

Fishery Management Report No. 18-30

**Fishery Management Report for Sport Fisheries in the
Yukon Management Area, 2017**

by

Lisa Stuby

December 2018

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

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IN THE YUKON MANAGEMENT AREA, 2017**

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

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ABSTRACT

Information specific to recreational fisheries in the Yukon Management Area in 2017 and preliminary information for 2018 is presented. Estimates of fishing effort, total catch, and harvest is summarized through the 2017 season. This information is provided to the Alaska Board of Fisheries, general public, and other 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 8,592 angler-days of sport fishing in 2017. Non-salmon species dominated both total catch and harvest with estimates of 23,570 and 4,028 fish, respectively versus estimates of 1,225 and 218 for salmon. Arctic grayling, northern pike, Dolly Varden, Arctic char, sheefish, and burbot comprised approximately 93% of the total catch and 85% of the total harvest. Salmon catch and harvest were comprised of king, coho, and chum salmon and were 5% and 5% respectively of total fish. No king salmon were harvested in 2017 due to a lower-than-average run and subsequent restrictions to subsistence harvest, which led to an issuance of an emergency order to close the sport fishery.

Key words: Yukon River, sport fisheries, sport fishery management, fisheries management plan, Anvik River, Andreafsky River, Nowitna River, Dall River, Innoko River, Dalton Highway, northern pike, king 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 were 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. 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.

Many of the 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 2017, with preliminary information from the 2018 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 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 [excluding Tanana 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 mi² (1,146,000 km²) 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, Division of Sport Fish 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);
- 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 in evaluating fisheries and wildlife issues and proposing regulatory changes. Advisory council 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.

Within the YMA there are 10 ACs: Eagle, Yukon Flats, Central, Tanana-Rampart-Manley (TRM), Middle Yukon, Koyukuk, Grayling-Anvik-Shageluk-Holy Cross (GASH), Ruby, Mid-Lower Yukon, and Coastal Lower Yukon. In addition, ACs from the Tanana River Management Area (TRMA) 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. Emergency orders are implemented to address conservation issues for resident species and for inseason management of salmon fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the BOF. Emergency orders issued under this authority for the YMA during 2017 and 2018 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 obtained 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 (26–28 September 2018); the Western Interior RAC met in Galena (10–11 October 2018); and the Eastern Interior RAC meeting was in Tanana (11–12 Oct 2018).

The Division of Sport Fish Yukon Area Management Biologist (AMB) attended the Western Interior RAC meeting. At this meeting 7 Office of Subsistence Management (OSM) proposals were discussed with respect to 1) Expanding area and fishing time between the mouth of Koyukuk River and Tanana (Figure 2); 2) Decreasing time of subsistence fishery closures prior to state commercial fishing from the Yukon River mouth to the mouth of the Koyukuk River (excluding Koyukuk and Innoko rivers); 3) Decreasing time of subsistence fishery closure prior to and following state commercial salmon fishing periods between the Yukon River mouth to just above Holy Cross; 4) repeal fin clip requirement of subsistence caught king salmon (*Oncorhynchus tshawytscha*) in the Lower Yukon River; 5) Protect the first pulse of king salmon, and; 6) enable dip nets to be allowable gear type for subsistence harvest of salmon for the Yukon River. No proposals regarding sport fisheries were presented. Additionally, there was consensus supporting future assessment projects on Bering Cisco and protecting salmon spawning habitat. 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, and 1 or more assistant area management biologists.

Area management biologists evaluate fisheries and propose and implement management strategies through plans and regulations in order to meet divisional goals. A critical part of these positions consists of interaction with the BOF, ACs, and the general public. 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 2017 were available in fall 2018.

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 2016, *In prep*). 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 king salmon, 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 2016, *In prep*).

SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The YMA consists of approximately 157,475 miles² (407,858 km²) 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 YMA area is sparsely populated and communities are invariably located near water because of the importance of fish and/or marine mammals as a food source.

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, which ends at Prudhoe Bay; Steese Highway, which ends at Circle; Taylor Highway (no winter maintenance), which ends at Eagle; and the Elliott Highway, which ends at Manley Hot Springs on the Tanana River approximately 60 miles from the confluence with the Yukon River.

Land ownership and jurisdictions fragment YMA into a complex mosaic. The federal government is the major land manager through its jurisdiction over lands in two National Parks and Preserves (Yukon-Charley and Gates of the Arctic), five National Wildlife Refuges (Yukon Flats, Kanuti, Koyukuk, Nowitna, and Innoko), the White Mountains National Recreation Area, the Steese National Conservation Area, Wild and Scenic Rivers (Alatna, Andreafsky, Charley, Fortymile, John, and Koyukuk rivers, and Beaver Creek), 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.

FISHERY RESOURCES

Virtually all freshwater and migratory fish species sought by anglers in Alaska are available in the YMA. All populations are wild since 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 king salmon, coho salmon *Oncorhynchus 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 the YMA. Exceptionally large northern pike *Esox lucius* and sheefish (Inconnu) *Stenodus leucichthys* are available throughout the drainage but more specifically targeted in the Innoko, Dall, 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 relatively 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.

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; and
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.

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 resulted in reductions in bag limits for northern pike and Arctic grayling. Due to increased sport fishing pressure and 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, which is defined as 5-miles on each side of the road (10-mile strip centered on the highway).
2. Ambler Road Corridor. This proposed road corridor would connect the Dalton Highway to the Ambler Mining District located in the drainages of the Koyukuk and Kobuk rivers. Waterbodies affected within the YMA would include the Koyukuk, John, and Alatna rivers, and numerous smaller streams and lakes. Concerns related to this project are similar to what has occurred on the Dalton Highway. That is, little baseline fisheries assessment has been conducted on these waterbodies and as a result, the potential for fish habitat degradation due to road construction and mine traffic is not well understood. In addition, concerns have been

expressed from ACs and RACs regarding increased fishing pressure due to easier access to remote locations as a result of the new road.

3. Development of new sport fisheries in rural Alaska. Development of sport fisheries in remote areas has, at times, resulted in friction between local residents and nonlocal anglers, who have historically enjoyed exclusivity 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 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 page 21–22).
4. 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’ (AVCP) 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. Because all Alaskans qualify for subsistence, resident anglers could choose to fish with hook and line in these areas under subsistence regulations instead of sport fish regulations. This is of particular concern to sport fish managers because subsistence fishing does not require a sport fish license and therefore subsistence caught fish are excluded from the SWHS, and subsistence fishers using hook-and-line aren’t subject to the bag and possession limits that sport fishers are obligated to obey.
5. 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. As reflection of this resentment, proposals to the BOF have looked to eliminate catch-and-release in some fisheries.
6. 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 remains to be of 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. A site inspection was conducted during 2018 for a potential future boat launch in Eagle.

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=home.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 is 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, or by phone, e-mail, and social media. In addition, I&E staff distribute and update fishery brochures and fishing regulations; manage both the regional webpage and our newly developed Fishing in Interior Alaska Facebook page. 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. In addition, the Education Associate has created several instructional videos on various fisheries managed by Region III Sport Fish Division and in the near future, will work with the Yukon and Northwest/North Slope AMBs to create a video on sport fishing opportunities along the Dalton Highway Corridor.

SPORT FISHING EFFORT, HARVEST, AND CATCH

Effort, harvest, and catch statistics for YMA sport fisheries have been estimated from responses to the SWHS since 1977 and reported under the headings of the "Yukon River drainages" (Area Y)¹. The 2017 estimate of 8,592 angler-days is below the last 5- (2012–2016) and 10-year (2007–2016) estimates of 9,540 and 10,210 angler-days, respectively (Table 1).

The vast majority of the YMA and its fishable waters are located away from highways and roads. Residents of these rural communities harvest a substantial amount of fish and game resources for subsistence use, and fishing is usually conducted with more efficient 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, as was mentioned above, rural harvests are often unknown due to their exclusion in the SWHS.

¹ Alaska Sport Fishing Survey database [Internet]. 1996–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

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. Sport harvests have averaged less than 5,000 fish in the most recent 5- and 10-year periods (Table 1). The most recent estimate (4,742 fish in 2017) reflects the past 5- and 10-year averages. However, the 2015 and 2016 total harvest estimates of 3,272 and 2,422 fish respectively were well below these averages. The harvest in the YMA has been dominated by freshwater resident species, primarily Arctic grayling, northern pike, and sheefish. In 2016, Pacific salmon (all species combined) were 16% of the total sport harvest in the management area. However, for 2017 Pacific salmon comprised 5% of the total harvest.

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, 90% of all fish caught in the YMA were released. The percentage of catch-and-release activity varied by species. In 2016, 96% of northern pike, 91% of Arctic grayling, 76% of sheefish, and 100% of king salmon were released. Similarly, for 2017, 92% of northern pike, 87% of Arctic grayling, 58% of sheefish, and 100% of king salmon were released (Table 1). An Emergency Order (Appendix A) closed the entire YMA to sport harvest of king salmon during May 1-June 16, 2017, which severely restricted harvest potential.

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 fish guides are operating businesses and provides additional information on catch and harvest trends. For example, king salmon harvest and fish released from the guide logbook reports for the YMA for 2007–2016 have averaged 65 and 269 fish respectively (Appendix B), compared with 124 and 800, respectively, from the SWHS for 2007–2016 (Table 1). The reason for the discrepancy is because the SWHS reports estimates, while the guide logbook attempts to report actual number of fish kept and released. The 2017 guide logbook data is currently unavailable.

OTHER USER GROUPS – COMMERCIAL AND SUBSISTENCE FISH HARVESTS

Important subsistence fisheries exist in the Yukon River drainage. The BOF identifies fish stocks or portions of stocks or populations that are customarily and traditionally taken or used for subsistence. Under Alaska’s subsistence statute, the Alaska Board of Fisheries must identify fish stocks that support subsistence fisheries and, if there is a harvestable surplus of these stocks, adopt regulations that provide reasonable opportunities for these subsistence uses to take place. Whenever it is necessary to restrict harvests, subsistence fisheries have a preference over other uses of the stock(s) (AS 16.05.258).

Commercial fisheries provide an economic base for income and employment in many local communities and in recent years have focused on summer and fall chum, and coho salmon (Estensen et. al 2018). On average commercial harvests in the Alaska portion of the Yukon River for summer and fall chum and coho salmon have exceeded 800,000 fish during 2012–2016 (JTC 2018). Currently, there are small commercial fisheries for whitefish and lamprey *Lampetra camtschatica* in the Lower Yukon River. The only personal use (non-subsistence) fishery in the Yukon River drainage is located near Fairbanks on the Tanana River (JTC 2018).

King salmon are an important subsistence species throughout the Yukon River drainage. The current amounts necessary for subsistence (ANS) of king salmon in the Alaska portion of the Yukon River drainage was designated by the BOF in January 2013 to be 45,500–66,704 king

salmon. Since 2008, king salmon harvests have been below the ANS (Appendix C1) because of poor run sizes and subsequent restrictions to fishing opportunities in order to meet drainage-wide escapement goals (Estensen et. al 2018). Summer and fall chum salmon provide the largest subsistence harvest of salmon. Although present in the lower part of the drainage, pink salmon are not targeted to a great extent in commercial or subsistence fisheries.

Coho salmon harvests generally occur incidentally in the subsistence fisheries while fall chum salmon are targeted (Estensen et. al 2018). During 2012–2016 the average annual coho salmon subsistence harvest was 16,003, the average commercial harvest was 115,372, the average personal-use harvest was 159, and the average sport harvest was 451 (JTC 2018, Table 1).

SECTION II: FISHERIES

Waters within the YMA offer some of the most remote and diverse sport fishing opportunities in Alaska. Opportunities exist to catch trophy northern pike, sheefish, Dolly Varden, lake trout, and Arctic grayling within wilderness settings. Sport fishing opportunities for salmon are currently not as well developed in other management areas. 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 2017. Discussion of each fishery will include 1) historical perspective; 2) recent fishery performance and 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. Information regarding the 2018 season will be included as available but estimates of sport effort and harvest will not be available until 2019. A summary of recent sport fish harvests by species are provided for reference and recent fishery performance will focus on data from 2017 with 5- and 10-year average comparisons back to 2007 for the tables presented. For a list of sport harvest and catch prior to 2007, see the SWHS.

YUKON RIVER DRAINAGE SALMON

Yukon River drainage commercial, subsistence, and personal use (Tanana River near Fairbanks) fisheries are managed by the Division of Commercial Fisheries. King, 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

King salmon are found throughout the Yukon River drainage. Chum salmon, composed of summer and fall runs, 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 have been located as far upriver as Rampart on the mainstem Yukon River, but relatively few fish are taken annually in commercial or subsistence harvests.

Sport catch and harvests of salmon in the Yukon River drainage have historically been, and continue to be, primarily from streams of the Tanana River drainage and primarily target king and coho salmon. Recent sport fisheries in the Tanana River drainage are discussed within the *Fishery Management Report for Recreational Fisheries in the Tanana River Management Area, 2015* (Wuttig and Baker 2017). The majority of king salmon sport harvests in the YMA have been

primarily reported 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 or as legal subsistence gear in the AVCP area of the Lower Yukon River. 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 king and chum salmon began in 1998 with runs in 2000 being the lowest up to that time on record for both species. In September 2000, the BOF classified the Yukon River king salmon as a stock of yield concern, Yukon River summer chum salmon as a stock of management concern, and most of the Yukon River drainage fall chum salmon stock as a stock of 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 that reduced harvests. Through 2006, king and chum salmon runs continued to improve over the very poor runs of 1998–2001. In 2007 and continuing through 2013, the number of king salmon returning to the Yukon River drainage was less than expected. Beginning in 2014 and continuing through 2018 the king salmon return has been better than expected, but still below the historical average. These numbers are reflected in the subsistence sport harvest values in relation to the ANS (Appendix C1) and also in recent and historical escapement estimates past the Pilot Station sonar, which represents an index of drainage-wide total run estimates. During 1998–2001, average king salmon passage past Pilot Station sonar was estimated at 116,976, during 2002–2006 was 217,440, during 2007–2013 was 154,476, and was 182,499 during 2014–2018².

Summary of Yukon king Salmon Runs 2017 and 2018

In 2017, the pre-season, drainage-wide king salmon run was projected to be 140,000–194,000 fish, with 70,000–97,000 of those fish being Canadian-origin fish (JTC 2018). Unlike recent years, this projected run size was expected to be strong enough to meet the upper end of the interim management escapement goal (IMEG) range of 42,500–55,000 fish past Eagle sonar (Canadian bound). Cumulative passage at Pilot Station sonar was approximately 263,000 king salmon, which was well-above the 2012–2016 average of approximately 150,000 fish (JTC 2018). However, a conservative management approach was implemented, especially earlier in the run, with restrictions to subsistence harvest. As a result, commercial fishing on king salmon was closed for the season as well as the sport fishery effective May 1, 2017 (AS 16.05.258). Restrictions were relaxed or removed once run projections at the sonar project near Pilot Station coincided with the

² Escapement Monitoring Inseason and Historical Data for the Yukon Management Area database [Internet]. 1995-2018. Anchorage, AK. Alaska Department of Fish and Game, Division of Commercial Fisheries (cited October 31, 2018). Available from: http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareayukon.salmon_escapement

upper end of the preseason forecast, and the predicted total run estimate at the project was projected to be one of the highest since 2003. The sport fishery opened on June 16, 2017 (Appendix A1). Commercial sale of incidentally-caught king salmon was prohibited during the summer season, however, during the fall season (July 17) ADF&G allowed the sale of 168 incidentally-caught king salmon (Appendix C1). Of the two most popular sport fisheries in the YMA, sustainable escapement goals (SEG) for the East Fort Andreafsky River weir (2,100-4,900) and Anvik River aerial survey (1,100-1,700) were achieved in 2017 (2,970 and 1,101 respectively, JTC 2018).

The 2017 summer chum salmon run was projected to be over 2 million fish, a run size sufficient to meet escapement and subsistence needs and provide for a commercially harvestable surplus. However, the management of a summer chum-directed salmon commercial fishery would be affected by the need to conserve king salmon and would depend on king salmon run timing and abundance (JTC 2018). Therefore, most of the harvest of summer chum salmon was from openings with selective gear (manned fish wheels with live wells that allowed for live release of all king salmon and dip nets during 2018). During the 2017 summer season, the total commercial harvest of summer chum salmon in the Alaska portion of the Yukon River drainage was 555,296, which was the largest harvest since 1989 (JTC 2018). Pilot Station sonar estimated passage of 3,093,735 fish.

Management of the Yukon Area fall season commercial salmon fisheries on coho salmon is in accordance with the *Policy for the Management of Sustainable Salmon Fisheries* (5 ACC 39.222) and the *Yukon River Coho Salmon Management Plan* (5 ACC 05.369). The latter plan allows a coho salmon directed commercial fishery in the absence of achieving the threshold number of fall chum salmon if a harvestable surplus of coho salmon is identified and a commercial fishery will not have a significant impact on fall chum salmon escapement and allocation (JTC 2018). Preliminary coho salmon passage estimates at Pilot Station sonar was approximately 166,320 fish, which is above the historical median of about 160,000 fish. Total commercial harvest of Yukon River coho salmon in the Alaska portion of the drainage was 139,915 and subsistence harvest was 7,645.

The 2018 drainage-wide king salmon outlook was for a run size of 173,000 to 251,000 fish and be large enough to provide for normal subsistence harvests (JTC 2018). Preliminary estimates indicated that 2018 king salmon escapement throughout the Yukon River were lower than anticipated. The preliminary cumulative passage of king salmon past the sonar site near Pilot Station was approximately 161,831 fish. Canadian border passage estimated from the sonar near Eagle, Alaska was approximately 57,959 king salmon, above the IMEG of 42,500–55,000 fish. The 2018 preliminary subsistence harvest estimates of king salmon for the Yukon are currently unavailable. Summer chum salmon past Pilot Station sonar (1,612,688) was less than 2017, but still large enough to support a commercial fishery.

Summary of Catch and Harvests in Yukon Salmon Sport Fisheries in 2017

Sport fishing for king salmon was closed during May 1–June 16, 2017. Based on responses to the SWHS, 398 king salmon were caught, and none were harvested during the open period (Tables 1 and 2). Sport fishing effort for king salmon in the YMA is typically small and most effort occurs in Lower Yukon River tributaries. In recent years, the Anvik River has been the predominant site for king salmon sport fishing however; during 2017 only 26 king salmon were captured and released. The majority of king salmon sport fish catches were in the Porcupine River drainage (204). Weak king salmon runs experienced since 2007 has resulted in restrictions to the sport

fishery in 9 of the past 10 years (2008, 2009, and 2011–2017), and the sport fishery was restricted again in 2018. Prior to these restrictions, relative to the size and the productivity of the Yukon River drainage, the estimated sport harvest of king salmon in the YMA has been historically low and has represented less than 1% of the total harvest of king salmon from the Yukon River population (Burr 2004).

During 2017, 163 chum salmon (SWHS combines summer and fall chum salmon were harvested solely from the Anvik River and 430 were caught (Table 1). The 55 coho salmon were harvested (178 caught) from unspecified clear-water tributaries between the Koyukuk River and Fort Yukon. Of these, 25 coho salmon were captured (but not harvested) from the Andreafsky River³. Although not much sport fishing occurs on the Porcupine River for fall chum salmon due to low returns into this drainage during fall 2018. The mainstem Porcupine River was closed on October 3, 2018 to sport fishing for chum salmon, except for the Sheenjek, Black, Coleen, and Salmon Trout rivers that remained open (Appendix A).

Fishery Objectives and Management

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 an international treaty with Canada. The department is generally unable to manage individual stocks in this mixed stock fishery because of inadequate stock-specific information; however, in-season genetics analysis has recently improved this inadequacy.

Guideline harvest ranges have been established for commercial fisheries targeting king salmon throughout the Alaska portion of the Yukon River drainage (5 AAC 05.360). The department attempts to manage king 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 king 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 that aimed to provide a more equitable allocation of fish among subsistence fishermen 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 (i.e. closed to fishing) of the first pulse of king salmon as the fish migrate upstream through the fishing districts. After the first-pulse closure, the department may discontinue subsistence fishing closures based upon inseason run assessments. Also, in January 2013, the BOF reviewed the status of Yukon River king salmon and continued the *stock of yield concern* designation for Yukon River king salmon.

The department 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).

³ Alaska Sport Fishing Survey database [Internet]. 1996–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

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. Emergency actions to restrict harvest and/or inseason regulations for the sport fishery are generally not considered unless there are restrictions to the subsistence fishery.

In 2017 and 2018, the sport fishery for king salmon in the Yukon River was closed prior to the arrival of the run. In 2017, after subsistence users were able to fish with 7.5-inch mesh gillnets, the sport fishing closure was rescinded to allow for the annual harvest limit of 1 king salmon (Appendix A1). In 2018, sport fishery was closed for the entire season due to subsistence harvest restrictions.

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 state and federal management. This continues to be a divisive issue affecting all users because the state and federal governments define subsistence users differently. 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 non-subsistence 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 king salmon in the Yukon River in 2000 and 2001 placed an economic burden on fledgling local businesses that directly or indirectly support sport anglers, and without any real biological benefit due to the relatively low catch and harvest. This lack of opportunity continues to the present day. 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. The intent of sport fishery management continues to focus on providing a predictable level of opportunity for anglers throughout the season while providing for conservative management of Yukon River drainage king salmon.

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. In this plan, the subsistence fishing schedule is described and guidelines for commercial fishing harvest ranges for the Yukon River District are established. One significant modification to the plan was added in 2013, which requires protection of the first pulse of king salmon. After the pulse closure, the department may allow subsistence fishing based upon inseason run assessment. At the 2106 BOF, *Lawful gear and gear specifications* (5 AAC 01.220) was amended to require the immediate release of live king salmon from fish wheels and beach seines during times of king salmon harvest restrictions; previously fish

wheels were only required to be checked every six hours and beach seines were not mentioned as a gear restriction under 5 AAC 01.220(m).

Current or Recommended Research and Management Activities

Currently, there is no active research program concerning the king 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 the catch and harvest of salmon has regularly been reported (Table 2). Currently there is one sport fish guiding business operating within this drainage. These sport fisheries target king, sockeye, 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, nonresidents of Alaska, 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.

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 sport 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. 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 YMA, the majority of sport harvested northern pike are from the Porcupine, Dall, Nowitna, Koyukuk, Innoko, and Andreafsky Rivers, and Birch, Beaver, and Nome creeks (Table 3). The Porcupine and Koyukuk rivers are two of the largest tributaries of the Yukon River, and 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 (Burr 2015, Brown, et al. 2005, 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, which is an approximately 21-mile boat ride from the boat launch near the Yukon River bridge. Residents of Stevens Village, located near the mouth of the Dall River, continue to express concern over encroachment by outside visitors and by what they have perceived as a depletion of resources, particularly reduced numbers of 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 (5 AAC 73.010(c)(3)). 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 and Scenic 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 remote wilderness setting. Most of the sport fishing effort occurs within the lower 30 miles of the river and connected sloughs and oxbow lakes. The fishery occurs almost entirely during the open water season, with a substantial portion of the fishing effort and harvest of northern pike occurring concurrent with moose hunting activities in September.

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, sheefish, and northern pike. The state record northern pike (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. 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. The majority of clientele consist of nonresidents.

Recent Fisheries Performance

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

Harvest of northern pike in the YMA for 2017 was estimated to be 983 fish (Tables 3 and 4). Estimated catch of northern pike in 2017 was 7,291 fish, which is much lower than the 5- and 10-year average catch (13,820 and 11,915 respectively).

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 was at low levels in recent years; however, there was an increase in effort in 2016 and 2017 (Table 4). During the last 5- and 10-year periods, fishing effort for northern pike in the Dall River averaged approximately 146 and 212 angler-days, respectively (Table 4). On average, between 2007–2016, this fishery provided approximately 8% of all northern pike harvested from the YMA and 2% since 2012.

Nowitna River. The Nowitna River accounted for approximately 12% of the average harvest of northern pike in the YMA during 2007–2016 and 21% of the total catch (Table 4). The average

estimated level of sport fishing effort in the Nowitna River was approximately 506 angler-days for 2007–2016, decreasing by approximately 34% to 335 for 2012–2016 (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 three 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 indicated that northern pike using the lower 20 miles of the river are part of a single large stock. The study concluded that the population was 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 the 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. Fishing effort for northern pike in the Innoko River has varied over the years since 2007. The 5- and 10-year averages have been 861 and 654 respectively (Table 4). In 2016, fishing effort was estimated at 668 angler-days, which was close to the 5- and 10-year averages. However, in 2017 effort fell by approximately 46% to 358. Harvest estimates of northern pike from the Innoko River have continued to remain low, averaging less than 50 fish per year and accounting for 4% of total average harvest during 2007–2016. In contrast, estimates of total catch average approximately 31% during this period. In 2017, total catch of northern pike was estimated to be about 1,041 fish, which is much lower than the 2016 catch of 7,418 fish (Table 4).

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 conducted during this period that described subsistence use patterns of freshwater fish, including geographic distribution of subsistence fishing for northern pike during winter and summer (Brown et al. 2005). The project also gathered information on size and sex composition of the winter subsistence catch based on tag returns from fish tagged during the summertime sport fishery. These studies found that

northern pike spawning in the Lower Innoko River drainage travel extensively (>200 miles seasonally), but generally remain within the Innoko River drainage during the open water season rather than migrating into the Yukon River or neighboring drainages. In contrast, during winter these fish were regularly found in the mainstem 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, and generally salmon species are targeted. The winter subsistence fishery for northern pike occurs in both the Innoko and Yukon rivers. The two fisheries (sport and subsistence) are, therefore, generally segregated in time and in geographic location. Along with residents of the Yukon River communities, residents of Kuskokwim River communities were observed participating in the subsistence fishery during the study. Residents of communities situated on the Kuskokwim River travel cross-country during spring via snow machine to harvest northern pike in the Lower Innoko River/Paimiut Slough area. 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 an extensive 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 since both sport and subsistence fisheries selectively catch and/or target large northern pike. 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, a claim that been consistently confirmed by both the SWHS and guide logbooks. 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 harvested. 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 pre-spawning 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 (10 per day, 10 in possession with no size limit). 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 (≥ 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.

The department 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. The department, 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* (unpublished management plan, Alaska Department of Fish and Game, Division of Sport Fish, Fairbanks). The goal of this planning process was 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 population⁴.

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 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. Given that the majority of sampled northern pike >30 inches are females, a size selective harvest under greater levels of exploitation than currently observed has the potential to result in a disproportionate number of females being removed from the population.

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. 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; however, recent stock assessment data is lacking.

Nowitna River. The population of northern pike inhabiting the Nowitna River is not believed to be at risk of overexploitation, particularly because it is far from any villages (Ruby is ~60 river km downstream). However, the department 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

⁴ 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).

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.

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 and there is limited acceptance of catch-and-release fishing as practiced by many visiting sport anglers. 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 subsistence fish 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 large. Approximately 3,000 northern pike were tagged with numbered Floy®⁵ anchor tags between 2001 and 2004. The recapture rate in the sport fishery of these tagged fish has been less than 2% annually (Scanlon 2009). Just 6 of these tagged fish were ever 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 assumed large population size, and the presence of many size and age groups, this stock should be resilient to moderate increases 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 or 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 (excluding, Dall, Nowitna, and Innoko rivers and Dalton Highway corridor) 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. 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.

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.

⁵ Product names used in this report are included for scientific completeness but do not constitute a product endorsement.

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 (unpublished)* and recommendations of the GASH AC (Burr 2004).

Dalton Highway Corridor. The opening of the entire length of the Dalton Highway (North Slope Haul Road) to public travel 1994 provided new access to lakes and streams and subsequent increases in recreational fishing effort on northern pike stocks. As a result, the BOF enacted regulations so that for 5 miles on each side of this highway from the Yukon River northward, bag and possession limit for northern pike is 5 fish, of which only one fish may be 30 inches or greater in length.

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. The department 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. Periodic monitoring of Nowitna River northern pike stocks should be conducted by the department to assess length composition and proportion of fish longer than 30 inches.

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 monitor these fisheries for increases in fishing effort or changes in patterns of use. In addition to 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 genetically 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 harvests⁶ has indicated that the heaviest sport utilization has occurred in the middle part of the Yukon River drainage in 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 harvest in the drainage are from streams that have no, or very limited, road access. Historic sport effort and harvest in these systems are estimated to be small relative to road accessible streams (Table 5).

Dalton Highway Corridor. Historically, based on the 10-year average (2007–2016) the sport fishery for Arctic grayling from Koyukuk River tributaries accessed from the Dalton Highway accounts for about 20% to 21% respectively of harvest and 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 streams crossed by the Dalton Highway at three locations and the road parallels the stream for several 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 substantial 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 (about 35%) wintered in other locations, including the South Fork Koyukuk River, the Middle Fork Koyukuk River, and Prospect Creek. During the spawning season (spring), most Arctic grayling were located in the Jim River in either the fishery area close to the road system or in the Lower Jim River, and 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 (e.g., Tanana Drainage). This study suggests that Arctic grayling

⁶ Alaska Sport Fishing Survey database [Internet]. 1996–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

in the Jim River are probably a distinct stock that may share overwintering and feeding habitat with other 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 sizes 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 daily bag and possession limit remained at 5 fish.

Nome and Beaver Creeks. 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 has resulted in increased visitor use and an increased catch of Arctic grayling in this area.

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 McSweeney 2001). This study found a high population density (1,325 fish per river mile) of small Arctic grayling (> 150 mm FL) with age-3 and age-4 fish dominating the age classes. 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- and 10-year periods were 2,122, and 2,142 respectively (Table 5). In 2017, an estimated 2,639 Arctic grayling were harvested, which is over 100% larger than 1,005 during 2016. Catch estimates for the YMA have averaged 20,524 for the recent 5-year period and 19,990 between 2007–2016. Estimated catch of Arctic grayling in 2017 was 14,583, which was higher than 11,563 in 2016 (Table 5). These data reflect sustainable catch and harvest rates of Arctic grayling throughout the YMA.

Dalton Highway Corridor. Sport fisheries for Arctic grayling along the Dalton Highway south of Atigun Pass (including Jim River) have harvested an average of approximately 425 fish annually during 2007–2016. In most years, more Arctic grayling are harvested from the Jim River than from the other streams along the roadway (Table 5). In 2016, 297 (75%) of the estimated 398 Arctic grayling harvested from the Dalton Highway streams were from the Jim River. However, for 2017, harvest dropped to 67, of which 55 were harvested from the Jim River. Total estimated catch from waters along the Dalton Highway (including Jim River) during 2007-2016 has averaged

more than 4,146 fish, with approximately 60% of those fish coming from the Jim River. In 2016, the estimated catch for the Dalton Highway Arctic grayling fishery was 5,059 fish (4,231 fish were caught in the Jim River). In contrast, the 2017 estimated catch for these Arctic grayling was 1,587 with 1,432 caught in the Jim River (Table 5). The reason for the relatively sharp decrease in fishing effort in 2017 compared to the previous year is unknown.

Nome and Beaver Creeks. The SWHS combines Beaver Creek and Nome Creek data into a single estimate. The estimated annual harvest of Arctic grayling from Beaver Creek during 2007-2016 averaged approximately 185 fish (Nome Creek is closed to harvest). Estimated catch during this time period was 3,989 (Table 5). Estimated harvest of Arctic grayling from Beaver Creek in 2017 was approximately 939 fish and catch from Beaver and Nome creeks was 4,660. These are among the largest harvest and catch values in recent history (Table 5).

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, sustainable populations of Arctic grayling with characteristics that are desirable to the public. The regional management approach 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 with no size limit, 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 spawning period, 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 Corridor. 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 and Beaver Creeks. 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 McSweeney 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 Corridor. 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, recent estimates of angler effort and Arctic grayling catch have not reflected significant increases in the sport fishery, especially for 2017 where catch and effort are substantially lower than the past 5- and 10-year averages (Appendix D).

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). 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. It is unknown what the subsistence harvest of Arctic grayling has been along this road corridor during 2004–2017. Throughout the iddle Yukon River region (Tanana to Kaltag) during 2005–2008, Arctic grayling catches accounted for approximately 3% of the total non-salmon harvest (Brown, et al. 2010), so current harvest is assumed to be negligible. 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 and Beaver Creeks. 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). Increases in visitor use and in angling effort are anticipated as the recreational destination becomes more popular; however, currently no changes in the fishery regulations for Nome and Beaver creeks are anticipated. However, the 2017 harvest of 939 in Beaver Creek approached the 1,000-fish threshold level established in the objective for this fishery. This number was in contrast to the 2016 harvest of 52. Therefore, harvest and associated catch estimates will be carefully examined in future years to see if any adjustments need to be made to the sport fish regulation.

Recent Board of Fisheries Action

The most recent Board of Fisheries action concerning Arctic grayling stocks in the YMA occurred in 2004.

Dalton Highway Corridor. In 1994, the BOF reduced the daily 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 and Beaver Creeks. 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, headwater tributary of Beaver Creek. In January 2004, the sport fish daily bag and possession 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 Corridor. 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 and Beaver Creeks. A reassessment of the Arctic grayling stock inhabiting Nome Creek (Beaver Creek drainage) is recommended to determine whether a sustainable harvest opportunity currently exists. Also, reassessment of the Beaver Creek Arctic grayling stock may become necessary in the future if the 2017 harvest value is the beginning of a future trend of harvest values approaching the 1,000-fish threshold. Currently, the department is exploring a radiotelemetry project aimed at identifying the overlap of habitat use between the headwater creeks of Nome, Champion, Bear, and mainstem Beaver Creek.

YUKON RIVER SHEEFISH

Background and Historical Perspective

Sheefish are a large piscivorous member of the coregonidae (whitefish) subfamily and are distinguishable by a protruding lower jaw. In the Yukon River drainage, the species is highly migratory and during the open-water season are primarily found at the mouths of tributaries. Sheefish may also use lake and brackish water habitats to forage (Burr 2015). Sheefish are

relatively long-lived and may reach life spans of 20–30 years or more (Stuby 2018). Similar to other whitefish such as Bering cisco, sheefish spawn in relatively few locations and have specialized spawning habitat needs that are similar amongst different tributary systems (Stuby 2018).

During spring, soon after ice out, many sheefish migrate upriver and are valued at this time of year due to their large size and status as a highly-prized food (Runfola, et al. 2018). Sheefish are captured throughout the drainage during the open water season by subsistence fishermen, and incidentally in salmon fisheries all along the river (Estensen et al. 2018). Sheefish are also harvested incidentally in a fall season commercial fishery targeting Bering cisco in the Lower river (Estensen et al. 2018). Throughout the Lower Yukon River (Alakanuk and Kotlik) to Middle Yukon River region (Tanana to Kaltag) during 2005–2008 and 2014–2015, sheefish catches accounted for 14% of the total non-salmon harvest by weight (Brown, et al. 2010, Runfola et al. 2018). During and prior to late fall ice up, sheefish have been observed travelling to the lower reaches of large drainages to overwinter (Stuby 2018). Sheefish are subject to a winter subsistence fishery on the Lower Yukon River (Crawford 1979).

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 Innoko, Koyukuk, Nulato, Porcupine, and Nowitna rivers (Table 6).

Currently sheefish in the YMA are managed under a single regulation adopted by the BOF in 1969:

- Daily bag and possession limit is 10 fish, no size limit. Season is open the entire year.

Recent multi-year studies using radiotelemetry techniques have verified known or identified new locations of spawning areas in the Yukon River drainage. To date, six 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 (Draanjik) river drainages, as well as the upper reaches of the mainstem Yukon River (Alt 1987), but specific locations have not been identified. Sheefish have been noted to spawn during late September/early October (Brown and Burr 2012, Stuby 2018). Currently, two genetically distinct groups are known to exist within the Yukon River drainage (Olsen, et al. 2017).

Sheefish in the Yukon River drainage 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, where they overwinter and travel upriver in spring (Brown and Burr 2012). Analysis of strontium concentrations in otoliths from sheefish harvested from spawning migrations into the Yukon Flats and Upper Koyukuk, Tanana, and Nowitna rivers were conducted to identify anadromy in sheefish. Most otoliths were indicative of non-anadromy or migration into brackish water. However, a small proportion of clearly anadromous individuals were present in the spawning populations (Brown et al. 2007 and Esse 2011).

Recent Fishery Performance

Estimated average annual sport harvest of sheefish from the YMA in the recent 5-year period (2012–2016) was 65 fish. In the last 10-year period, harvests have ranged from 19 in 2015 to 462 in 2008 (Table 6). Similarly, catch estimates for the YMA have ranged widely, from approximately 1,717 in 2009 to 123 in 2015 (Table 6). In 2017, approximately 270 sheefish were caught and 120 of those were harvested. These data reflect a continued low 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 and catch and harvest levels are low, specific management objectives have not been identified. The goal of management is to maintain naturally reproducing, sustainable populations of sheefish with characteristics that are desirable to the angler such as large size.

Current Issues and Fishery Outlook

At present, there is little concern for overharvest of sheefish in the Yukon River drainage from sport fishing activity. However, sheefish are currently being subjected to increased harvest in subsistence and commercial fisheries. Local subsistence fishermen report increased harvest of sheefish to help offset limited access to king salmon brought on by poor runs in recent years (Runfola et al. 2018). Incidental harvest of sheefish could increase if allowable harvest increases for Bering cisco during fall in the Lower Yukon River. Increased direct and indirect harvest of large adult sheefish in either or both of these fisheries may impact this slow-growing, long-lived 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 Ambler Mining District Industrial Access 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

If the Ambler Road is constructed, due to the potential adverse impacts to one of the 6 known sheefish spawning areas in the Yukon River drainage as discussed above, this spawning population will need to be closely monitored and pre- and post-spawning migration timing spawning population estimates, habitat monitoring, etc. will be proposed to ensure sustainability. Future studies to identify and characterize additional spawning areas in the Upper Yukon River and the degree of anadromy are also recommended. Because of the large distance from the upriver areas to the rich marine feeding habitats, sheefish inhabiting the Upper Yukon River are likely to be resident rather than anadromous populations. 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.—Recreational angler effort, number of fish harvested, and total catch by species within the Yukon Management Area, 2006–2017.^a

Year	Angler Effort (days)	Total ^b Fish	Pacific salmon						Non-Salmon Resident Species						
			Total	King	Coho	Sockeye	Pink	Chum	Total	Lake Trout	Dolly Varden/Arctic Char	Arctic Grayling	Sheefish	Northern Pike	Burbot
Harvest															
2006	11,423	6,088	794	101	371	0	54	268	4,636	6	174	2,041	540	1,134	741
2007	11,394	5,627	873	411	258	0	0	204	4,563	40	181	2,824	177	1,281	60
2008	12,973	5,793	636	155	171	0	0	310	4,918	33	36	2,531	462	1,577	279
2009	10,608	7,037	979	27	849	0	0	103	5,494	76	381	2,773	210	1,265	789
2010	9,134	5,890	1,877	161	575	20	0	1,121	3,723	23	346	1,778	299	1,104	173
2011	10,291	2,368	498	102	179	0	0	217	1,758	124	11	907	118	430	168
2012	8,671	2,531	537	231	47	0	51	208	1,994	0	16	1,433	44	501	0
2013	10,332	7,719	1,697	155	127	0	0	1,415	6,015	22	319	4,062	94	1,482	36
2014	12,917	6,225	1,959	0	1,639	0	0	320	4,246	25	167	2,498	95	1,184	277
2015	8,230	3,272	804	0	413	61	136	194	2,365	149	20	1,613	19	551	13
2016	7,548	2,422	398	0	29	35	70	264	2,009	75	84	1,005	73	681	91
2017	8,592	4,742	218	0	55	0	0	163	4,028	0	172	2,639	120	983	114
Average															
2007–2016	10,210	4,888	1,026	124	429	12	26	436	3,709	57	156	2,142	159	1,006	189
2012–2016	9,540	4,434	1,079	77	451	19	51	480	3,326	54	121	2,122	65	880	83
Catch															
2006		64,380	5,486	438	1,640	183	514	2,711	58,127	26	984	23,718	8,298	24,335	766
2007		49,572	6,725	2,681	1,887	0	0	2,157	42,541	79	1,590	25,458	318	15,021	75
2008		39,381	6,836	685	1,277	113	2,072	2,689	31,852	58	1,332	20,687	834	8,655	286
2009		46,975	6,337	970	4,076	34	0	1,257	38,275	281	1,681	22,767	1,717	10,931	898
2010		39,479	9,258	745	1,983	85	1,768	4,677	29,739	23	2,700	15,521	1,100	10,143	252
2011		22,924	3,530	899	558	43	92	1,938	19,238	201	272	12,842	378	5,300	245
2012		29,604	3,107	544	174	11	802	1,576	26,490	0	673	13,976	361	11,463	17
2013		47,659	13,374	927	1,597	47	78	10,72	34,235	339	1,474	21,677	247	10,450	48
2014		68,160	12,270	156	10,47	143	258	1,234	55,781	25	4,305	31,839	470	18,805	337
2015		39,331	2,253	124	1,100	89	409	531	36,586	661	760	23,567	123	11,732	13
2016		35,069	4,000	268	29	66	2,753	884	30,626	238	1,782	11,563	304	16,648	91
2017		25,411	1,225	398	223	0	0	604	23,570	0	1,287	14,583	270	7,291	139
Average															
2007–2016		41,815	6,769	800	2,316	63	823	2,767	34,564	191	1,657	19,990	585	11,916	226
2012–2016		43,965	7,001	404	2,676	71	860	2,990	36,798	253	1,799	20,524	301	13,820	101

^a Alaska Sport Fishing Survey database [Internet]. 2006–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

^b Total Fish Includes harvest and catch of whitefish and unidentified species.

Table 2.—Sport harvest and catch of king salmon in the Yukon Management Area, 2007–2017^a.

	Year											Averages	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–2016	2012–2016
Yukon River drainages (Fort Yukon to Canadian Border)													
Harvest	0	0	0	0	0	0	0	0	0	0	0	0	0
Catch	0	0	0	0	0	0	0	0	0	0	0	0	0
Yukon River drainages (Koyukuk River to Fort Yukon)													
Harvest Subtotal	0	15	0	0	0	0	0	0	0	0	0	2	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	0	15	0	0	0	0	0	0	0	0	0	2	0
Catch Subtotal	0	54	609	0	0	0	0	80	0	0	204	74	16
Porcupine River drainage	0	0	0	0	0	0	0	0	0	0	204	0	0
Koyukuk River	0	39	0	0	0	0	0	0	0	0	0	4	0
Other streams	0	15	609	0	0	0	0	80	0	0	0	70	16
Yukon River drainages (downstream from Koyukuk River)													
Harvest Subtotal	411	140	27	161	102	231	155	0	0	0	0	123	77
Anvik River	250	140	10	161	102	231	155	0	0	0	0	105	77
Andreafsky River	161	0	17	0	0	0	0	0	0	0	0	18	0
Other streams	0	0	0	0	0	0	0	0	0	0	0	0	0
Catch Subtotal	2,082	631	361	745	899	544	927	76	124	268	194	666	388
Anvik River	1,905	631	344	726	899	475	927	76	59	163	26	621	340
Andreafsky River	161	0	17	0	0	69	0	0	0	105	0	35	35
Other streams	16	0	0	19	0	0	0	0	65	0	168	10	13
Total Harvest ^b	411	155	27	161	102	231	155	0	0	0	0	124	77
Total Catch ^b	2,681	685	970	745	899	544	927	156	124	268	398	800	404

^a Alaska Sport Fishing Survey database [Internet]. 2007–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). 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, 2007–2017^a.

	Year											Averages	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–2016	2012–2016
Yukon River drainages (Fort Yukon to Canadian Border)													
Subtotal ^b	68	74	24	10	0	11	0	0	0	14	23	20	5
Fortymile River	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	68	74	24	10	0	11	0	0	0	14	23	20	5
Yukon River drainages (Koyukuk River to Fort Yukon)													
Subtotal ^b	831	1,351	652	856	423	290	1,385	987	279	556	870	761	699
Porcupine River	23	39	18	0	41	10	52	136	0	0	422	32	40
Chandalar River	0	7	0	0	13	10	0	14	0	0	0	4	5
Birch Creek (near Steese Hwy)	0	264	0	87	14	0	301	29	0	0	0	70	66
Beaver and Nome Creeks	25	60	10	186	0	92	43	0	0	0	33	42	27
Dall River	306	13	203	73	110	31	0	0	0	15	82	75	9
Haul Road Streams	0	0	106	59	0	0	35	0	0	0	0	20	7
Nowitna River	172	130	70	185	74	13	366	0	124	59	11	119	112
Melozitna River	0	0	0	54	19	0	0	0	0	0	16	7	0
Koyukuk River	80	648	0	123	17	121	546	14	0	106	0	166	157
Other	225	190	245	89	135	13	42	794	155	376	306	226	276
Yukon River drainages (downstream from Koyukuk River)													
Subtotal ^b	133	152	589	238	7	200	97	197	223	111	90	195	166
Nulato River	0	0	0	0	0	0	0	0	0	0	0	0	0
Kaiyuh/Khotol River	0	0	0	0	0	0	0	0	0	0	16	0	0
Anvik River	38	43	0	0	7	0	19	20	0	66	66	19	21
Innoko River	0	60	173	29	0	17	78	71	20	0	8	45	37
Andreafsky River	80	0	130	18	0	104	0	53	203	45	0	63	81
Other	15	49	286	191	0	79	0	53	0	0	0	67	26
Total^b	1,281	1,577	1,265	1,104	430	501	1,482	1,184	551	681	983	1,001	870

^a Alaska Sport Fishing Survey database [Internet]. 2007–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

^b Subtotals and totals may exceed the sum of subtotals because fishing site(s) not specified.

Table 4.–Total fishing effort (angler-days), and northern pike catch and harvest from principal sport fisheries in the Yukon Management Area, 2007–2017^a.

Year	Total ^b	Dall River			Nowitna River			Innoko River		
		Effort	Number	Percent ^c	Effort	Number	Percent ^c	Effort	Number	Percent ^c
Harvest										
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%
2015	551	0	0	0%	434	124	23%	497	20	4%
2016	681	195	15	29%	473	59	9%	668	0	0%
2017	983	232	82	8%	71	11	1%	358	8	1%
Average										
2007-2016	1,006	212	75	8%	506	119	12%	654	45	4%
2012-2016	880	146	9	2%	335	112	12%	861	37	4%
Catch										
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%	536	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%
2015	11,732	0	0	0%	434	371	3%	497	8,806	75%
2016	16,648	195	276	2%	473	1,541	9%	668	7,418	45%
2017	7,291	232	276	4%	71	11	>1%	358	1,041	14%
Average										
2007-2016	11,915	212	553	5%	506	2,130	21%	654	4,161	31%
2012-2016	13,820	146	312	3%	335	1,681	15%	861	6,742	48%

^a Alaska Sport Fishing Survey database [Internet]. 2007–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

^b Total harvest and catch of northern pike in the Yukon Management Area.

^c Percent of total harvest and catch of northern pike in the Yukon Management Area.

Table 5.—Sport harvest and catch of Arctic grayling in the Yukon Management Area, 2007–2017^a.

	Harvest Year											Averages	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–2016	2012–2016
Yukon River drainages (Fort Yukon to Canadian Border)													
Subtotal	474	86	169	38	234	90	277	1,293	179	0	145	284	368
Fortymile River	386	0	124	23	28	0	241	0	96	0	81	90	67
Charley River	11	70	0	0	49	0	0	48	0	0	0	18	10
Kandik River	0	0	0	0	98	19	0	0	0	0	0	12	4
Other	77	16	45	15	59	71	36	1,245	83	0	64	165	287
Yukon River Drainages (Koyukuk River to Fort Yukon)													
Subtotal	2,184	1,699	1,414	1,244	591	1,194	3,417	844	798	927	2,125	1,431	1,436
Porcupine River	185	865	188	347	0	119	2,053	101	0	0	583	386	455
Birch Creek (near Steese Hwy)	223	231	80	100	42	0	0	52	78	172	68	98	60
Beaver and Nome Cr.	349	0	180	285	274	42	496	0	174	52	939	185	153
Dalton Highway Streams ^b	712	112	282	38	160	287	373	279	112	101	12	246	230
Jim River	501	173	57	30	76	50	256	179	171	297	55	179	191
Koyukuk River ^c	12	137	475	162	0	0	128	50	225	31	39	122	87
Other	202	151	152	282	39	696	111	183	38	274	429	213	260
Yukon River drainages (downstream from Koyukuk River)													
Subtotal	166	776	1,190	496	82	133	368	361	425	78	369	408	273
Nulato River	0	100	668	0	0	0	0	0	0	0	0	77	0
Anvik River	151	174	98	360	73	52	90	223	118	78	113	142	112
Innoko River	15	502	0	0	0	0	145	80	0	0	0	74	45
Andreafsky River	0	0	264	136	0	47	133	38	288	0	39	91	101
Other	0	0	160	0	9	34	0	20	19	0	217	24	15
Total Yukon Harvest^d	2,824	2,531	2,773	1,778	907	1,433	4,062	2,498	1,613	1,005	2,639	2,142	2,122

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Table 5.–Page 2 of 2.

	Catch Year											Averages	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–2016	2012–2016
Yukon River drainages (Fort Yukon to Canadian Border)													
Subtotal	1,030	1,773	691	776	1,556	620	788	1,775	1,855	74	1,920	1,094	1,022
Fortymile River	533	27	243	69	56	344	393	40	190	0	81	190	193
Charley River	238	70	211	0	196	0	0	96	0	0	501	81	19
Kandik River	0	0	0	0	491	186	0	0	0	0	0	68	37
Other	259	1,676	237	707	813	90	395	1,639	1,665	74	1,338	756	773
Yukon River Drainages (Koyukuk River to Fort Yukon)													
Subtotal	21,400	11,677	12,010	7,725	8,862	9,696	15,055	12,090	9,081	8,677	11,304	11,627	10,920
Porcupine River	255	1,742	1,622	1,008	74	1,146	2,877	935	41	0	583	970	1,000
Birch Creek (near Steese Hwy)	499	558	858	774	240	289	388	220	1,528	1,153	803	651	716
Beaver and Nome Cr	13,644	134	3,763	2,039	5,880	2,565	4,159	4,724	2,387	597	4,660	3,989	2,886
Dalton Highway Streams ^b	2,291	2,738	2,114	639	368	2,249	1,680	2,734	1,302	828	155	1,694	1,759
Jim River	3,229	4,765	1,440	1,278	785	1,477	3,841	1,784	1,685	4,231	1,432	2,452	2,604
Koyukuk River ^c	70	268	825	687	39	173	824	102	1,037	72	78	410	442
Other	1,412	1,472	1,388	1,300	1,476	1,797	1,286	1,591	1,101	1,796	3,593	1,462	1,514
Yukon River drainages (downstream from Koyukuk River)													
Subtotal	3,028	7,237	10,066	7,020	2,424	3,496	5,585	17,974	7,974	2,812	1,359	6,762	7,568
Nulato River	0	1,505	668	0	0	19	0	0	0	0	480	219	4
Anvik River	3,013	5,197	8,164	6,685	2,415	2,449	3,014	15,340	6,860	2,791	371	5,593	6,091
Innoko River	15	502	0	15	0	86	145	1,105	0	0	194	187	267
Andreafsky River	0	0	968	297	0	704	1,508	1,509	1,506	21	97	651	1,050
Other	0	33	266	23	9	238	918	20	58	0	217	157	247
Total Catch ^d	25,458	20,687	22,767	15,521	12,842	13,976	21,677	31,839	23,567	11,563	14,583	19,990	20,524

^a Alaska Sport Fishing Survey database [Internet]. 2007–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). 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, 2007–2017^a.

	Harvest Year											Averages	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–2016	2012–2016
Yukon River drainages (Fort Yukon to Canadian Border)													
Subtotal	0	26	0	14	0	0	0	0	0	0	7	4	0
Charley River	0	26	0	0	0	0	0	0	0	0	0	3	0
Other	0	0	0	14	0	0	0	0	0	0	7	1	0
Yukon River drainages (Fort Yukon to Koyukuk River)													
Subtotal	129	254	80	197	118	10	94	70	19	73	105	104	53
Porcupine River	0	20	0	184	32	0	0	36	0	0	86	27	7
Birch Creek (near Steese Hwy)	0	0	0	0	0	0	20	0	0	0	0	2	4
Dall River	0	30	0	0	0	10	0	0	0	0	0	4	2
Ray River	48	0	80	0	0	0	0	0	0	0	0	13	0
Nowitna River	81	143	0	0	26	0	67	0	0	0	0	32	13
Melozitna River	0	0	0	0	0	0	0	0	0	0	0	0	0
Koyukuk River	0	61	0	13	12	0	0	0	19	20	0	13	8
Other	0	0	0	0	48	0	7	34	0	53	19	14	19
Yukon River drainages (downstream from Koyukuk River)													
Subtotal	48	182	130	88	0	34	0	25	0	0	8	51	12
Nulato River	0	0	23	76	0	0	0	0	0	0	0	10	0
Innoko River	0	182	0	12	0	34	0	18	0	0	0	25	10
Andreafsky River	24	0	0	0	0	0	0	0	0	0	0	2	0
Other	24	0	107	0	0	0	0	7	0	0	8	14	1
Total ^b	177	462	210	299	118	44	94	95	19	73	120	159	65

-continued-

Table 6.–Page 2 of 2.

	Catch Year											Averages	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–2016	2012–2016
Yukon River drainages (Fort Yukon to Canadian Border)													
Subtotal	0	26	0	290	0	0	0	0	0	0	7	32	0
Charley River	0	26	0	0	0	0	0	0	0	0	0	3	0
Other	0	0	0	290	0	0	0	0	0	0	7	29	0
Yukon River drainages (Fort Yukon to Koyukuk River)													
Subtotal	210	612	80	722	371	142	247	303	65	272	222	302	206
Porcupine River	12	20	0	522	32	0	0	136	0	0	173	72	27
Birch Creek (near Steese Hwy)	0	0	0	0	0	0	50	0	0	0	0	5	10
Dall River	0	30	0	0	0	86	0	0	0	0	0	12	17
Ray River	48	0	80	0	0	0	0	0	0	8	0	14	2
Nowitna River	81	259	0	12	198	0	190	0	19	143	0	90	70
Melozitna River	0	0	0	0	0	0	0	0	0	0	0	0	0
Koyukuk River	0	303	0	13	93	0	0	0	39	20	0	47	12
Other	69	0	0	145	48	56	7	167	7	101	49	60	68
Yukon River drainages (downstream from Koyukuk River)													
Subtotal	108	196	1,637	88	7	219	0	167	58	0	41	248	89
Nulato River	0	0	23	76	0	13	0	0	0	0	0	11	3
Innoko River	35	196	199	12	0	206	0	160	19	32	0	86	83
Andreafsky River	24	0	0	0	0	0	0	0	0	0	0	2	0
Other Streams	49	0	1,415	0	7	0	0	7	39	0	41	152	9
Total ^b	318	834	1,717	1,100	378	361	247	470	123	304	270	585	301

^a Alaska Sport Fishing Survey database [Internet]. 2007–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

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

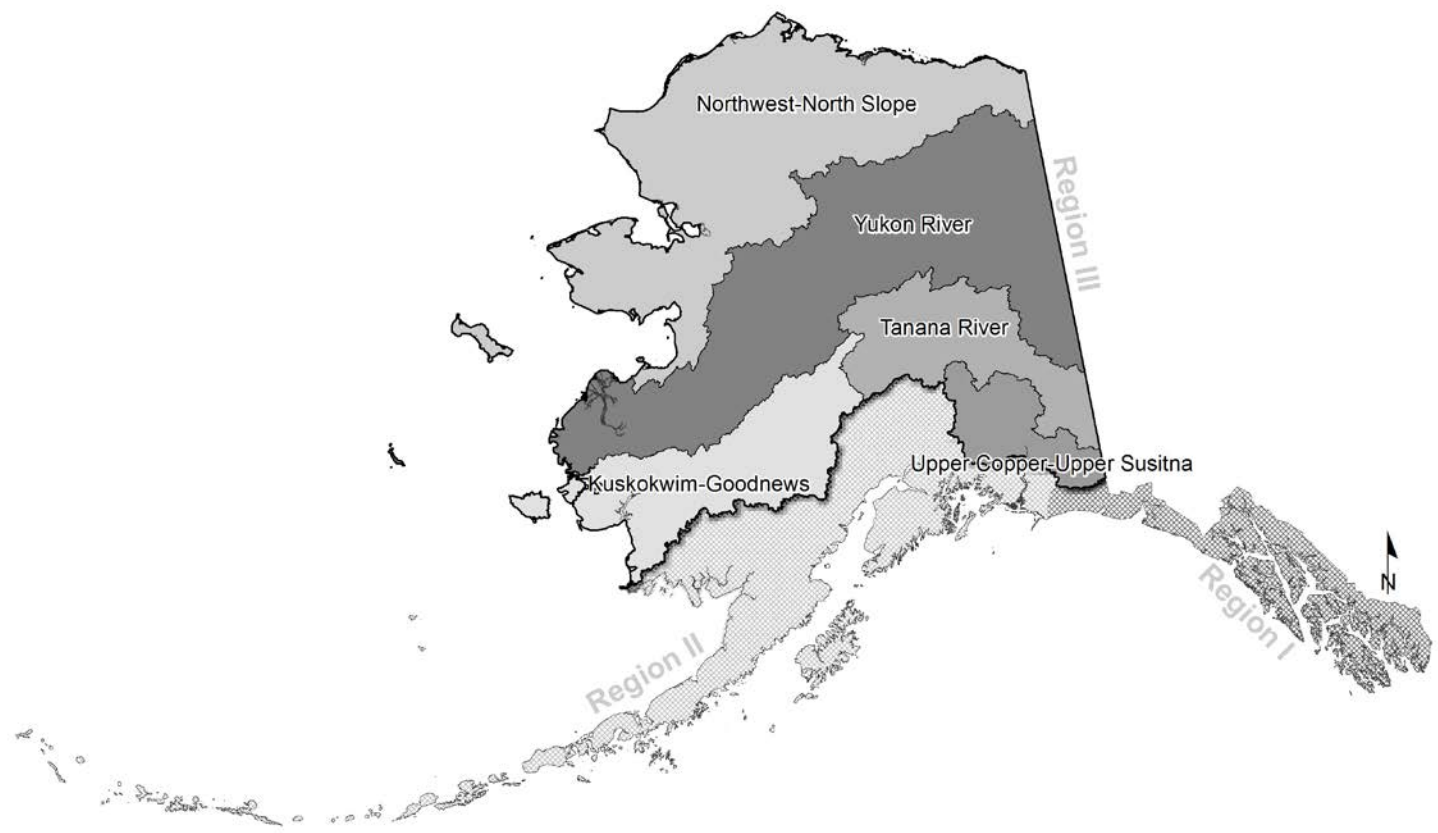


Figure 1.—Map of the sport fish regions in Alaska and the 5 management areas in Region III.

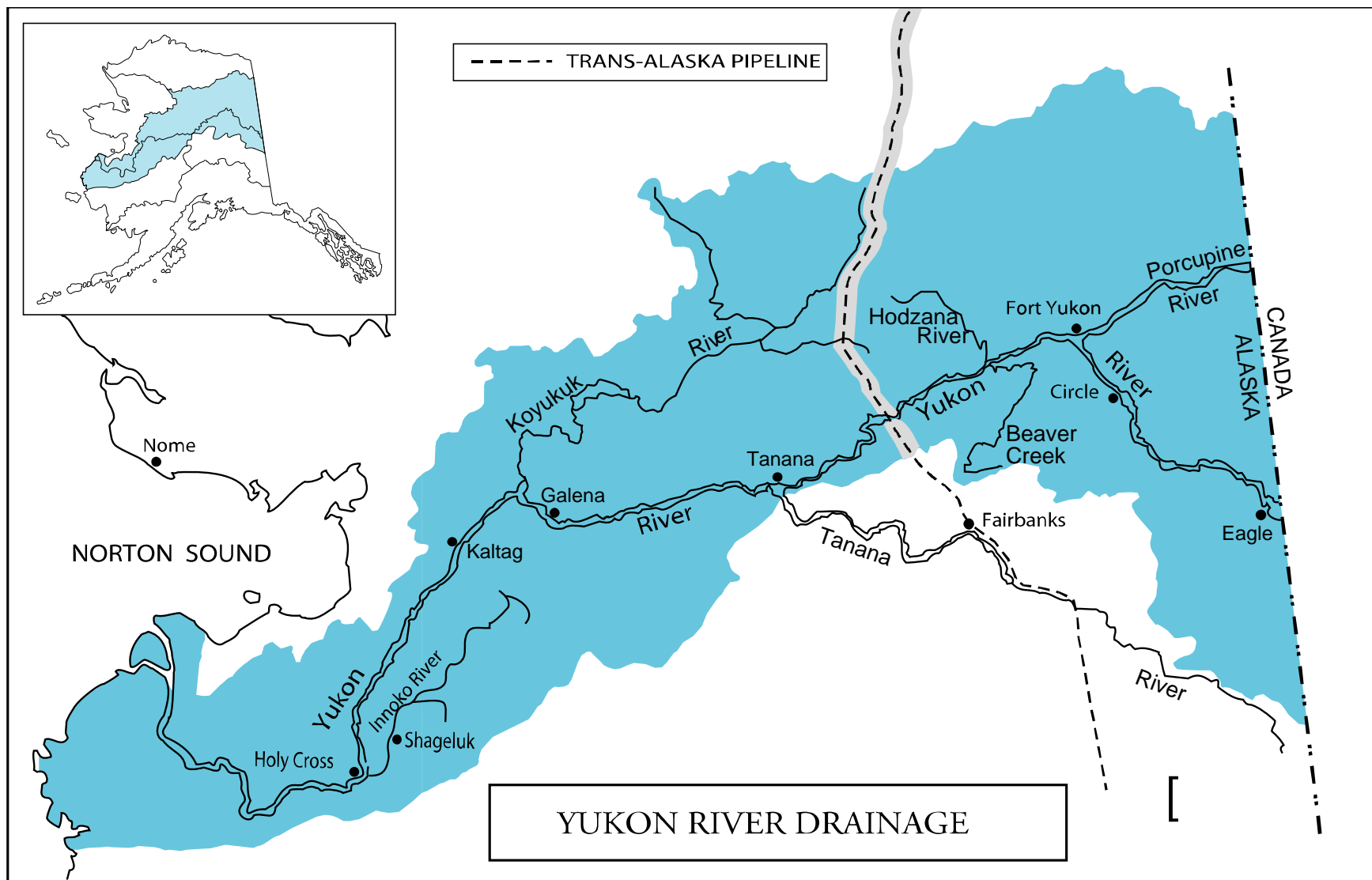


Figure 2.—Yukon Management Area; Tanana River drainage is excluded from the YMA.

APPENDIX A

Appendix A.–Emergency orders issued for Yukon Management Area sport fisheries during 2017–2018.

Year	E. O. Number	Explanation
2017	3-KS-Y-03-17	Closed all waters of the Yukon River drainage (excluding the Tanana River drainage) to sport fishing for king salmon, effective 12:01 a.m. Monday, May 1, 2017.
2017	3-KS-Y-06-17	Rescinded 3-KS-Y-03-17 and opens sport fishing for king salmon in the Yukon River drainage (excluding the Tanana River drainage) with a bag and possession limit for one king salmon 20 inches or greater in length, effective 12:01 a.m. Monday, June 16, 2017.
2018	3-KS-Y-03-18	Closed all waters of the Yukon River drainage (excluding the Tanana River drainage) to sport fishing for king salmon, effective 12:01 a.m. Friday, May 11, 2018.
2018	3-CS-Y-1-18	Closed the mainstem Porcupine River to sport fishing for chum salmon except for the Sheenjek, Black, Coleen, and Salmon Trout rivers, which remained open. EO effective 12:01 a.m., Wednesday, October 3, 2018.

APPENDIX B

Appendix B.—Guided angler effort (angler-days) and fish species kept and released in the Yukon Management Area, as reported in the freshwater guide logbooks, 2007–2016.^a

Year	Angler-days	Salmon			Lake trout	Dolly Varden	Arctic grayling	Northern pike	Sheefish
		King	Coho	Sockeye					
Fish Harvested									
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
2015	1,094	2	297	35	1	10	59	5	0
2016	2,011	0	560	42	0	44	154	11	26
Average									
2007–2016	1,127	65	253	9	0	18	116	41	6
2012–2016	1,271	33	322	16	0	22	113	18	7
Fish Released									
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
2015		9	735	84	4	2,052	12,415	5,356	24
2016		8	1,381	93	0	1,535	10,189	6,584	3
Average									
2007–2016		269	1,240	52	1	1,055	8,463	5,367	68
2012–2016		135	1,035	62	1	1,511	10,431	5,258	46

^a Sigurdsson and Powers 2016, *In prep.*

APPENDIX C

Appendix C1.—Commercial^a, subsistence^a, and sport harvest^b of king salmon in the Alaska portion of the Yukon River drainage, 1996–2017.

Year	Tanana River			Yukon River without Tanana			Yukon River		
	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
1996	447	1,177	3,746	91,443	42,129	128	91,890	43,306	128
1997	2,728	2,712	1,953	113,693	53,266	221	116,421	55,978	221
1998	963	1,919	448	43,662	51,814	208	44,625	53,733	208
1999	690	1,624	1,001	70,078	50,570	22	70,768	52,194	22
2000	0	983	177	9,115	34,858	99	9,115	35,841	99
2001	0	2,327	667	0	50,610	12	0	52,937	12
2002	1,066	1,067	478	23,828	41,553	8	24,894	42,620	8
2003	1,813	2,349	2,153	39,305	52,760	566	41,118	55,109	566
2004	2,057	1,589	1,319	54,886	52,086	194	56,943	53,675	194
2005	453	1,966	483	31,886	50,595	0	32,339	52,561	0
2006	84	1,229	638	46,562	46,481	101	46,646	47,710	101
2007	281	1,717	549	34,202	53,457	411	34,483	55,174	411
2008	0	605	254	4,641	44,581	155	4,641	45,186	155
2009	0	1,285	836	316	32,520	27	316	33,805	27
2010	0	1,143	313	9,897	43,416	161	9,897	44,559	161
2011	0	1,367	372	82	39,613	102	82	40,980	102
2012	0	627	114	0	29,788	231	0	30,415	231
2013	0	367	11	0	12,166	155	0	12,533	155
2014	0	283	0	0	3,003	0	0	3,286	0
2015	0	440	13	0	7,137	0	0	7,577 ^c	0
2016	0	816	20	0	20,842	0	0	21,658 ^c	0
2017	0	842 ^c	18	168c	37,258 ^c	0	168c	38,100 ^c	0
Average									
1996–2016	504	1,314	740	27,314	38,726	133	27,818	40,040	133
2007–2016	28	865	248	4,914	28,652	124	4,942	29,517	124
2012–2016	0	507	32	0	14,587	77	0	15,094	77

^a Estensen et al. 2018 and Christy Gleason, Division of Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication.

^b Alaska Sport Fishing Survey database [Internet]. 1996–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 31, 2018). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

^c Data are preliminary.



2018 Yukon River Salmon Fisheries Outlook

The 2018 drainage-wide king salmon outlook is for a run size of 173,000 to 251,000 fish. The upper end of this range is less than the total run observed in 2017. The 2018 run may be large enough to provide for normal subsistence harvests, however, a cautionary approach will be taken early in the season, and inseason management strategies will be based on run assessment information once fish begin entering the river. If assessment indicates the king salmon run size is near the upper end of the range, and goals are projected to be met, subsistence fishing restrictions would likely be relaxed. If that occurs, commercial chum fishermen may be given the opportunity to sell king salmon incidentally-caught in the chum fishery, but this would likely be at the tail end of the run, when the majority of king salmon have passed upriver for escapement and subsistence harvest purposes.

2018 Run and Harvest Outlook for Yukon River Salmon

	King	Summer Chum	Fall Chum*	Coho
Projection:	Below Average	Above average	Above average	Average
Escapement:	Potential to meet goals	Expect to meet goals	Expect to meet goals	Expect to meet goals
Subsistence:	Some restrictions	Expect to provide for normal harvest	Expect to provide for normal harvest	Expect to provide for normal harvest
Commercial:	No directed fishery	Up to 1.4 million available	Up to 1.2 million available	60,000 to 200,000 available

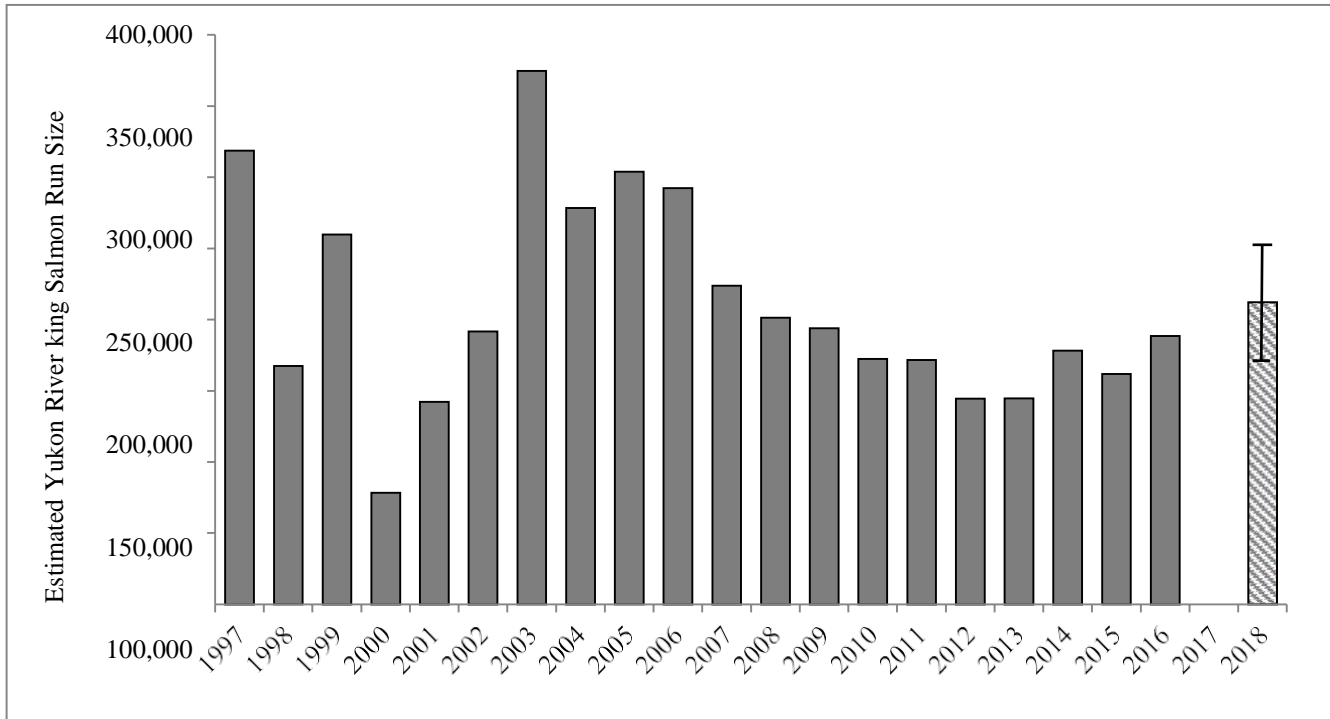
* Fall Chum projection and harvestable surplus totals will be revised in early July based on summer chum salmon run size.

Management Strategies

- Before king salmon enter the river, subsistence fishing will be open 24 hours per day, 7 days per week with 7.5-inch or smaller mesh gillnets. Fishermen are reminded that whenever gillnets are allowed, they may choose to use *smaller* mesh gillnets than specified.
- As king salmon enter each district, subsistence salmon fishing will be provided on a reduced regulatory schedule with 7.5-inch or smaller mesh gillnets during the early part of the run.
- Commercial fishing for summer chum will begin with selective gear, based on inseason run assessment.
- When confidence is high that the king salmon run is adequate and escapement goals are likely to be met, the use of 7.5-inch gillnets on a full regulatory schedule will be considered. If inseason assessment indicates a poorer than anticipated run, subsistence fishing time may be reduced, or gear may be limited to selective gear types with no retention of king salmon allowed.
- The sport fishery for king salmon will begin the season closed (effective May 11) throughout the U.S. portion of the Yukon River drainage, excluding the Tanana River drainage. king salmon may not be retained or possessed. Management actions for the Tanana River drainage will be announced in early June.

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The following chart shows the historical estimated king salmon total run size in the Yukon River.



Note: Total run size is measured at Pilot station sonar and includes escapement and harvest below the sonar. The 2018 shaded bar represents the approximate midpoint of the projected outlook range of 173,000 to 251,000 king salmon. The dashed line is the recent 5-year average run size.

The U.S./Canada Yukon River Panel has established Canadian Interim Management and Escapement Goals (IMEG) of 42,500–55,000 king salmon and 70,000–104,000 fall chum salmon. These goals are assessed at the mainstem sonar program operated near Eagle. The Fishing Branch River IMEG of 22,000–49,000 fall chum salmon is based upon the historical weir data. Porcupine River chum salmon production has been consistently underperforming compared to other Yukon River fall chum salmon stocks. Management of the Porcupine River will be based on inseason run assessment and may include subsistence fishery restrictions similar to 2017.

For additional information:

Toll-free Fishing schedule and fish counts hotline: (866) 479-7387; in Fairbanks: (907) 459-7387.

News releases and daily test fishery counts will be posted on Facebook:

www.facebook.com/YukonRiverFishingADFG/

ADF&G:

Holly Carroll (king and summer chum), Anchorage office: (907) 267-2324

Jeff Estensen (fall chum and coho), Fairbanks office: (907) 459-7217

The Emmonak ADF&G office will open June 4: (907) 949-1320.

USFWS:

Fred Bue, Fairbanks: (907) 455-1849 or (800) 267-3997

APPENDIX D

Appendix D.—Number of visitors contacted at the Coldfoot Visitor Center^a, estimated fishing effort (angler-days)^b, and total catch^b of Arctic grayling for the Dalton Highway corridor (Yukon River to Atigun Pass), 1997–2018.

Year	Visitors	Fishing Effort	Grayling Catch
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	7,139	985	3,707
2015	7,970	1,136	2,969
2016	7,941	1,038	5,059
2017	7,941	566	1,587
2018	8,459	Unavailable ^c	Unavailable ^c
Average			
2007–2016	8,464	1,087	4,008
2012–2016	7,805	948	4,095

^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]. 1997–2017. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish. Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>

^c SWHS data for 2018 will become available in 2019.