 inches. As a result, opportunity to harvest large northern pike in this fishery was greatly restricted. These regulations provide for harvest of smaller northern pike and for catch-and-release fishing of large northern pike (bag limit is 4 fish < 30 inches and 1 fish ≥ 48 inches). Fishing effort and total harvest and catch have remained relatively stable. Any growth of the fishery will be closely monitored. Management efforts will continue to be consistent with shared goals outlined in the *Fisheries Management Plan for the Dall River Northern Pike Fishery.* The intended effect of the current regulation is to increase survival of large northern pike, thereby increasing the size of fish available for catch-and-release. The outlook for fishing at the Dall River is good in terms of the abundance and size of fish in the population.

Nowitna River

The population of northern pike inhabiting the Nowitna River is not believed to be at risk of overexploitation. However, ADF&G recognized a need for new sport regulations consistent with other popular northern pike sport fisheries in the Yukon and Tanana river areas that would help control the harvest of large northern pike. In January 2007, the BOF adopted a proposal to reduce harvest of large (≥ 30 inches) northern pike (bag limit of 5 fish, only 1 of which may be 30 inches or longer). As with other fisheries where a similar regulation has been established, the intent is to decrease the harvest of large northern pike and thereby increase the size of fish available for catch-and-release, while allowing for a limited harvest. With this regulation, the outlook for northern pike fishing in the Nowitna River is good, with an increased proportion of larger fish available in the population over time.

[3] The assessed population includes the portion of the population that is accessible to the sampling gear used in stock assessment. For the Dall River, this includes fish larger than 19 inches total length (TL) or 450 mm fork length (FL).

Innoko River

Growth of the guided sport fishery for northern pike in the Innoko River has been a source of concern for many residents of local GASH communities. Many residents of this area hold traditional beliefs and live traditional subsistence lifestyles. There is limited acceptance of catch-and-release fishing as practiced by many visiting anglers. Local residents have reported reduced catch rates during winter and summer fishing with rod and reel. Residents have also voiced a concern over increased wintertime use of northern pike stocks by nonlocal rural residents. They report that groups travel from communities downstream in the Yukon River drainage and from the nearby Kuskokwim River area to conduct subsistence fishing for northern pike through the ice.

The stock of northern pike inhabiting the Lower Innoko River is not believed to be in danger of overharvest. Movements of radiotagged northern pike show that these fish travel extensively throughout a large area of connected rivers, lakes, and sloughs. The population size of northern pike in this area, although unknown, is likely to be very large. Approximately 3,000 northern pike were tagged with numbered Floy[4] anchor tags between 2001 and 2004. Recapture rate in the sport fishery of these tagged fish has been less than 2% annually (Scanlon 2009). To date, only 6 of these tagged fish have been reported captured in the subsistence fishery. A substantial portion of fish in this stock are in old age and large size categories, as shown in samples collected during tagging (Scanlon 2009) and from the subsistence fishery (Brown et al. 2005). Because of the large amount of undisturbed habitat, the large population size, and the presence of many size and age groups, this stock is very resilient to moderate increase in fishing effort and harvest. Abundance of northern pike in the area is not likely to change due to overfishing. However, if either the subsistence use by local or nonlocal residents or the sport use grows substantially, a decrease in the proportion of very large and old fish is possible.

Recent Board of Fisheries Action

Current sport fishing regulations (10 fish, no size limit) for northern pike in the YMA were established in 1987. Prior to 1987, there were no bag, possession, or size limits for northern pike within most of the area.

Dall River

Current sport fishing regulations for the Dall River fishery were adopted by the BOF during January 2001. Regulations established special bag, possession, and size limits for northern pike in the Dall and Little Dall River drainages. The regulations are consistent with the recommendations of the *Fisheries Management Plan for the Dall River Northern Pike Fishery*. Current regulations are as follows:

- open season is May 20–September 30;
- bag and possession limit is 4 northern pike less than 30 inches and 1 fish 48 inches or larger;
- no harvest of northern pike ≥ 30 and <48 inches is allowed; and
- only unbaited, single-hook, artificial lures may be used.

[4] Product names used in this report are included for scientific completeness but do not constitute a product endorsement.

Nowitna River

In 2007, the sport regulation for northern pike in the Nowitna River drainage was reduced from 10 per day without size limit to 5 fish with only one 30 inches or larger. The intent of this regulation is to reduce harvest of large fish (> 30 inches) as discussed above.

Innoko River

In 2001, the BOF adopted regulations governing the sport fishery for northern pike in the Innoko River. The bag limit is 3 northern pike per day, of which only 1 may be 30 inches or larger. The regulation adopted for the Innoko River fishery is consistent with the regulatory strategy outlined in the *Yukon River Northern Pike Fishery Management Plan* and recommendations of the GASH AC.

Current or Recommended Research and Management Activities

The northern pike sport fishery in the YMA has gained a higher profile as a result of better access provided by guiding services and facilities established in recent years. ADF&G will continue to monitor levels of fishing effort, catch, and harvest throughout the YMA with the intent of identifying additional sites for stock assessment. To ensure the continuing quality of these stocks, monitoring of sport fishing effort, catch, and harvest is needed with anticipated growth in both sport and subsistence fisheries.

Dall River

To assess the effectiveness of the protected slot length limit established in 2001, it will be necessary to assess the Dall River northern pike stock periodically with the goal of estimating the proportion of northern pike larger than 30 inches (the lower end of the current slot limit). A need for better methodology for assessing length compositions of northern pike stocks in large open riverine systems has been identified.

Nowitna River

The popular Nowitna River fishery continues to provide a substantial portion of the total catch and harvest of northern pike in the YMA. Field work for the radiotelemetry study of northern pike inhabiting the Lower Nowitna River was completed in 2007. Complete analysis of these data and completion of the report should provide a clearer understanding of the geographic range, spawning areas, and annual movements of this stock. No additional investigation of this population is currently planned.

Innoko River

Given the potential impact of growth in the sport and subsistence fisheries on the proportion of large northern pike present in the Lower Innoko River, the department will closely monitor these fisheries for increases in fishing effort or changes in patterns of use. In addition to closely inspecting estimates of catch, effort, and harvest in the sport fishery, the department should establish a sampling protocol to monitor changes in proportion of large fish in the sport fish catch.

Seasonal movements and age and size composition of northern pike in the Innoko River upstream of Shageluk should be investigated. According to information recorded by Brown et al. (2005), this area (Holikachuk to several miles upstream of Iditarod) is especially important to residents of Shageluk and Grayling for harvesting northern pike and sheefish. The guided sport

fishery also targets northern pike in the area. The northern pike stock in this area is believed to be generally distinct from the Lower Innoko River stock studied by Scanlon (2009) and Brown et al. (2005). To date, no movement of northern pike between these areas has been detected by recapture of Floy-tagged fish or by movements of radiotagged fish.

YUKON RIVER ARCTIC GRAYLING

Background and Historical Perspective

Arctic grayling are distributed throughout the entire drainage, from the headwaters in Canada to streams that originate in the Yukon Delta. Sport fishing effort is likewise widespread. Historic documentation of harvests[5] indicates that the heaviest sport utilization has occurred in the middle part of the Yukon River drainagein tributary streams between the Porcupine River downstream to the Koyukuk River (Figure 2). Within this section, most of the catch and harvest comes from the Koyukuk River tributaries, including those that are crossed by the Dalton Highway near the villages of Wiseman and Coldfoot. Improved road access has also been provided to Nome and Beaver creeks and other popular Middle Yukon River sites. In addition, an important component of the catch (but not harvest) of Arctic grayling comes from the Anvik River in the Lower Yukon River. Most of this fishing effort is believed to come from guided clients staying at a fishing lodge located on the Upper Anvik River. Virtually all other Arctic grayling harvests in the drainage are from streams that have no, or very limited, road access. Historic sport effort and harvests in these systems are estimated to be small relative to road accessible streams (Table 5).

Dalton Highway

The sport fishery for Arctic grayling from Koyukuk River tributaries accessed from the Dalton Highway (Haul Road) accounts for about 15% of the harvest and 20% of the catch of Arctic grayling from the entire Yukon Management Area (Table 5). Given the relatively small proportion of the Koyukuk River drainage that is accessible from the Dalton Highway, Arctic grayling stocks along this road are subjected to the highest level of use by anglers in the drainage.

The Jim River is one of the most accessible of the streams crossed by the Dalton Highway; the road parallels the stream for many miles. Between 1995 and 1997, stock assessment experiments were conducted to obtain baseline abundance and composition data for stocks of Arctic grayling in rivers and streams crossed by the Dalton Highway. Studies concluded that catchability of fish in the Jim River is not affected by accessibility from the highway and that fishing pressure at easily accessible locations along the river is probably not great enough to cause changes in catchability throughout the summer (Fish 1997).

A study of the movement of Arctic grayling vulnerable to the Jim River summer fishery was conducted in 1997 and 1998 using radiotelemetry. The goals of the study were to locate spawning and overwintering habitats of Arctic grayling and to determine the fidelity of Arctic grayling to summer feeding grounds in the Jim River. This study found that most fish tagged in the Jim River remain in the Jim River through the winter (Fish 1998). A smaller proportion

[5] Alaska Sport Fishing Survey database [Internet]. 1996–2013. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

(about 35%) wintered in other locations, including the South Fork Koyukuk River, the Middle Fork Koyukuk River, and Prospect Creek. During the spawning season, most Arctic grayling were located in the Jim River in either the fishery area or in the Lower Jim River. Some fish (< 20%) were located during the spawning season in Fish Creek, Prospect Creek, and the south fork Koyukuk River. The migration characteristics and patterns of habitat use are very similar to those of other stocks of Arctic grayling inhabiting other clearwater rapid-runoff rivers in Interior Alaska (Tanana Valley). This study suggests that Arctic grayling in the Jim River are probably a distinct stock that may share overwintering and feeding habitat with other related Koyukuk River stocks.

In 2000 and 2001, a study was conducted to estimate the age and length at maturity for Arctic grayling in the Jim River (Gryska 2003). This study found that Arctic grayling in this system mature at larger size and at an older age than do Arctic grayling in the Chena River; 50% maturity was estimated at 7 years and at about 300 mm fork length (FL) or 13 inches total length (TL), compared with 5 years and 270 mm (12 inches TL) for the Chena River stock. In January 2004, the BOF adopted new regulations for the Dalton Highway Arctic grayling fishery. The 12-inch minimum length limit was rescinded, but the bag limit remained at 5 fish.

Nome/Beaver Creek

Excellent access has been provided to Beaver Creek by way of the improved road to Nome Creek from the Steese Highway north of Fairbanks. Beginning in the early 1990s, BLM upgraded the roadbed and initiated construction of multiple campgrounds. In 1999, construction of the campgrounds and the expanded road system leading to Nome Creek and its confluence with Beaver Creek was completed. This road system is located near the Fairbanks population center and resulted in increased visitor use and an increased catch of Arctic grayling in this area, although, the average catch for the recent 5-year average (2009–2013) of 3,681 fish is down from the recent 10-year average (2004–2013) of 4,870 fish.

Research conducted by BLM during the late 1980s indicated a very small resident Arctic grayling population in Nome Creek. Concern over increased fishing effort and potentially high levels of exploitation of the Arctic grayling stock in this 3rd-order tributary prompted ADF&G to propose increasingly restrictive regulations for Nome Creek, culminating in the current catch-and-release only regulation that was adopted by the BOF in the winter 1994–1995.

During 2000, a mark-recapture experiment was conducted in a 30-mile section of Beaver Creek (excluding Nome Creek) to assess the Arctic grayling population (Fleming and McSweeny 2001). The study found a very high population density (1,325 fish per river mile) of small Arctic grayling (> 150 mm FL, most 220–250 mm FL) with age classes age-3 and age-4 dominating. The density of Arctic grayling larger than 250 mm FL in the study area was substantially less (200–350 fish per river mile), with larger fish distributed farther upstream in general. As a result of this information, a new sport fishing regulation (bag limit of 5 fish, no size limit) was adopted for Beaver Creek during the 2001 BOF meeting.

Recent Fishery Performance

Estimated average harvest of Arctic grayling from the YMA in the recent 5-year period (2009–2015) was 2,191 fish, which reflects little change over historic levels (Table 5). In 2014, an estimated 2,498 Arctic grayling were harvested. Catch estimates for the YMA have averaged 17,357 for the recent 5-year period (2009–2015); estimated catch in 2014 was 31,839 Arctic

grayling (Table 5). These data reflect a continued low, but stable, level of use of the species in the YMA as a whole.

Dalton Highway

Sport fisheries for Arctic grayling along the Dalton Highway (Haul Road) have harvested an average of approximately 367 fish annually since 2004. In most years, more Arctic grayling are harvested from the Jim River than from the other streams along the roadway (Table 5). In 2014, 179 (39%) of the estimated 458 Arctic grayling harvested from the Dalton Highway streams were from the Jim River. Total estimated catch from waters along the Dalton Highway since 2004 has averaged about 4,000 fish, of which about 2,100 have come from the Jim River (Table 5). In 2014, the estimated catch for the Dalton Highway Arctic grayling fishery was 4,518 fish, which is comparable to estimates from recent 5- and 10-year periods.

Nome/Beaver Creek

The SWHS combines Beaver Creek and Nome Creek data into a single estimate. The estimated annual catch of Arctic grayling from Nome and Beaver creeks averaged approximately 4,800 fish for the most recent 5-year period (Table 5). Estimated catch from 2014 was approximately 4,724 fish. The estimated harvest of Arctic grayling from Beaver Creek (Nome Creek is closed to harvest) was 0 fish in 2014, the first year of no harvest of Arctic grayling in Beaver Creek since 2008.

Fishery Objectives and Management

Management strategies for Arctic grayling stocks in the YMA are found in the *Yukon River Area Wild Arctic Grayling Management Plan* (5 AAC 73.055). The goal of management is to maintain naturally reproducing populations of Arctic grayling with characteristics that are desirable to the public and sustainable.

The "regional management approach" for sport fishery regulation is currently applied to all Arctic grayling fisheries in the YMA except for Nome Creek in the Beaver Creek drainage. Under the regional regulation, the bag limit is 5 fish, bait is permitted, and the season is open year round. The Nome Creek fishery is regulated under the "special management approach." In Nome Creek, the fishery is open year round, but is restricted to catch-and-release. In addition, from April 1 through May 31, only unbaited, single-hook, artificial lures may be used. To date, fishery objectives are in place for 2 fisheries in the YMA: the Dalton Highway (Jim River) and Nome/Beaver Creek.

Dalton Highway

The fishery objective for the Dalton Highway Arctic grayling fishery is to maintain total harvest of Arctic grayling from the Jim River below 10% of the estimated abundance of fish larger than 250 mm FL in the assessed area. The most recent applicable estimate of abundance is 12,000 fish (Fish 1998). Catch and harvest estimates from the SWHS provide the measure of fishing mortality. For the purpose of this management scheme, 10% of all fish released are added to the estimate of harvest to incorporate mortality of released fish. The performance of the Jim River Arctic grayling fishery serves as a proxy for the Arctic grayling fishery in the Yukon drainage portion of the Dalton Highway.

Current regulations for the Dalton Highway Arctic grayling fishery were adopted in January 2004:

- Daily bag and possession limit is 5 fish, no size limit.

The length limit (12-inch minimum size, adopted in 1994) was rescinded for this fishery because all stock status studies and estimates of effort and harvest indicated that these stocks could sustain greater levels of harvest. Also, the 12-inch minimum length limit that had been in place was not long enough to attain the goal of delaying recruitment to the fishery until maturity was attained (Gryska 2003). In order to be effective at protecting pre-spawning fish, the minimum length limit for harvest would need to be increased to at least 13 inches. If it becomes necessary to reduce fishing mortality on these stocks, a reduction in bag limit with no length limit is recommended.

Nome/Beaver Creek

The goal of management for Nome Creek is to minimize fishing mortality of Arctic grayling within this small, road accessible tributary of Beaver Creek with a catch-and-release fishery.

The fishery objective for Beaver Creek is to maintain total harvest of Arctic grayling below 10% of the estimated abundance of fish larger than 250 mm FL in the assessed area. The most recent estimate of abundance of Arctic grayling larger than 250 mm FL in the assessed area is 9,900 fish (Fleming and McSweeny 2001). Catch and harvest estimates from the SWHS provide the measure of fishing mortality. For the purpose of this management scheme, 10% of all fish released are added to the estimate of harvest to incorporate mortality of released fish.

Current sport fishing regulations were adopted by the BOF for Beaver Creek Arctic grayling fishery in January 2004. The current regulations for Nome Creek and Beaver Creek are as follows:

- only unbaited, single hook, artificial lures may be used April 1–May 31;
- nome Creek is restricted to catch-and-release only for the entire year; and,
- at Beaver Creek (from its headwaters downstream to its confluence with the Yukon River, except for Nome Creek), bag and possession limit is 5 fish, no size limit.

Current Issues and Fishery Outlook

Dalton Highway

Local roadside depletion of fish stocks near crossings of the Koyukuk River tributaries by the Dalton Highway has been a concern because such depletions would reduce angling opportunity for sport fishers traveling this route. Fish (1997) concluded that catchability of fish in the Jim River was not affected by accessibility from the highway and that fishing pressure at easily accessible locations along the river is not great enough to cause changes in catchability throughout the summer.

Substantial increases in the levels of angler effort, catch, and harvest have been expected as a result of the large improvements in the road surface (most of the highway north of the Yukon River and south of Wiseman was paved beginning in 2001). However, while modest increases in visitor use have been recorded at the visitor center in Coldfoot (Appendix D), recent estimates of angler effort and Arctic grayling catch have not reflected significant increases in the sport fishery. With better road access and somewhat less restrictive sport fishing regulation, ADF&G anticipates that participation in the roadside fishery for Arctic grayling may increase.

Prior to the 2004 season, the minimum length limit was rescinded from the regulation for the Dalton Highway Arctic grayling sport fishery. A modest increase in the harvest of Arctic grayling from area waters was expected and realized. However, estimated harvests since 2004 have remained substantially below the established harvest threshold of 1,200 fish (or 10% of 12,000, the last abundance estimate for Arctic grayling in the Jim River). Continued modest increases in angler effort, catch, and harvest are expected in this fishery. Results from the SWHS and the survey from the visitor center in Coldfoot will be reviewed annually to monitor changes in this fishery.

In addition to changes in the sport fishery, a new gillnet subsistence fishery in these streams was authorized by the BOF during winter 2004. To date, only 2 individuals have participated in this new permit fishery and harvests have been low. If this permit fishery grows, the additional subsistence harvest will need to be factored into the estimated annual harvest. In this case, due to the state's subsistence priority, adjustments would be needed in the regulation of the sport fishery to ensure that total harvest levels remain sustainable.

Nome Creek/Beaver Creek

Improved access to Beaver and Nome creeks has resulted in a growing sport fishery for Arctic grayling, particularly in Nome Creek (catch-and-release fishery). Only modest increases in visitor use and in angling effort are anticipated as the recreational destination becomes more popular. No changes in the fishery regulations for Nome and Beaver creeks are anticipated. Current annual harvest levels from Beaver Creek have not yet approached the 1,000-fish threshold level established in the objective for this fishery.

Recent Board of Fisheries Action

The most recent BOF action concerning Arctic grayling stocks in the YMA occurred in 2004.

Dalton Highway

In 1994, the BOF reduced the bag and possession limit for Arctic grayling within the Dalton Highway Corridor from 10 to 5 fish and added a minimum length limit of 12 inches. This action was taken in response to increases in recreational use and harvest (Burr et al. 1998). As described above (Fisheries Objectives and Management), the 12-inch minimum size limit was rescinded in 2004.

Nome Creek/Beaver Creek

In 1994, the BOF adopted a catch-and-release–only regulation for Arctic grayling in Nome Creek in anticipation of continued increasing recreational use of this small tributary of Beaver Creek. In January 2004, the sport fishery bag limit regulation for Beaver Creek from its headwaters downstream to its confluence with O'Brien Creek, except for Nome Creek, was reduced from 10 to 5 per day.

Current or Recommended Research and Management Activities

At present, there is little concern for overharvest of Arctic grayling in streams crossed by the Dalton Highway or in the Nome/Beaver Creek fishery. Conservative annual sustainable harvest target levels have been established.

Dalton Highway

A reassessment of the stocks will be needed when fishing effort and harvests increase and begin to approach threshold use levels. In addition, a concurrent on-site creel census is recommended to better describe the sport fishery.

Nome Creek/Beaver Creek

A reassessment of the Arctic grayling stock inhabiting Nome Creek (Beaver Creek drainage) is recommended to determine whether a sustainable harvest opportunity currently exists.

YUKON RIVER SHEEFISH

Background and Historical Perspective

Sheeefish are large piscivorous members of the coregonidae (whitefish) subfamily. In the Yukon River drainage, the species is highly migratory, primarily found in streams and the brackish water at the river mouth, but they also use lake habitats to forage.

Sheefish are subject to an intensive subsistence fishery during the winter on the Lower Yukon River (Crawford 1979), throughout the drainage during the open water season by subsistence fishermen, and incidentally in salmon fisheries all along the river (Estensen et al. 2012; Jallen et al. 2012). Sheefish are also harvested incidentally in a fall season commercial fishery targeting Bering cisco in the lower river (Estensen et al. 2012).

Distribution of sport fishing effort, as indicated by catch and harvest, is likewise widespread. Historic documentation of harvests indicates that most sport utilization has occurred during summer and during the fall spawning migration near the mouth of tributary streams, including the Andreafsky, Innoko, Nulato, Nowitna, and Melozitna rivers (Table 6).

Currently sheefish in the Yukon River are under a single regulation adopted by the BOF in 1969:

- Dailyag and possession limit is 10 fish, no size limit. Season is open entire year.

The Trans-Alaska pipeline corridor was closed to all sport fishing in 1977. The highway corridor was reopened in 1980 to sport fishing for all species, except for sheefish and salmon for which the area has remained closed.

Although sheefish can be captured throughout much of the Yukon River drainage, many aspects of their life history remain unclear. Major migration routes, timing of migration, and important spawning, rearing, and overwintering areas for the species are only partly understood.

Recent multi-year studies using radiotelemetry have verified known or identified new locations of spawning areas in the Yukon River drainage. To date, 6 specific spawning locations have been described in the following locations: upper Innoko River, Alatna River (Koyukuk drainage), Sulukna River (Nowitna drainage), Chatanika River (Tanana drainage), mainstem Tanana River near Fairbanks, and mainstem Yukon River upstream of the Porcupine River outlet (Alt 1969; Brown 2000; Esse 2011, Gerken 2009; Gryska *In prep*; Brown and Burr 2012). Additional spawning areas are thought to exist in the Porcupine and Black river drainages, as well as the upper reaches of the mainstem Yukon River (Alt 1987), but specific locations have not been identified. Movements of juveniles, rearing habitats, and the behavior of nonspawning adults are largely unknown.

Sheefish are represented by both anadromous and freshwater resident forms. Some sheefish are thought to be members of resident populations that restrict their lifetime geographic range to the drainage in which they spawn (Alt 1985). Others are anadromous and are known to make rapid long-distance migrations to the mouth of the Yukon River and saltwater immediately following spawning (Brown and Burr 2012). Analysis of strontium concentrations in otoliths from sheefish harvested from spawning migrations into the Upper Koyukuk River, Yukon Flats, Tanana River, and Nowitna River were conducted to identify anadromy in sheefish (Brown et al. 2007 and Esse 2011). At least some anadromous individuals were present in the spawning populations within all of these drainages.

Recent Fishery Performance

Estimated average annual sport harvest of sheefish from the YMA in the recent 5-year period (2009–2013) was 153 fish. In the last 10-year period, harvests have ranged from 44 in 2012 to 1,352 in 2004 (Table 6). Similarly, catch estimates for the YMA have ranged widely, from more than 8,000 in 2006 to 247 in 2013 (Table 6). These data reflect a continued low, but variable, level of use of the species by sport anglers in the YMA.

Fishery Objectives and Management

Because the sport fishery for sheefish is currently widely distributed through the drainage, specific management objectives have not been identified. The goal of management is to maintain naturally reproducing populations of sheefish with characteristics that are sustainable and desirable to the public.

Current Issues and Fishery Outlook

At present, there is little concern for overharvest of sheefish in the Yukon River drainage. However, sheefish are currently being subjected to increased harvest in subsistence and commercial fisheries. Local subsistence fishers report increased harvest of sheefish to help offset limited access to Chinook salmon brought on by poor runs in recent years. A commercial fishery for Bering cisco during fall in the Lower Yukon River has documented an increased harvest of sheefish. Increased harvest of large adult sheefish in either or both of these fisheries may impact this anadromous stock.

Construction of new industrial roads for development of mineral deposits near known and recently identified spawning areas is of potential concern. The alignment of the proposed mining road from the Dalton Highway to the Ambler area traverses the Alatna River a short distance upstream of the sheefish spawning area. Potential impacts include increased human access to vulnerable spawning sheefish, habitat degradation from road construction, release of heavy metals, and fuel spills.

Recent Board of Fisheries Action

No regulatory actions have been taken by the BOF for Yukon River sheefish since 1980.

Current or Recommended Research and Management Activities

Additional sheefish spawning areas are thought to exist in the Porcupine and Black river drainages, as well as in the upper reaches of the Yukon River itself (Alt 1987), but specific locations have not been identified. A study to identify any additional spawning areas in the Upper Yukon and the degree to which sheefish in the area are anadromous is recommended.

Because of the large distance from the upriver areas to the rich marine feeding habitats, sheefish inhabiting the Upper Yukon are likely to be resident rather than anadromous populations. The resident populations are less resilient to increased harvest pressure than are the anadromous forms. It is important to identify these stocks so the effects of changes in harvest and use patterns can be managed effectively.

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TABLES AND FIGURES

Table 1.–Angler effort (angler-days), all species, number of fish harvested and total catch by species by recreational anglers within the Yukon Management Area, 2004–2014.[a]

	Year	Angler Effort	All fish Total	Pacific salmon Total	Chinook	Coho	Sockeye	Pink	Chum
Harvest									
	2004	13,109	10,432	1,318	194	907	79	33	105
	2005	8,965	7,954	729	0	360	78	0	291
	2006	11,423	6,088	794	101	371	0	54	268
	2007	11,394	5,627	873	411	258	0	0	204
	2008	12,973	5,793	636	155	171	0	0	310
	2009	10,608	7,037	979	27	849	0	0	103
	2010	9,134	5,890	1,877	161	575	20	0	1,121
	2011	10,291	2,368	498	102	179	0	0	217
	2012	8,671	2,531	537	231	47	0	51	208
	2013	10,332	7,719	1,697	155	127	0	0	1,415
	2014	12,917	6,225	1,959	0	1,639	0	0	320
Average									
	2004–2013	10,690	6,144	994	154	384	18	14	424
	2009–2013	9,807	5,109	1,118	135	355	4	10	613
Catch									
	2004		91,804	10,492	1,088	4,329	678	1,041	3,356
	2005		47,429	4,188	455	504	151	848	2,230
	2006		64,380	5,486	438	1,640	183	514	2,711
	2007		49,572	6,725	2,681	1,887	0	0	2,157
	2008		39,378	6,836	685	1,277	113	2,072	2,689
	2009		46,976	6,337	970	4,076	34	0	1,257
	2010		39,473	9,258	745	1,983	85	1,768	4,677
	2011		22,924	3,530	899	558	43	92	1,938
	2012		29,604	3,107	544	174	11	802	1,576
	2013		47,659	13,374	927	1,597	47	78	10,725
	2014		68,160	12,270	156	10,479	143	258	1,234
Average									
	2004–2013		47,920	6,933	943	1,803	135	722	3,332
	2009–2013		37,327	7,121	817	1,678	44	548	4,035

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Year	Non-salmon Total	Lake Trout	Dolly Varden /Arctic Char	Arctic Grayling	Sheefish	Northern Pike	Burbot
Harvest							
2004	8,655	98	167	3,271	1,352	3,656	111
2005	6,965	171	130	2,883	1,348	1,899	534
2006	4,636	6	174	2,041	540	1,134	741
2007	4,563	40	181	2,824	177	1,281	60
2008	4,918	33	36	2,531	462	1,577	279
2009	5,494	76	381	2,773	210	1,265	789
2010	3,723	23	346	1,778	299	1,104	173
2011	1,758	124	11	907	118	430	168
2012	1,994	0	16	1,433	44	501	0
2013	6,015	22	319	4,062	94	1,482	36
2014	4,246	25	167	2,498	95	1,184	277
Average							
2004–2013	4,872	59	176	2,450	464	1,433	289
2009–2013	3,797	49	215	2,191	153	956	233
Catch							
2004	80,697	553	2,420	32,455	5,329	39,762	178
2005	42,752	540	407	20,940	1,999	18,332	534
2006	58,127	26	984	23,718	8,298	24,335	766
2007	42,541	79	1,590	25,458	318	15,021	75
2008	31,852	58	1,332	20,687	834	8,655	286
2009	38,275	281	1,681	22,767	1,717	10,931	898
2010	29,739	23	2,700	15,521	1,100	10,143	252
2011	19,238	201	272	12,842	378	5,300	245
2012	26,490	0	673	13,976	361	11,463	17
2013	34,235	339	1,474	21,677	247	10,450	48
2014	55,781	25	4,305	31,839	470	18,805	337
Average							
2004–2013	40,395	210	1,353	21,004	2,058	15,439	330
2009–2013	29,595	169	1,360	17,357	761	9,657	292

[a]Alaska Sport Fishing Survey database [Internet]. 2004–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

Table 2.–Sport harvest and catch of Chinook salmon in the Yukon Management Area, 2004–2014. [a]

	Year											Averages	
Harvest	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004–2013	2009–2013
Yukon R. drainages (Ft. Yukon to Canadian Border)													
Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0
Yukon R. drainages (Koyukuk R. to Ft. Yukon)													
Subtotal	35	0	0	0	15	0	0	0	0	0	0	5	0
Porcupine River drainage	0	0	0	0	0	0	0	0	0	0	0	0	0
Koyukuk River	0	0	0	0	0	0	0	0	0	0	0	0	0
Other streams	35	0	0	0	15	0	0	0	0	0	0	5	0
Yukon R. drainages (downstream from Koyukuk R.)													
Subtotal	159	0	101	411	140	27	161	102	231	155	0	149	135
Anvik River	147	0	48	250	140	10	161	102	231	155	0	124	132
Andreafsky River	12	0	53	161	0	17	0	0	0	0	0	24	3
Other streams	0	0	0	0	0	0	0	0	0	0	0	0	0
Total [b]	194	0	101	411	155	27	161	102	231	155	0	154	135

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	Year											Averages	
Catch	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004–2013	2009–2013
Yukon R. drainages (Ft. Yukon to Canadian Border)													
Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0
Yukon R. drainages (Koyukuk R. to Ft. Yukon)													
Subtotal	35	89	0	0	54	609	0	0	0	0	80	79	122
Porcupine River drainage	0	0	0	0	0	0	0	0	0	0	0	0	0
Koyukuk River	0	77	0	0	39	0	0	0	0	0	0	12	0
Other	35	12	0	0	15	609	0	0	0	0	80	67	122
Yukon R. drainages (downstream from Koyukuk R.)													
Subtotal	1,053	366	438	2,082	631	361	745	899	544	927	76	805	695
Anvik River	1,028	354	385	1,905	631	344	726	899	475	927	76	767	674
Andreafsky River	12	12	53	161	0	17	0	0	69	0	0	32	17
Other	13	0	0	16	0	0	19	0	0	0	0	5	4
Total [b]	1,088	455	438	2,681	685	970	745	899	544	927	156	943	817

[a]Alaska Sport Fishing Survey database [Internet]. 2004–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

[b]Total may exceed the sum of subtotals because fishing site(s) not specified.

Table 3.–Sport harvest of northern pike in the Yukon Management Area, 2004–2014.[a]

	Year											Averages	
Harvest	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004–2013	2008–2013
Yukon R. drainages (Ft. Yukon to Canadian Border)													
Subtotal	60	0	160	68	74	24	10	0	11	0	0	41	9
Fortymile River	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	60	0	160	68	74	24	10	0	11	0	0	41	9
Yukon R. drainages (Koyukuk R. to Ft. Yukon)													
Subtotal[b]	2,428	724	834	831	1,351	652	856	423	290	1,385	987	977	721
Porcupine River	105	0	77	23	39	18	0	41	10	52	136	37	24
Chandalar River	0	0	0	0	7	0	0	13	10	0	14	3	5
Birch Creek	15	19	0	0	264	0	87	14	0	301	29	70	80
Beaver and Nome Creeks	0	47	0	25	60	10	186	0	92	43	0	46	66
Dall River	1,252	271	146	306	13	203	73	110	31	0	0	241	83
Haul Road Streams	0	0	0	0	0	106	59	0	0	35	0	20	40
Nowitna River	181	0	197	172	130	70	185	74	13	366	0	139	142
Melozitna River	0	0	0	0	0	0	54	19	0	0	0	7	15
Koyukuk River	629	265	296	80	648	0	123	17	121	546	14	273	161
Other	246	122	118	225	190	245	89	135	13	42	794	143	105
Yukon R. drainages (downstream from Koyukuk R.)													
Subtotal	1,002	1,127	140	133	152	589	238	7	200	97	197	369	226
Nulato River	0	10	0	0	0	0	0	0	0	0	0	1	0
Kaiyuh/Khotol River	60	57	0	0	0	0	0	0	0	0	0	12	0
Anvik River	13	48	0	38	43	0	0	7	0	19	20	17	5
Innoko River	265	60	0	0	60	173	29	0	17	78	71	68	59
Andreafsky River	302	895	44	80	0	130	18	0	104	0	53	157	50
Other	362	57	96	15	49	286	191	0	79	0	53	114	111
Total	1,507	3,656	1,899	1,134	1,281	1,577	1,265	1,104	430	501	1,482	1,435	975

[a]Alaska Sport Fishing Survey database [Internet]. 2004–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

Table 4.–Total fishing effort (angler-days), and northern pike catch and harvest from principal sport fisheries in the Yukon Management Area, 2004–2014.[a]

Year	Yukon total[b]	Dall River			Nowitna River			Innoko River		
		Effort	Number	Percent[c]	Effort	Number	Percent	Effort	Number	Percent
Harvest										
2004	3,656	686	1,252	34%	664	181	5%	1,551	265	7%
2005	1,899	423	271	14%	414	0	0%	486	60	3%
2006	1,134	347	146	13%	1,078	197	17%	623	0	0%
2007	1,281	600	306	24%	1,006	172	13%	600	0	0%
2008	1,577	102	13	1%	723	130	8%	515	60	4%
2009	1,265	349	203	16%	294	70	6%	620	173	14%
2010	1,104	179	73	7%	830	185	17%	237	29	3%
2011	430	165	110	26%	536	74	17%	263	0	0%
2012	501	533	31	6%	92	13	3%	760	17	3%
2013	1,482	0	0	0%	646	366	25%	1,140	78	5%
2014	1,184	0	0	0%	30	0	0%	1,242	71	6%
Average										
2009-2013	956	245	83	9%	485	142	15%	604	59	6%
2004-2013	1,433	338	241	17%	631	139	10%	680	68	5%
Catch										
2004	39,762	686	11,900	30%	664	2,429	6%	1,551	10,619	27%
2005	18,332	423	2,978	16%	414	349	2%	486	9,324	51%
2006	24,335	347	908	4%	1,078	4,090	17%	623	5,833	24%
2007	15,021	600	2,440	16%	1,006	5,216	35%	600	2,464	16%
2008	8,655	102	243	3%	723	917	11%	515	1,104	13%
2009	10,931	349	765	7%	294	1,419	13%	620	3,459	32%
2010	10,143	179	225	2%	830	2,491	25%	237	659	6%
2011	5,300	165	300	6%	563	2,852	54%	263	216	4%
2012	11,463	533	1,283	11%	92	371	3%	760	7,552	66%
2013	10,450	0	0	0%	646	6,123	59%	1,140	468	4%
2014	18,805	0	0	0%	30	0	0%	1,242	9,467	50%
Average										
2009-2013	9,657	245	515	5%	485	2,651	27%	604	2,471	26%
2004-2013	15,439	338	2,104	14%	631	2,626	17%	680	4,170	27%

[a] Alaska Sport Fishing Survey database [Internet]. 2004–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

[b] Harvest or total catch of northern pike in the Yukon area.

[c] Percent of harvest or total catch of northern pike in the Yukon area.

Table 5.–Sport harvest and catch of Arctic grayling in the Yukon Management Area, 2004–2014. [a]

	Year											Averages	
Harvest	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004–2013	2009–2013
Yukon R. drainages (Canadian Border to Ft. Yukon)													
Subtotal	371	129	235	474	86	169	38	234	90	277	1,293	210	162
Fortymile River	0	0	86	386	0	124	23	28	0	241	0	89	83
Charley River	272	0	121	11	70	0	0	49	0	0	48	52	10
Kandik River	0	0	0	0	0	0	0	98	19	0	0	12	23
Other	99	129	28	77	16	45	15	59	71	36	1,245	58	45
Yukon R. drainages (Ft. Yukon to Koyukuk R.)													
Subtotal	2,571	1,777	1,296	2,184	1,669	1,414	1,244	591	1,194	3,417	844	1,736	1,572
Porcupine River	227	226	91	185	865	188	347	0	119	2,053	101	430	541
Birch Creek	178	109	110	223	231	80	100	42	0	0	52	107	44
Beaver and Nome Cr.	579	432	699	349	0	180	285	274	42	496	0	334	255
Haul Road Streams [b]	23	328	91	712	112	282	38	160	287	373	279	241	228
Jim River	104	0	0	501	173	57	30	76	50	256	179	125	94
Koyukuk River [c]	1,080	415	51	12	137	475	162	0	0	128	50	246	153
Other	380	267	254	202	151	152	282	39	696	111	183	253	256
Yukon R. drainages (downstream from Koyukuk R.)													
Subtotal	253	881	510	166	776	1,190	496	82	133	368	361	486	454
Nulato River	0	78	0	0	100	668	0	0	0	0	0	85	134
Anvik River	146	0	10	151	174	98	360	73	52	90	223	115	135
Innoko River	16	0	72	15	502	0	0	0	0	145	80	75	29
Andreafsky River	0	803	414	0	0	264	136	0	47	133	38	180	116
Other	91	0	14	0	0	160	0	9	34	0	20	31	41
Total Yukon Harvest [d]	3,271	2,883	2,041	2,824	2,531	2,773	1,778	907	1,433	4,062	2,498	2,450	2,191

-continued-

Table 5.–Page 2 of 2.

Catch	Year											Averages	
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004–2013	2009–2013
Yukon R. drainages (Canadian Border to Ft. Yukon)													
Subtotal	981	452	745	1,030	1,773	691	776	1,556	620	788	1,775	941	886
Fortymile River	65	220	313	533	27	243	69	56	344	393	40	226	221
Charley River	692	0	259	238	70	211	0	196	0	0	96	167	81
Kandik River	0	0	35	0	0	0	0	491	186	0	0	71	135
Other	224	232	138	259	1,676	237	707	813	90	395	1,639	477	448
Yukon R. drainages (Ft. Yukon to Koyukuk R.)													
Subtotal	20,256	18,730	16,804	21,400	11,677	12,010	7,725	8,862	9,696	15,055	12,090	14,222	10,670
Porcupine River	696	705	472	255	1,742	1,622	1,008	74	1,146	2,877	935	1,060	1,345
Birch Creek	246	508	1,126	499	558	858	774	240	289	388	220	549	510
Beaver and Nome Cr	7,762	6,336	2,417	13,644	134	3,763	2,039	5,880	2,565	4,159	4,724	4,870	3,681
Haul Road Streams [b]	34	1,747	5,438	2,291	2,738	2,114	639	368	2,249	1,680	2,734	1,930	1,410
Jim River	2,687	437	4,265	3,229	4,765	1,440	1,278	785	1,477	3,841	1,784	2,420	1,764
Koyukuk River [c]	6,616	4,505	671	70	268	825	687	39	173	824	102	1,468	510
Other	2,215	4,492	2,415	1,412	1,472	1,388	1,300	1,476	1,797	1,286	1,591	1,925	1,449
Yukon R. drainages (downstream from Koyukuk R.)													
Subtotal	10,723	1,340	6,169	3,028	7,237	10,066	7,020	2,424	3,496	5,585	17,974	5,709	5,718
Nulato River	0	78	20	0	1,505	668	0	0	19	0	0	229	137
Anvik River	7,199	368	3,513	3,013	5,197	8,164	6,685	2,415	2,449	3,014	15,340	4,202	4,545
Innoko River	3,352	11	1,104	15	502	0	15	0	86	145	1,105	523	49
Andreafsky River	0	803	1,518	0	0	968	297	0	704	1,508	1,509	580	695
Other	172	80	14	0	33	266	23	9	238	918	20	175	291
Total Catch [d]	32,455	20,940	23,718	25,458	20,687	22,767	15,521	12,842	13,976	21,677	31,839	21,004	17,357

[a] Alaska Sport Fishing Survey database [Internet]. 2004–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

[b] Streams accessed from the Haul Road (Dalton Highway) excluding the Jim River.

[c] Koyukuk drainage waters excluding Jim River and streams accessed from the Haul Road (Dalton Highway).

[d] Total may exceed the sum of subtotals because fishing site(s) not specified.

Table 6.–Sport harvest and catch of sheefish in the Yukon Management Area, 2004–2014. [a]

	Year											Averages	
Harvest	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004–2013	2009–2013
Yukon R. drainages (Ft. Yukon to Canadian Border)													
Subtotal	0	0	0	0	26	0	14	0	0	0	0	4	3
Charley River	0	0	0	0	26	0	0	0	0	0	0	3	0
Other	0	0	0	0	0	0	14	0	0	0	0	1	3
Yukon R. drainages (Ft. Yukon to Koyukuk R.)													
Subtotal	809	991	316	129	254	80	197	118	10	94	70	300	100
Porcupine River	0	0	0	0	20	0	184	32	0	0	36	24	43
Birch Creek	0	27	0	0	0	0	0	0	0	20	0	5	4
Dall River	0	0	0	0	30	0	0	0	10	0	0	4	2
Ray River	0	54	0	48	0	80	0	0	0	0	0	18	16
Nowitna River	117	0	113	81	143	0	0	26	0	67	0	55	19
Melozitna River	146	0	0	0	0	0	0	0	0	0	0	15	0
Koyukuk River	468	0	0	0	61	0	13	12	0	0	0	55	5
Other	78	910	203	0	0	0	0	48	0	7	34	125	11
Yukon R. drainages (downstream from Koyukuk R.)													
Subtotal	543	357	224	48	182	130	88	0	34	0	25	161	50
Nulato River	58	340	0	0	0	23	76	0	0	0	0	50	20
Innoko River	47	17	20	0	182	0	12	0	34	0	18	31	9
Andreafsky River	0	0	41	24	0	0	0	0	0	0	0	7	0
Other	438	0	163	24	0	107	0	0	0	0	7	73	21
Total [b]	1,352	1,348	540	177	462	210	299	118	44	94	95	464	153

-continued-

Table 6.–Page 2 of 2.

	Year											Averages	
Catch	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004–2013	2009-2013
Yukon R. drainages (Ft. Yukon to Canadian Border)													
Subtotal	0	0	0	0	26	0	290	0	0	0	0	32	58
Charley River	0	0	0	0	26	0	0	0	0	0	0	3	0
Other	0	0	0	0	0	0	290	0	0	0	0	29	58
Yukon R. drainages (Ft. Yukon to Koyukuk R.)													
Subtotal	3,403	1,145	651	210	612	80	722	371	142	247	303	758	312
Porcupine River	0	0	0	12	20	0	522	32	0	0	136	62	117
Birch Creek	0	27	0	0	0	0	0	0	0	50	0	8	10
Dall River	0	0	0	0	30	0	0	0	86	0	0	12	17
Ray River	0	54	0	48	0	80	0	0	0	0	0	18	16
Nowitna River	2,046	0	448	81	259	0	12	198	0	190	0	323	80
Melozitna River	175	0	0	0	0	0	0	0	0	0	0	18	0
Koyukuk River	1,052	137	0	0	303	0	13	93	0	0	0	160	21
Other	130	927	203	69	0	0	145	48	56	7	167	159	51
Yukon R. drainages (downstream from Koyukuk R.)													
Subtotal	1,926	854	7,647	108	196	1,637	88	7	219	0	167	1,268	390
Nulato River	58	580	36	0	0	23	76	0	13	0	0	79	22
Innoko River	1,137	257	903	35	196	199	12	0	206	0	160	295	83
Andreafsky River	0	0	610	24	0	0	0	0	0	0	0	63	0
Other Streams	731	17	6,098	49	0	1,415	0	7	0	0	7	823	284
Total [b]	5,329	1,999	8,298	318	834	1,717	1,100	378	361	247	470	2,058	761

[a]Alaska Sport Fishing Survey database [Internet]. 2004–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

[b]Total may exceed the sum of subtotals because fishing site(s) not specified.

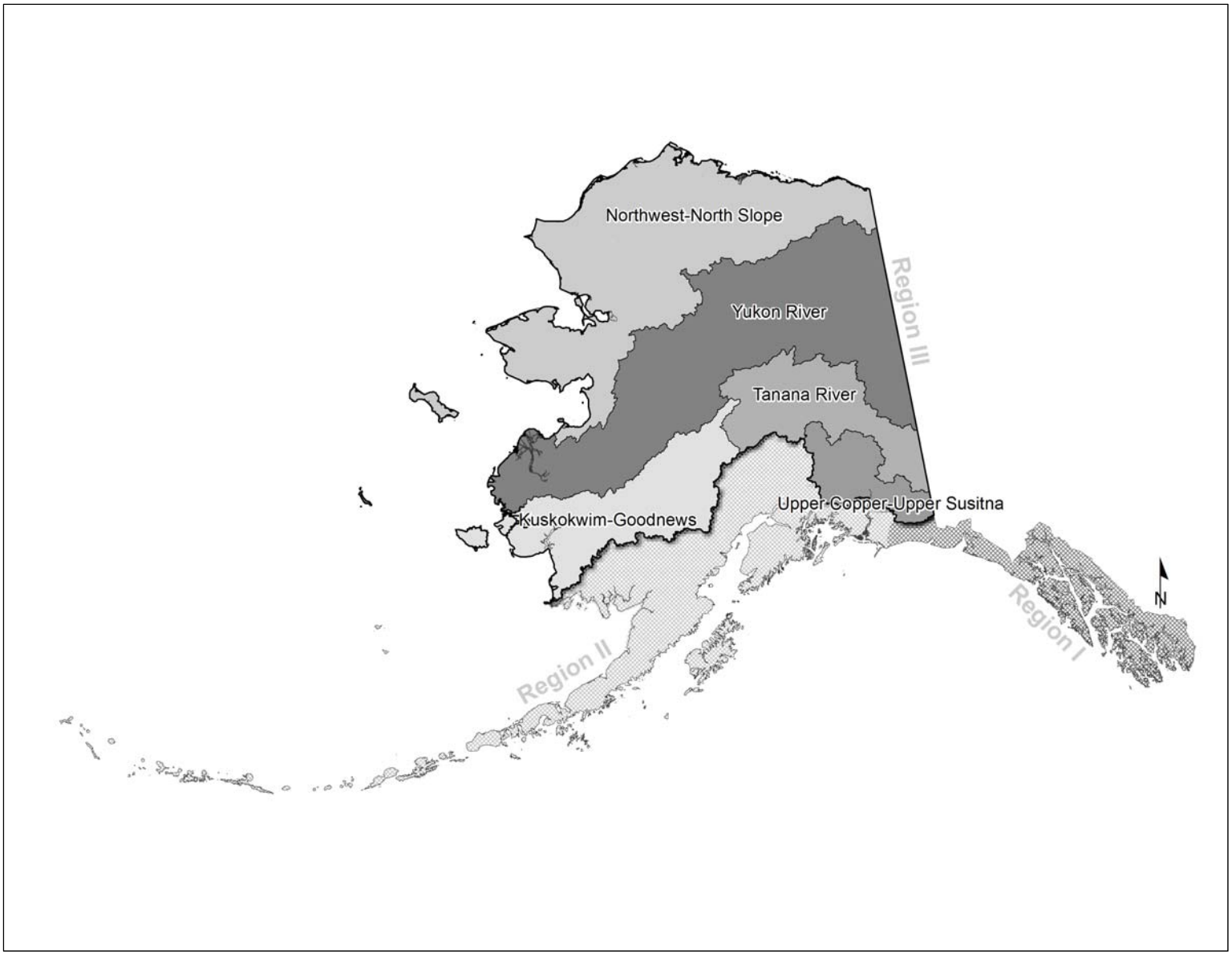

Figure 1.–Map of the sport fish regions in Alaska and the 5 management areas in Region III.

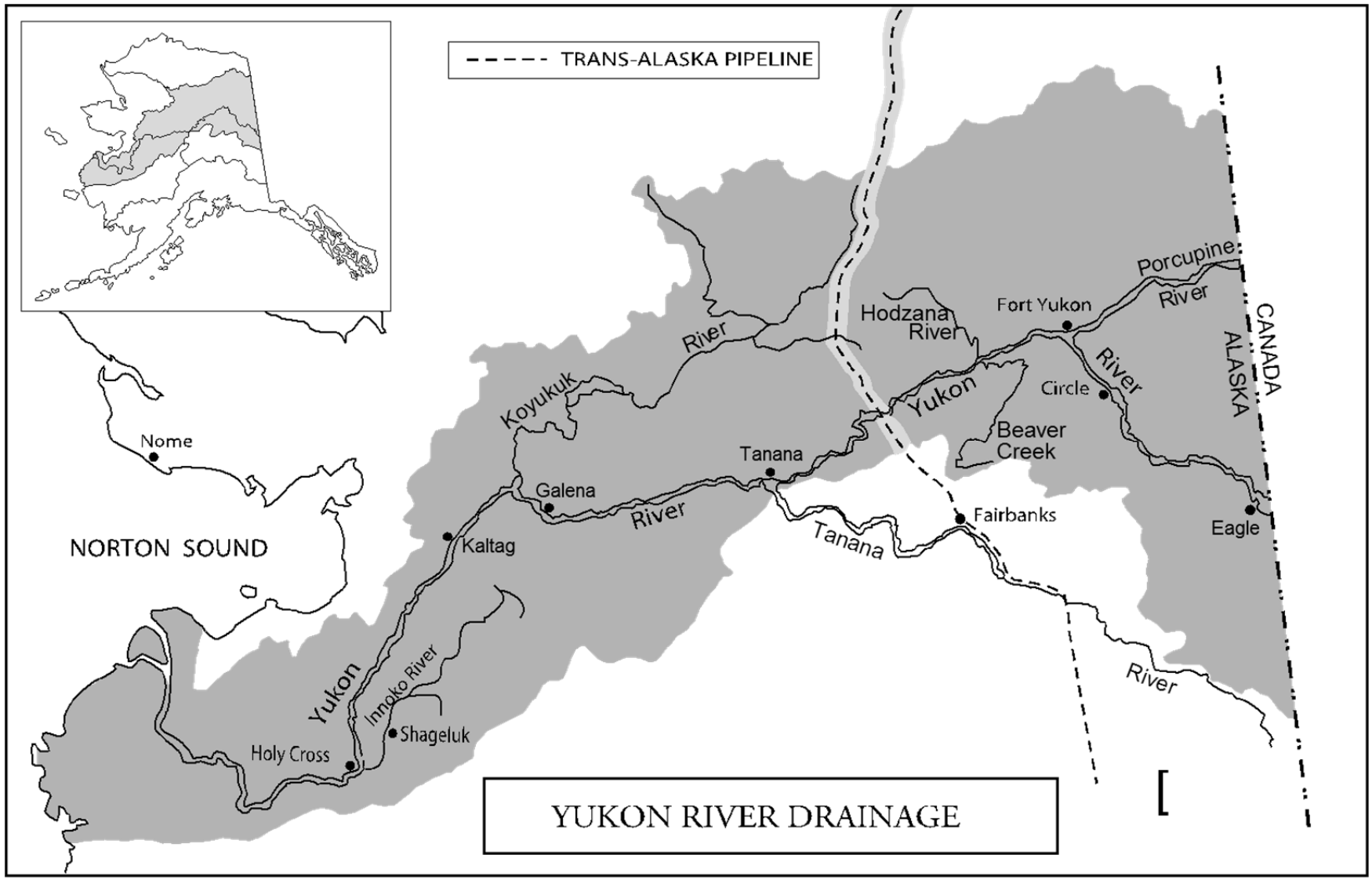

Figure 2.–Yukon Management Area; Tanana River drainage is excluded from the YMA.

APPENDIX A

Appendix A1.–Emergency orders issued for Yukon Management Area sport fisheries during 2014–2015.

Year	E. O. Number	Explanation
2014	3-KS-02-14	Closed all waters of the Yukon River drainage (the U.S. portion of the Yukon River drainage excluding the Tanana River drainage) to sport fishing for Chinook salmon, effective 12:01 a.m. Monday, May 12, 2014.
2015	3-KS-02-15	Closed all waters of the Yukon River drainage (excluding the Tanana River drainage) to sport fishing for Chinook salmon, effective 12:01 a.m. Monday, May 11, 2015.

APPENDIX B

Appendix B1.–Guided angler effort (angler-days) and fish species kept and released in the Yukon Management Area, as reported in the freshwater guide logbooks, 2006–2014.[a]

Year	Angler-days	Salmon			Lake trout	Dolly Varden	Arctic grayling	Northern pike	Sheefish
		Chinook	Coho	Sockeye					
Fish kept (harvested)									
2006	946	79	330	0	ND	ND	5	ND	ND
2007	1,273	143	164	2	0	28	215	223	6
2008	992	72	244	1	0	5	15	12	8
2009	566	31	120	0	0	5	35	21	0
2010	1,119	74	238	0	0	20	133	24	7
2011	965	163	153	0	0	11	191	41	2
2012	913	101	205	0	0	18	67	29	1
2013	1,118	64	198	4	0	22	150	37	8
2014	1,218	0	351	1	0	16	137	6	0
Fish released									
2006		318	2,305	47	0	238	3,782	ND	ND
2007		566	2,218	18	0	660	8,826	9,267	84
2008		366	1,559	25	0	548	5,292	6,257	64
2009		94	918	0	0	177	4,540	4,074	114
2010		287	1,888	121	0	961	7,579	4,513	145
2011		703	646	49	5	647	6,236	3,274	43
2012		267	609	69	1	542	5,517	4,033	46
2013		386	385	48	0	1,144	9,447	4,674	141
2014		4	2,064	17	0	2,282	14,586	5,641	14

[a]Sigurdsson and Powers, 2009–2014, *In prep*.

APPENDIX C

Appendix C1.–Commercial[a], subsistence[a], and sport harvest[b] of Chinook salmon in the Yukon River drainage, 1993–2014.

	Tanana River			Yukon River without Tanana			All Yukon River		
Year	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
1993	1,445	1,672	1,573	94,237	60,814	122	95,682	62,486	1,695
1994	2,606	2,370	1,871	112,865	50,471	410	115,471	53,077	2,281
1995	2,747	1,779	2,488	123,457	46,756	37	126,204	48,535	2,525
1996	447	1,177	3,745	91,443	42,129	128	91,890	43,306	3,230
1997	2,728	2,712	1,953	113,693	53,266	221	116,421	55,978	2,174
1998	963	1,919	447	43,662	51,814	207	44,625	53,733	654
1999	690	1,624	1,001	70,078	50,570	22	70,767	52,194	1,023
2000	0	983	177	9,115	34,858	99	9,115	35,841	277
2001	0	2,327	667	0	50,610	12	0	52,937	679
2002	836	1,067	478	23,820	41,553	8	24,656	42,620	486
2003	1,813	2,349	2,153	39,305	52,964	99	41,118	55,313	2,719
2004	2,057	1,589	1,319	54,886	52,287	194	56,943	53,876	1,513
2005	453	1,966	485	31,886	50,733	0	32,339	52,669	485
2006	84	1,318	638	46,562	46,481	101	46,646	47,799	739
2007	281	1,853	549	34,202	52,241	411	34,384	54,094	960
2008	0	731	254	4,641	43,089	155	4,641	43,820	409
2009	0	1,412	836	319	31,615	27	316	33,027	863
2010	0	1,305	313	9,897	42,116	161	9,897	43,421	474
2011	0	1,456	372	82	38,844	102	82	40,300	472
2012	0	698	114	0	27,684	231	0	28,382	345
2013	0	409	11	0	10,624	155	0	11,033	166
2014	0	284	0	0	2,440	0	0	2,724	0
Average									
1993–2002	1,246	1,763	1,404	68,237	48,284	127	69,483	50,071	1,502
2003–2012	469	1,468	703	22,178	43,805	148	22,647	45,273	898
2008–2012	0	1,120	378	2,987	36,670	135	2,987	37,790	513

Source:

[a]Estensen et al. 2012, 2013. Commercial harvest includes test fish sales and estimated harvest of female Chinook salmon to produce roe sold.

[b]Alaska Sport Fishing Survey database [Internet]. 2003–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES
NEWS RELEASE

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Date Issued: May 5, 2015

REVISED
2015 Yukon River Summer Salmon Fishery News Release # 2
2015 Yukon River Salmon Fisheries Outlook
Districts Affected: Yukon Area

The 2015 Chinook salmon run is expected to range from poor to below average. Continued conservation measures will be necessary to meet escapement objectives. This information sheet describes the anticipated management strategies for the 2015 salmon fishing season.

2015 Run and Harvest Outlook for Yukon River Salmon

	Chinook	Summer Chum	Fall Chum	Coho
Projection:	Poor	Average to above average	Average to above average	Average to below average
Escapement:	Potential to meet most goals	Expect to meet goals	Expect to meet goals	Expect to meet goals
Subsistence:	Fishery restrictions necessary	Expect to provide for normal harvest	Expect to provide for normal harvest	Expect to provide for normal harvest
Commercial:	No fishery anticipated	800,000 to 1,400,000 potentially available for harvest	250,000 to 470,000 potentially available for harvest	60,000 to 80,000 potentially available for harvest

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Management Strategies

- Before Chinook salmon enter the river, subsistence fishing opportunity for non-salmon species will be provided and gillnets will be restricted to 6-inch or smaller mesh size.
- As the Chinook salmon run begins to build, subsistence salmon fishing will close chronologically in each district based on the migration timing of Chinook salmon swimming upriver. The closure is expected to be in place to protect each of the Chinook salmon pulses. Fishermen in the Coastal District, Koyukuk, Innoko, and Tanana Rivers should also expect some closed fishing time to protect Chinook salmon in those areas.
- During subsistence salmon fishing closures, non-salmon species may be harvested using 4-inch or smaller mesh size gillnets not exceeding 60-feet in length. However, targeting of Chinook salmon with this gear type will not be allowed. This opportunity to harvest non-salmon will be reduced or discontinued if this gear is used to target Chinook salmon.
- When summer chum salmon become abundant, subsistence and commercial fishing opportunities will be provided with selective gear such as dip nets, beach seines, and manned fish wheels that require the immediate and careful release of all Chinook salmon alive.
- Fishermen are strongly encouraged to avoid fishing when and where Chinook salmon may be encountered. Subsistence restrictions will be relaxed after the majority of the Chinook salmon run has passed through each section of river in order to harvest other species.
- If confidence is high that the Chinook salmon run is within the pre-season outlook range and escapement goals are likely to be met, the use of 6-inch gillnets may be considered to allow the selective harvest of summer chum salmon and small Chinook salmon between pulses when incidental catches of Chinook salmon would be expected to be low.
- The sport fishery for Chinook salmon will be closed throughout the U.S. portion of the Yukon River drainage, excluding the Tanana River drainage. Chinook salmon may not be retained or possessed. Restrictions for the Tanana River drainage will be announced in early June.
- The fall chum salmon run is anticipated to be of sufficient size to provide for full subsistence opportunity with a surplus for commercial harvest.
- The fall chum salmon commercial fishery is expected to begin in the Lower Yukon Area in the middle of July.

The 2015 Chinook salmon outlook is for a run size range of 118,000 to 140,000. This range is similar in size to the run observed in 2014 and requires subsistence harvest restrictions in order to assure minimum escapement objectives are met. As in recent years, initial management will be based on the expectation that the 2015 Chinook salmon run size will likely be near the lower end of this range. However, management strategies may change based on inseason run assessment information.

The following chart shows the historical estimated Chinook salmon total run size in the Yukon River, illustrating the drastic decline in production beginning in 1998. The cause of this drop in production remains largely unknown.

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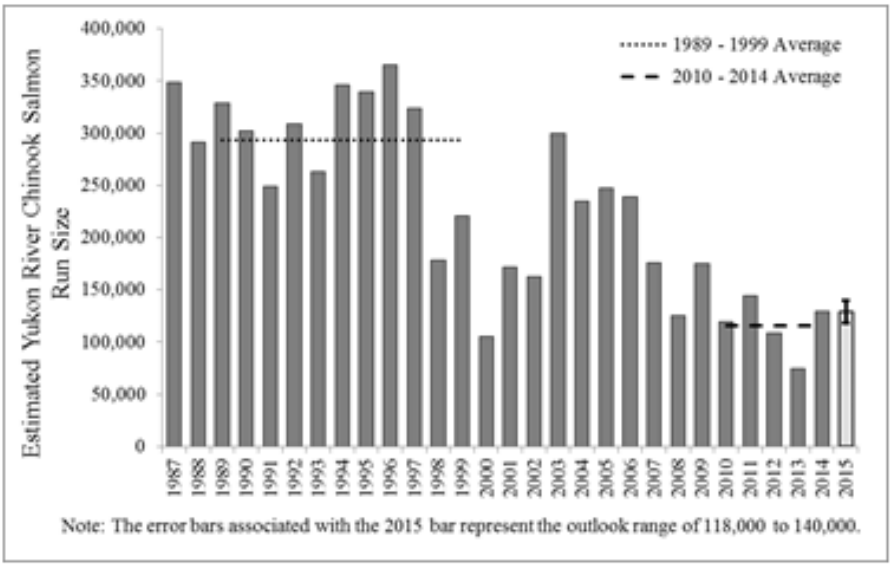

For 2015, the US/Canada Yukon River Panel agreed to continue Interim Management Escapement Goals (IMEG) in Canada of 42,500-55,000 Chinook salmon and 70,000-104,000 fall chum salmon based upon the Eagle sonar program. If escapement objectives are expected to be met and there is a surplus of Chinook salmon and fall chum salmon, additional Chinook and fall chum salmon will need to cross the border to fulfill harvest sharing commitments specified in the US/Canada Yukon River Agreement. The Fishing Branch River IMEG of 22,000-49,000 fall chum salmon is based upon the historical weir data. However, the Porcupine River Chum Salmon production has been consistently underperforming other Yukon River fall chum salmon stocks, so fishery managers will work with fishermen along the Porcupine River on exploring opportunities to conserve chum salmon in the local area.

For additional information:
Subsistence fishing schedule: 1-866-479-7387 (toll free outside of Fairbanks); in Fairbanks, call 907-459-7387.

ADF&G: Stephanie Schmidt, Anchorage 907-267-2217; Jeff Estensen, Fairbanks 907-459-7217; or contact the Emmonak office 907-949-1320. The Emmonak ADF&G office is expected to be open by May 30.

USFWS: Fred Bue, Fairbanks 907-455-1849 or 1-800-267-3997; or contact the Emmonak office 907-949-1798.

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APPENDIX D

Appendix D1.–Number of visitors contacted at the Coldfoot Visitor Center[a], estimated fishing effort (angler-days, all species)[b], and total catch[b] of Arctic grayling for the Dalton Highway corridor (Yukon River to Atigun Pass), 1996–2014.

Year	Visitors	Fishing Effort	Grayling Catch
1996	4,742	423	936
1997	5,399	843	3,025
1998	5,124	617	1,656
1999	5,248	577	5,293
2000	5,002	363	759
2001	4,629	445	919
2002	4,714	152	705
2003	7,067	396	1,786
2004	8,597	503	3,258
2005	8,051	270	2,184
2006	8,378	2,590	9,703
2007	9,439	1,975	5,779
2008	9,657	987	7,503
2009	8,574	1,177	3,253
2010	8,311	1,260	1,917
2011	9,634	731	1,153
2012	8,187	791	3,509
2013	7,787	791	5,230
2014	6,710	985	3,707

[a] A multiagency visitor center operated by the US Department of Interior: Bureau of Land Management, US Fish and Wildlife Service and National Park Service.

[b] Alaska Sport Fishing Survey database [Internet]. 1996–2014. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 30, 2015). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/