**Fishery Management Report No. 18-27**

# Sport Fisheries in the Bristol Bay Management Area, 2016–2018

**by**

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**and**

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**November 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)**

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

**Weights and measures (English)**

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

**Time and temperature**

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

**Physics and chemistry**

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

**General**

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

**Mathematics, statistics**

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

*FISHERY MANAGEMENT REPORT NO. 18-27*

# SPORT FISHERIES IN THE BRISTOL BAY MANAGEMENT AREA, 2016–2018

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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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# TABLE OF CONTENTS

**Page**

# TABLE OF CONTENTS (Continued)

# TABLE OF CONTENTS (Continued)

# LIST OF TABLES

# LIST OF FIGURES



# LIST OF APPENDICES

# ABSTRACT

This report summarizes the major sport fisheries in the Bristol Bay Management Area during 2016, 2017, and 2018. Fisheries include Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and sockeye salmon (*O. nerka*), rainbow trout (*O. mykiss*), Arctic char (*Salvelinus alpinus*), Dolly Varden (*Salvelinus malma*), Arctic grayling (*Thymallus arcticus*), and northern pike (*Esox lucius*). Significant sport fisheries are described, and estimates of sport fishing effort, catch, and harvest, and salmon escapements are provided. Overviews of the management for each fishery are provided, including sport fishing regulations and management plans.

Key words: Bristol Bay Sport Fish Management Area, Alaska Board of Fisheries, management plan, Nushagak River, Togiak River, Naknek River, rainbow trout, *Oncorhynchus mykiss*, Chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, sockeye salmon, *Oncorhynchus nerka*

# INTRODUCTION

## MANAGEMENT AREA DESCRIPTION

The Bristol Bay Sport Fish Management Area (BBMA) is part of the Division of Sport Fish, Southcentral Region (Region II) and includes all waters and drainages flowing into Bristol Bay between Cape Newenham in the northwest to Cape Menshikof in the southeast (Figure 1).

The sport fisheries of this large region are divided into 3 geographic sections for convenience: Eastern, Central, and Western sections (Figure 1). The section boundaries, which encompass one or more adjacent drainages, are located somewhat arbitrarily. However, for some species, particularly rainbow trout *Oncorhynchus mykiss*, the section boundaries delineate distinct differences in the character of the fisheries or the biology of local stocks.

The Eastern Section includes all drainages from the Kvichak River to the area's southern boundary at Cape Menshikof (Figure 1). Major federal jurisdictions in the Eastern Section include the Lake Clark National Park and Preserve, Katmai National Park and Preserve, and the Becharof National Wildlife Refuge. The Central Section is composed of the drainages entering Nushagak Bay and is dominated by the Nushagak and Wood river systems. The Wood–Tikchik State Park falls within the Central Section boundary. The Western Section includes all drainages from Cape Constantine on the Nushagak Peninsula west to Cape Newenham and contains portions of the Togiak National Wildlife Refuge. The Togiak River is the major drainage within the section.

Major communities located within the area include Togiak, Dillingham, Iliamna, King Salmon, Naknek, Egegik, and Pilot Point. The management area is not linked to the State of Alaska highway system, although local roads provide sport fishermen with limited access near the major communities. Float-equipped aircraft, and to a lesser extent boats, are commonly used to access the area's many remote fisheries.

Although the Alaska Department of Fish and Game (ADF&G) has management jurisdiction for sport fisheries in the BBMA, the United States Fish and Wildlife Service (USFWS), National Park Service (NPS), and United States Geological Survey (USGS) manage federal public lands and conduct research in the area.

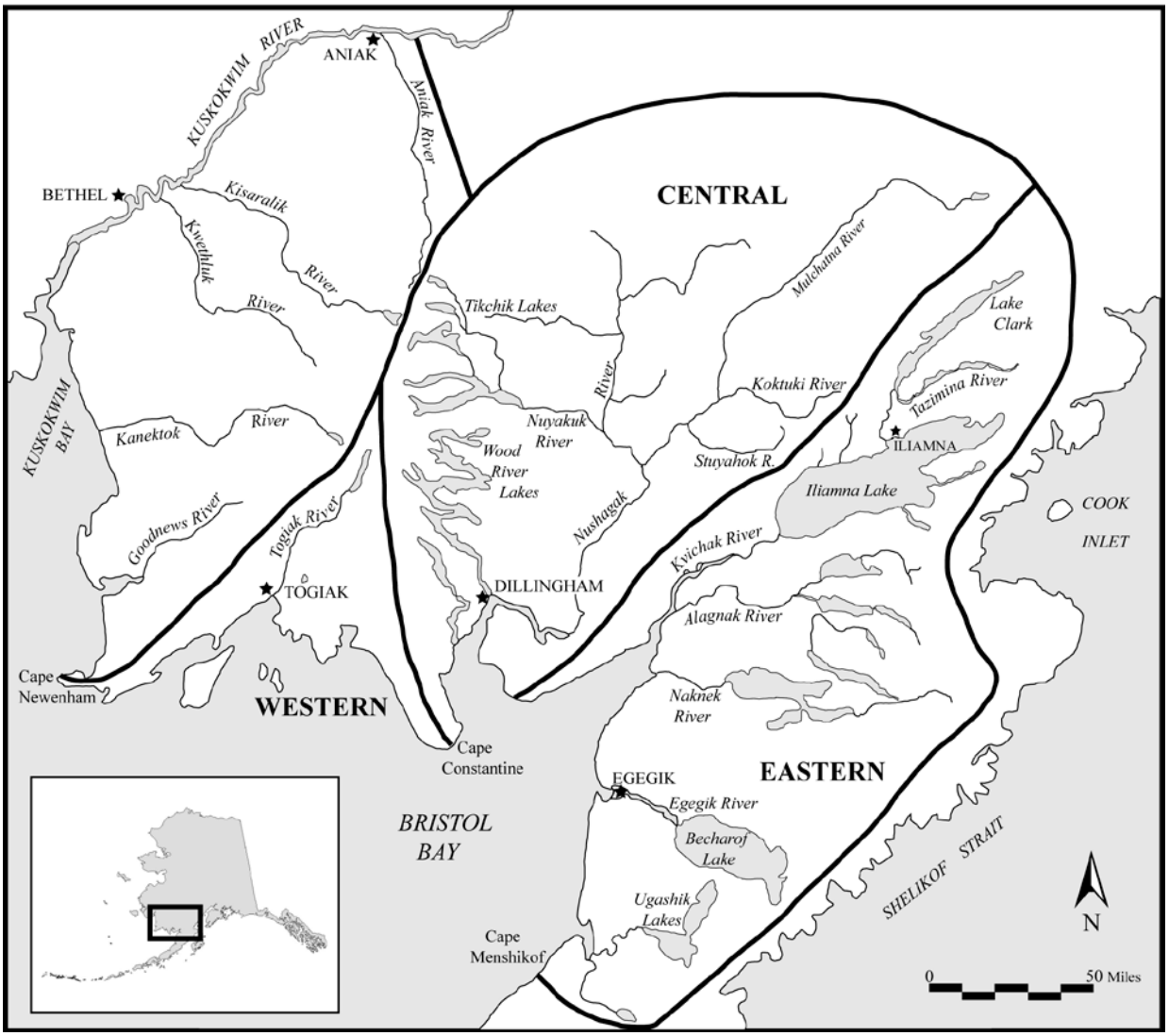


Figure 1.–Bristol Bay Sport Fish Management Area showing the Eastern, Central, and Western sections.

## INFORMATION SOURCES FOR MANAGEMENT

ADF&G utilizes several sources of information to manage fisheries in the BBMA. One of the primary means for monitoring sport fishing effort, catch, and harvest is a mail survey by ADF&G called the Statewide Harvest Survey (SWHS)[1]. This annual survey, begun in 1977, estimates the number of angler-days of sport fishing effort expended by anglers in Alaskan waters (residents as well as nonresidents) and harvest by species. The survey provides estimates of both effort and harvest by site, but it is not designed to provide estimates of effort directed toward a single species. Beginning in 1990, the survey was modified to include estimates of catch (release plus harvest) by site. The BBMA includes portions of 3 areas defined in the SWHS: a portion of the Naknek River Drainage–Alaska Peninsula Area (Area R) excluding the

[1] Alaska Sport Fishing Survey database [Internet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish. SWHS estimates available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

saltwater fisheries and freshwater fisheries of Cold Bay and the Aleutian Islands, the Kvichak Area (Area S), and the Nushagak Area (Area T).

In addition to the SWHS, ADF&G Division of Sport Fish (SF) has operated the freshwater logbook program since 2006, which requires sport fishing guide businesses to record sport fishing effort, catch, and harvest by freshwater commercially guided clients (Sigurdsson and Powers 2009-2014; ADF&G freshwater logbook database ).

Creel surveys have been selectively used to ground-truth the SWHS and the freshwater logbook program for fisheries of interest or for fisheries that require more detailed information or inseason management. For BBMA, these include creels surveys of the Alagnak River (Brookover 1989; Dunaway 1990a, 1994; Naughton and Gryska 2000; Collins and Dye 2003), the Kvichak River (Dunaway and Fleischman 1996b), Lower Talarik Creek (Russell 1977; Minard 1990; Minard et al. 1992; and unpublished data[2]), and the Nushagak River (Dye 2012).

ADF&G also conducts stock assessment projects. For example, on the Nushagak and Mulchatna rivers, significant monitoring and stock assessment projects have been conducted intermittently since 1986 (Minard 1987; Minard and Brookover 1988a; Dunaway et al. 1991; Dunaway and Bingham 1992; Dunaway and Fleischman 1995; Minard et al. 1998; Dye 2005; Cappiello and Dye 2006; Dye 2012; Borden and Dye *In prep*).

Commercial and subsistence harvests of salmon are monitored and reported by the ADF&G Division of Commercial Fisheries (Elison et al. 2018). For larger fisheries, forecasts of each season's run are provided by the Division of Commercial Fisheries (CF) and are reported in a statewide salmon forecast summary (Elison et al. 2018).

Escapements of some salmon stocks are monitored by counting towers, sonar, or aerial index surveys. For example, in the Nushagak River, escapement is estimated by sonar as the salmon migrate upriver (Elison et al. 2018). Historically, aerial index surveys of Chinook salmon (*Oncorhynchus tshawytscha*) in the drainages of the Nushagak, Togiak, Alagnak, and Naknek rivers were also conducted. Due to budget shortfalls, most of these aerial index surveys were suspended from 2009 through 2015.

## SPORT FISHING EFFORT AND HARVEST

The BBMA contains some of the most productive waters in the world for Pacific salmon (*Oncorhynchus* spp.), rainbow trout (*O. mykiss*), Arctic grayling (*Thymallus arcticus*), Arctic char (*Salvelinus alpinus*), and Dolly Varden (*S. malma*). The area has been acclaimed for its sport fisheries since the 1930s. Total sport fishing effort in the BBMA increased from about 25,000 angler-days in 1977 to a peak of more than 116,000 angler-days in 1995. From 2012 through 2016, total annual effort in the BBMA averaged 80,826 angler-days and effort during 2017 was 82,743 angler-days (Table 1). From 2012 through 2016, guided sport fishing effort has averaged 33,091 angler-days (Table 2). Based on recent trends and current economic stability, sport fishing effort is expected to stabilize or slowly increase during the foreseeable future.

[2] Memos summarizing the Lower Talarik Creek rainbow trout projects, located at Alaska Department of Fish and Game, Division of Sport Fish, Dillingham are as follows: 1997 data from J. Dye, dated October 15, 1997, Dillingham; 1998 data from C. Schwanke, dated December 1, 1998; 1999 data from J. Dye to Bob Clark, dated November 15, 2000; 2000 data from J. Dye and M. Cavin to Bob Clark, dated November 15, 2000; 2001 data from J. Dye to Bob Clark, dated January 2002; 2003 data from C. Collins to James Hasbrouck, dated August 12, 2004; 2004 data from T. Jaecks to James Hasbrouck, dated January 23, 2005.

Table 1.–Sport fishing effort in angler-days by section and drainage, Bristol Bay Management Area, 2007–2017, including 1977–2006 average.

| Section and drainage | Average 1977–2006 | Year | | | | | | | | | | Average 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | | |
| Eastern | | | | | | | | | | | | | |
| Naknek R. | 14,147 | 17,744 | 14,444 | 16,850 | 16,828 | 14,465 | 12,704 | 12,723 | 16,202 | 12,604 | 14,347 | 13,716 | 15,739 |
| Brooks R. | 3,103 | 3,882 | 3,951 | 2,513 | 3,469 | 4,227 | 3,607 | 3,426 | 3,696 | 2,265 | 2,994 | 3,198 | 2,326 |
| Kvichak R. | 3,797 | 5,557 | 5,849 | 6,015 | 6,061 | 6,045 | 5,313 | 4,080 | 4,172 | 3,767 | 4,850 | 4,436 | 4,227 |
| Copper R. | 1,810 | 2,513 | 1,520 | 1,959 | 1,756 | 2,246 | 2,625 | 3,082 | 3,427 | 2,269 | 2,564 | 2,793 | 2,653 |
| Alagnak R. | 6,982 | 8,881 | 8,652 | 5,541 | 6,549 | 5,669 | 5,039 | 4,782 | 6,013 | 6,908 | 5,668 | 5,682 | 7,001 |
| Newhalen R. | 3,799 | 1,643 | 1,470 | 1,370 | 968 | 1,048 | 540 | 1,498 | 429 | 4,033 | 2,049 | 1,710 | 2,860 |
| Lake Clark | 2,438 | 1,377 | 2,008 | 1,725 | 1,964 | 1,586 | 965 | 3,193 | 3,341 | 3,827 | 3,814 | 3,028 | 3,831 |
| Other | 10,309 | 18,944 | 15,872 | 10,177 | 13,828 | 14,824 | 12,355 | 5,342 | 12,591 | 10,642 | 8,151 | 9,816 | 9,793 |
| Subtotal [a] | 46,306 | 60,541 | 53,766 | 46,150 | 51,423 | 50,110 | 43,148 | 38,126 | 49,871 | 46,315 | 44,437 | 44,379 | 48,430 |
| Central | | | | | | | | | | | | | |
| Nushagak R. | 9,603 | 16,970 | 14,936 | 13,991 | 8,671 | 11,329 | 14,973 | 16,082 | 17,568 | 13,766 | 17,737 | 16,025 | 13,299 |
| Mulchatna R. | 3,132 | 3,084 | 1,524 | 1,157 | 879 | 1,548 | 1,573 | 1,415 | 1,341 | 2,949 | 1,169 | 1,689 | 1,806 |
| Agulowak R. | 1,731 | 3,966 | 2,040 | 1,641 | 1,953 | 2,065 | 1,136 | 1,176 | 1,993 | 1,346 | 935 | 1,317 | 1,660 |
| Agulukpak R. | 1,325 | 1,249 | 1,239 | 1,430 | 924 | 2,480 | 738 | 689 | 796 | 678 | 1,131 | 806 | 1,026 |
| Wood River L. [b] | 6,003 | 7,300 | 6,484 | 3,893 | 4,013 | 9,146 | 2,953 | 7,988 | 6,678 | 3,683 | 2,434 | 4,747 | 3,754 |
| Tikchik–Nuyakuk | 2,111 | 2,145 | 2,070 | 1,419 | 1,278 | 4,255 | 1,353 | 1,353 | 2,964 | 1,624 | 636 | 1,586 | 3,030 |
| Other | 3,148 | 2,371 | 1,185 | 1,060 | 3,713 | 7,454 | 3,433 | 6,814 | 6,159 | 3,562 | 2,387 | 4,471 | 3,248 |
| Subtotal [a] | 26,987 | 37,085 | 29,478 | 24,591 | 21,431 | 31,806 | 23,849 | 35,517 | 37,499 | 27,608 | 26,429 | 30,180 | 27,823 |
| Western | | | | | | | | | | | | | |
| Togiak R. | 2,691 | 5,181 | 4,695 | 3,638 | 3,636 | 4,326 | 9,526 | 3,170 | 8,098 | 4,129 | 3,159 | 5,616 | 4,960 |
| Other | 329 | 884 | 249 | 1,583 | 1,034 | 983 | 491 | 1,037 | 341 | 956 | 535 | 672 | 1,530 |
| Subtotal [a] | 3,020 | 5,218 | 4,944 | 5,221 | 4,670 | 5,309 | 9,905 | 4,207 | 8,439 | 5,085 | 3,694 | 6,266 | 6,490 |
| Total | 76,313 | 102,844 | 88,188 | 75,962 | 77,524 | 87,225 | 76,902 | 77,850 | 95,809 | 79,008 | 74,560 | 80,826 | 82,743 |

*Source*: Estimates from Alaska Statewide Harvest Survey (SWHS) were obtained from the Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: ADF&G, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

*Note*: "Angler-day" is the time spent fishing by 1 person for any part of a day.

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

Table 2.–Total guided sport fishing effort in angler-days in selected waters of the BBMA, 2007–2016.

| Drainage | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ugashik R. | 434 | 339 | 216 | 302 | 406 | 285 | 298 | 369 | 335 | 284 | 314 |
| Naknek R. | 3,993 | 4,273 | 3,923 | 3,160 | 4,162 | 3,444 | 3,784 | 3,814 | 4,039 | 4,188 | 3,854 |
| Brooks R. | 858 | 833 | 664 | 751 | 1,090 | 1,155 | 1,021 | 1,051 | 952 | 843 | 1,004 |
| Alagnak R. | 4,732 | 4,152 | 3,057 | 2,809 | 2,954 | 2,462 | 2,780 | 2,703 | 3,319 | 3,019 | 2,857 |
| Kvichak R. | 1,927 | 2,218 | 1,585 | 2,538 | 1,451 | 1,030 | 988 | 1,598 | 1,798 | 1,907 | 1,464 |
| Newhalen R. | 254 | 314 | 120 | 159 | 46 | 220 | 186 | 253 | 373 | 410 | 288 |
| Lower Talarik Crk. | 123 | 143 | 101 | 129 | 123 | 151 | 116 | 201 | 175 | 217 | 172 |
| Nushagak R. downstream of Mulchatna R. | 7,632 | 7,738 | 5,539 | 3,920 | 4,056 | 6,208 | 6,799 | 7,297 | 8,185 | 7,334 | 7,165 |
| Nushagak R. upstream of Mulchatna R. | 715 | 330 | 100 | 630 | 732 | 544 | 601 | 731 | 773 | 723 | 674 |
| Togiak R. | 2,211 | 1,818 | 1,223 | 873 | 1,094 | 1,429 | 1,470 | 1,924 | 1,518 | 1,824 | 1,633 |
| All Bristol Bay drainages | 38,573 | 37,879 | 29,906 | 26,739 | 29,658 | 29,373 | 30,841 | 34,741 | 35,274 | 35,227 | 33,091 |

*Source:* ADF&G freshwater logbook database and Sigurdsson and Powers (2009–2014).

Historically, more than 60% of the sport fishing effort has occurred on average (1977–2003) in the waters of the Eastern Section of the BBMA (Figure 2). Although the Eastern Section still dominates effort, the percentage has declined slightly (Table 1 and Figure 2). On average, the Eastern Section has accounted for 55% of the total effort from 2012 through 2016. The Central Section typically accounts for the second largest proportion of effort, followed by the Western Section. Distribution of effort among sections during 2017 was similar to other recent seasons (Figure 2).

Sockeye salmon (*O. nerka*), Chinook salmon (referred to as "king salmon" in regulatory language), and coho salmon (*O. kisutch*) are the most harvested species in the BBMA, with fewer chum (*O. keta*) and pink (*O. gorbuscha*) salmon, Dolly Varden, Arctic char, Arctic grayling, and rainbow trout taken annually (Tables 3 and 4). It is likely the apparent decline in harvests of nonsalmon species is due in part to the accepted catch-and-release ethic among sport anglers as well as bag limit reductions for Dolly Varden and Arctic char, northern pike (*Esox lucius*), and Arctic grayling adopted by the Alaska Board of Fisheries (BOF) in 1997, 2001, and 2006.

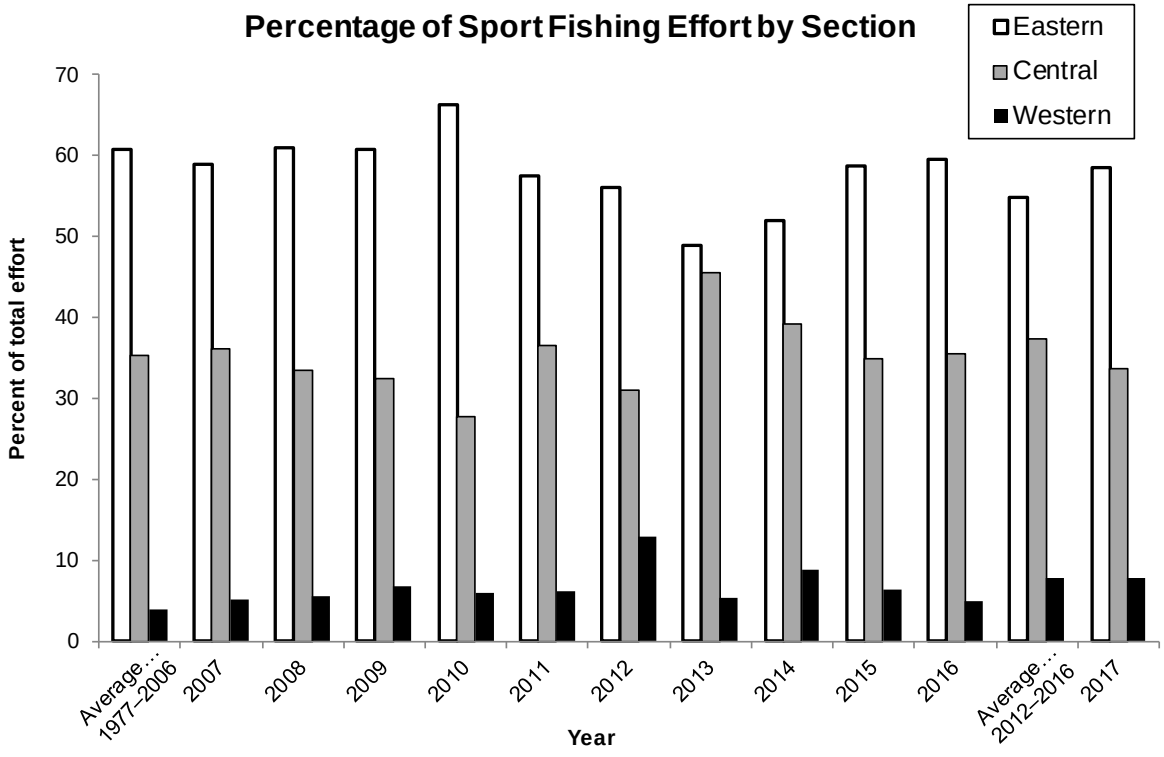


Figure 2.–Percent of total sport fishing effort by section for the Bristol Bay Management Area, 2004–2017, including 1977–2003 and 2012–2016 averages.

*Source*: Calculated from Table 1.

Table 3.–Numbers of fish harvested by species in sport fisheries in the BBMA, 2004–2017, including 1977–2003 average.

| Species | Average 1977–2003 | Year 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sockeye salmon | 12,725 | 12,071 | 11,925 | 17,658 | 14,835 | 18,593 | 17,874 | 14,725 | 14,068 | 14,341 | 13,218 | 14,747 | 18,837 | 15,535 | 15,336 | 23,842 |
| Chinook salmon | 10,176 | 13,195 | 13,076 | 12,838 | 13,821 | 9,969 | 9,671 | 6,224 | 10,412 | 10,009 | 9,794 | 10,671 | 9,957 | 12,220 | 10,530 | 9,844 |
| Coho salmon | 8,868 | 17,977 | 12,447 | 14,164 | 13,139 | 20,152 | 13,375 | 12,917 | 13,535 | 16,722 | 12,380 | 20,699 | 18,145 | 14,125 | 16,414 | 19,764 |
| Dolly Varden–Arctic char | 4,862 | 6,365 | 2,401 | 2,213 | 3,106 | 1,930 | 2,427 | 2,897 | 2,594 | 1,470 | 1,040 | 2,037 | 3,497 | 1,745 | 1,958 | 1,253 |
| Rainbow trout | 4,121 | 1,932 | 1,902 | 1,108 | 2,411 | 1,255 | 462 | 766 | 1,961 | 652 | 323 | 648 | 1,025 | 694 | 668 | 498 |
| Arctic grayling | 4,439 | 3,010 | 839 | 959 | 1,863 | 1,836 | 1,129 | 1,411 | 999 | 809 | 621 | 799 | 1,077 | 361 | 733 | 790 |
| Pink salmon | 1,163 | 3,138 | 550 | 625 | 437 | 1,579 | 47 | 1,170 | 79 | 1,430 | 124 | 1,079 | 60 | 849 | 708 | 101 |
| Lake trout | 1,283 | 1,289 | 1,309 | 435 | 738 | 920 | 645 | 724 | 1,370 | 188 | 719 | 599 | 736 | 542 | 557 | 411 |
| Chum salmon | 1,820 | 1,848 | 2,703 | 1,509 | 501 | 1,458 | 1,443 | 2,159 | 1,267 | 1,497 | 2,946 | 1,344 | 939 | 1,412 | 1,628 | 1,746 |
| Northern pike | 1,410 | 1,751 | 1,626 | 1,293 | 1,051 | 812 | 1,545 | 614 | 780 | 442 | 917 | 715 | 869 | 216 | 632 | 409 |
| Total | 51,748 | 62,576 | 48,778 | 52,802 | 51,902 | 58,504 | 48,618 | 43,607 | 47,065 | 47,560 | 42,082 | 53,338 | 55,142 | 47,699 | 49,164 | 58,658 |

*Source*: Estimates from Alaska Statewide Harvest Survey (SWHS) were obtained from the Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

Table 4.–Total guided sport fishing harvest by species in selected waters of the BBMA, 2007–2016.

| Drainage | Species | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ugashik R. | | | | | | | | | | | | |
| | Chinook salmon | 4 | 0 | 4 | 6 | 1 | 1 | 2 | 2 | 0 | 0 | 1 |
| | Coho salmon | 190 | 73 | 97 | 58 | 48 | 84 | 112 | 124 | 58 | 114 | 98 |
| | Sockeye salmon | 25 | 1 | 15 | 3 | 9 | 2 | 24 | 7 | 0 | 20 | 11 |
| | Rainbow trout | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Naknek R. | | | | | | | | | | | | |
| | Chinook salmon | 910 | 790 | 661 | 469 | 608 | 608 | 768 | 642 | 622 | 898 | 708 |
| | Coho salmon | 1,891 | 3,081 | 2,125 | 960 | 1,880 | 1,819 | 2,014 | 2,232 | 1,682 | 1,520 | 1,853 |
| | Sockeye salmon | 2,656 | 2,513 | 1,980 | 2,142 | 2,068 | 2,109 | 2,505 | 2,376 | 3,651 | 2,745 | 2,677 |
| | Rainbow trout | 52 | 12 | 24 | 13 | 9 | 21 | 32 | 31 | 21 | 3 | 22 |
| Brooks R. | | | | | | | | | | | | |
| | Chinook salmon | 5 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 1 |
| | Coho salmon | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sockeye salmon | 21 | 10 | 8 | 8 | 4 | 1 | 18 | 0 | 5 | 0 | 5 |
| | Rainbow trout | 67 | 0 | 0 | 5 | 6 | 7 | 40 | 0 | 0 | 0 | 9 |
| Alagnak R. | | | | | | | | | | | | |
| | Chinook salmon | 540 | 308 | 150 | 254 | 345 | 290 | 284 | 349 | 410 | 229 | 312 |
| | Coho salmon | 601 | 663 | 558 | 609 | 442 | 493 | 849 | 1,326 | 864 | 848 | 876 |
| | Sockeye salmon | 3,903 | 3,787 | 2,494 | 2,522 | 2,686 | 2,182 | 1,686 | 1,430 | 3,012 | 2,421 | 2,146 |
| | Rainbow trout | 322 | 13 | 7 | 14 | 3 | 3 | 17 | 0 | 3 | 1 | 5 |
| Kvichak R. | | | | | | | | | | | | |
| | Chinook salmon | 4 | 66 | 7 | 3 | 1 | 0 | 0 | 0 | 20 | 0 | 4 |
| | Coho salmon | 260 | 357 | 335 | 599 | 254 | 194 | 139 | 170 | 210 | 224 | 187 |
| | Sockeye salmon | 1,446 | 2,267 | 1,319 | 2,156 | 1,476 | 1,255 | 1,049 | 1,341 | 1,907 | 1,934 | 1,497 |
| | Rainbow trout | 141 | 29 | 12 | 39 | 13 | 4 | 2 | 7 | 0 | 1 | 3 |
| Newhalen R. | | | | | | | | | | | | |
| | Chinook salmon | 0 | 0 | 1 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 2 |
| | Coho salmon | 2 | 3 | 16 | 10 | 4 | 9 | 64 | 34 | 11 | 34 | 30 |
| | Sockeye salmon | 459 | 1,099 | 392 | 533 | 167 | 663 | 499 | 515 | 975 | 1,131 | 757 |
| | Rainbow trout | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 1 |

-continued-

Table 4.–Page 2 of 2.

| Drainage | Species | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Talarik Crk. | | | | | | | | | | | | |
| | Chinook salmon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Coho salmon | 0 | 5 | 9 | 32 | 2 | 14 | 3 | 0 | 2 | 0 | 4 |
| | Sockeye salmon | 0 | 0 | 0 | 6 | 12 | 65 | 11 | 8 | 0 | 6 | 18 |
| | Rainbow trout | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nushagak R. and Mulchatna R. | Chinook salmon | 4,324 | 4,621 | 3,030 | 1,567 | 2,140 | 3,827 | 3,823 | 4,095 | 4,613 | 4,273 | 4,126 |
| | Coho salmon | 1,159 | 2,135 | 1,704 | 1,723 | 1,723 | 1,993 | 2,993 | 1,823 | 3,194 | 1,664 | 2,333 |
| | Sockeye salmon | 89 | 264 | 29 | 53 | 81 | 139 | 388 | 239 | 315 | 200 | 256 |
| | Rainbow trout | 216 | 24 | 2 | 19 | 12 | 9 | 16 | 10 | 23 | 16 | 15 |
| Togiak R. | | | | | | | | | | | | |
| | Chinook salmon | 1,078 | 685 | 539 | 477 | 455 | 521 | 543 | 841 | 515 | 728 | 630 |
| | Coho salmon | 1,353 | 1,945 | 887 | 597 | 878 | 1,407 | 1,603 | 2,142 | 2,064 | 2,447 | 1,933 |
| | Sockeye salmon | 140 | 269 | 44 | 2 | 22 | 70 | 28 | 32 | 77 | 64 | 54 |
| | Rainbow trout | 13 | 10 | 0 | 9 | 0 | 1 | 3 | 4 | 0 | 4 | 2 |
| All Bristol Bay drainages | | | | | | | | | | | | |
| | Chinook salmon | 6,865 | 6,470 | 4,392 | 2,777 | 3,550 | 5,255 | 5,422 | 5,929 | 6,180 | 6,129 | 5,783 |
| | Coho salmon | 5,456 | 8,263 | 5,734 | 4,588 | 5,231 | 6,013 | 7,777 | 7,851 | 8,085 | 6,851 | 7,315 |
| | Sockeye salmon | 8,739 | 10,210 | 6,281 | 7,425 | 6,525 | 6,486 | 6,208 | 5,948 | 9,942 | 8,521 | 7,421 |
| | Rainbow trout | 811 | 88 | 45 | 99 | 43 | 51 | 110 | 52 | 47 | 25 | 57 |

*Source:* ADF&G freshwater logbook database.

## MANAGEMENT PLANS AND POLICIES

The following section is a list of the various management plans adopted or implemented by the BOF that guide ADF&G's management of Bristol Bay sport fisheries. For those plans specifically adopted as a regulation, the Alaska Administrative Code (AAC) is provided. Additional information is provided later in the pertinent fishery sections. There are other management plans that address commercial salmon fisheries that do not directly address sport fisheries management but may affect sport fisheries to some extent. These plans are more fully discussed under the specific sport fishery where such plans may be a factor.

### Nushagak–Mulchatna King Salmon Management Plan

Management of the subsistence, commercial, and sport fisheries for Nushagak Chinook salmon stocks is governed by the *Nushagak–Mulchatna King Salmon Management Plan* (5 AAC 06.361). The plan was first adopted by the BOF in January 1992 and most recently modified during the December 2012 meeting.

### Nushagak River Coho Salmon Management Plan

Management of the subsistence, commercial, and sport fisheries for Nushagak coho salmon stocks is governed by the *Nushagak River Coho Salmon Management Plan* (5 AAC 06.368). The plan was first adopted by the BOF during the December 1995 meeting and was updated at the December 2015 meeting. The purpose of this plan is to provide management guidelines to ensure an adequate spawning escapement of coho salmon into the Nushagak River system.

### Kvichak River Drainage Sockeye Salmon Management Plan

To ensure biological spawning escapement requirements of sockeye salmon into the Kvichak River drainage, the BOF adopted the *Kvichak River Drainage Sockeye Salmon Management Plan* (5 AAC 67.025) during the January 2001 meeting. The impetus for this plan was the poor sockeye salmon runs of 1999 and 2000. This is an inriver plan that addresses sport and subsistence fisheries only.

### Southwest Alaska Rainbow Trout Management Plan

In February 1990, the BOF overhauled nearly all regulations for rainbow trout fisheries in the 2 management areas now known as the Bristol Bay Management Area and the Kuskokwim–Goodnews Sport Fish Management Area. The new regulations implement the *Southwest Alaska Rainbow Trout Management Plan* (ADF&G 1990) without adopting the plan's language into regulation. However, the BOF recognized the plan as a guiding policy to achieve and maintain a more orderly and comprehensive mix of rainbow trout angling opportunities throughout the 2 areas. The overriding philosophy of the *Southwest Alaska Rainbow Trout Management Plan* is one of conservative wild stock management (ADF&G 1990). In 1998, the BOF adopted *Criteria for Establishing Special Management Areas for Trout* (5 AAC 75.013; subsequently amended as 5 AAC 75.210). This regulation embodies most of the original criteria that are still used in the *Southwest Alaska Rainbow Trout Management Plan*.

### Statewide Policy and Plan for Management of Sustainable Wild Rainbow Trout Fisheries

The BOF adopted the *Policy for the Management of Sustainable Wild Trout Fisheries* (5 AAC 75.222), and *Statewide Management Standards for Wild Trout* (5 AAC 75.220) in March 2003.

The policy provides principles and criteria to ensure conservation, sustainability, and optimal sustained yield and benefits for wild trout, and provides direction to the BOF and ADF&G as to how those principles and criteria are to be applied in the regulatory process. The plan ensures conservative management of wild trout fisheries while recognizing existing plans and policies that guide management of wild trout on a regional basis.

In most areas of the state, conservative management for wild rainbow trout, cutthroat trout, and steelhead, in combination, means a bag and possession limit of 2 fish, of which only 1 may be 20 inches or greater in length, with an annual limit of 2 fish 20 inches or greater in length. The plan recognizes existing plans and policies that guide management of wild trout by region and allows the BOF to adopt regulations that deviate from the plans as necessary to address sustainability or optimal sustained yield issues, establish special management areas, or liberalize harvest opportunities in specific water bodies under other criteria.

### Sustainable Salmon Fisheries Policy for Alaska

In March 2000, the BOF adopted the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222), which became an integral part of the BOF's yearly review of the state's salmon fisheries. The policy contains 5 fundamental principles for sustainable salmon management, each with criteria that are to be used by ADF&G and the BOF to evaluate the health of the state's salmon fisheries and to address any conservation issues and problems as they arise. The 5 fundamental principles of the policy are as follows:

1) Wild salmon populations and their habitats must be protected to maintain resource productivity.
2) Fisheries shall be managed to allow escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem functioning.
3) Effective salmon management systems should be established and applied to regulate human activities that affect salmon.
4) Public support and involvement for sustained use and protection of salmon resources must be maintained.
5) In the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats must be managed conservatively.

The policy requires that ADF&G describe the extent to which salmon fisheries and their habitats conform to explicit principles and criteria. In response to these reports, the BOF must review fishery management plans or create new ones. If a salmon stock of concern is identified in this review, the management plan will contain measures to address the concern, including needed research, habitat improvements, or new regulations.

## EMERGENCY ORDERS ISSUED IN 2016 THROUGH 2018

There were no emergency orders issued in 2016, 4 issued in 2017, and 6 issued in 2018 (Table 5).

Table 5.–Emergency orders for 2016–2018.

| Year | Emergency order | Issued | Effective | | |
|---|---|---|---|---|---|
| | | | Time | Day | Date |
| 2016 | – | – | – | – | – |
| 2017 | | | | | |
| | 2-KS-5-16-17 | 21 Jun | 12:01 AM | Friday | 23 Jun |
| | 2-RS-5-21-17 | 29 Jun | 12:01 AM | Wednesday | 30 Jun |
| | 2-RS-5-25-17 | 6 Jul | 12:01 AM | Friday | 7 Jul |
| | 2-RS-5-29-17 | 12 Jul | 12:01 AM | Thursday | 13 Jul |
| 2018 | | | | | |
| | 2-RS-5-28-18 | 3 Jul | 12:01 AM | Wednesday | 4 Jul |
| | 2-RS-5-32-18 | 10 Jul | 12:01 AM | Thursday | 12 Jul |
| | 2-RS-5-38-18 | 13 Jul | 12:01 AM | Saturday | 14 Jul |
| | 2-RS-5-39-18 | 16 Jul | 12:01 AM | Tuesday | 17 Jul |
| | 2-RS-5-42-18 | 18 Jul | 12:01 AM | Thursday | 19 Jul |
| | 2-RS-5-43-18 | 18 Jul | 12:01 AM | Thursday | 19 Jul |

*Note*: All emergency orders expired on 31 December at 11:59 PM of the year of issue unless superseded by a subsequent emergency order.

## Emergency Order 2-KS-5-16-17

This emergency order reduced the bag, possession, and annual limits for king salmon 20 inches or greater in length in the waters of the Nushagak–Mulchatna drainage from 2 per day, only one of which may be 28 inches or greater in length, with an annual limit of 4, to 1 per day, 20 inches or greater in length, with an annual limit of 2.

Justification: ADF&G was unable to project the date the inriver run of Chinook salmon would exceed 70,000 fish.

## Emergency Order 2-RS-5-21-17

This emergency order increased the bag and possession limits for sockeye salmon from 5 to 10 fish in all waters of the Nushagak–Mulchatna River drainage, excluding the Wood River drainage. The bag limit for other salmon, except king and sockeye salmon, remained at 5 per day, 5 in possession. These limits were in combination with the more liberal limits for sockeye salmon.

Justification: The passage of sockeye salmon had exceeded the escapement goal for the Nushagak River drainage.

## Emergency Order 2-RS-5-25-17

This emergency order increased the bag and possession limits for sockeye salmon from 5 per day to 10 per day in all waters of the Wood River drainage. The limits for other salmon, except king and sockeye salmon, remained at 5 per day, 5 in possession. These limits were in combination with the more liberal limit for sockeye salmon.

Justification: The passage of sockeye salmon had exceeded the escapement goal for the Wood River drainage.

### Emergency Order 2-RS-5-29-17

This emergency order increased the bag and possession limits for sockeye salmon from 5 fish to 10 fish in all waters of the Alagnak River drainage. The bag and possession limits for salmon, other than king and sockeye salmon, remained at 5 fish. These limits were in combination with the more liberal limit for sockeye salmon.

Justification: The passage of sockeye salmon had exceeded the escapement goal for the Alagnak River drainage.

### Emergency Order 2-RS-5-28-18

This emergency order increased the bag and possession limits for sockeye salmon from 5 to 10 fish in all waters of the Wood River drainage. The bag and possession limits for other salmon, except king and sockeye salmon, remained at 5 fish. These limits were in combination with the more liberal limit for sockeye salmon.

Justification: The passage of sockeye salmon had exceeded the escapement goal for the Wood River drainage.

### Emergency Order 2-RS-5-32-18

This emergency order reduced the bag and possession limits for sockeye salmon from 5 fish to 2 fish in all waters of the Kvichak River drainage upstream of its confluence with the Alagnak River (Branch River). In addition, this emergency order closed sport fishing for sockeye salmon in 4 areas of the Kvichak River drainage to eliminate potential conflicts between sport and subsistence fisheries.

Justification: Sockeye salmon escapement was not expected to achieve the lower end of the escapement goal of 2 million fish for the Kvichak River drainage. This emergency order was issued in accordance with the *Kvichak River Drainage Sockeye Salmon Management Plan*.

### Emergency Order 2-RS-5-38-18

This emergency order rescinded 2-RS-5-32-18, issued on 10 July 2018. Regulatory provisions for Kvichak River–Lake Iliamna drainage sockeye salmon reverted to those embodied under 5 AAC 67.020(2). Effectively, this emergency order restored the bag and possession limits for sockeye salmon in the Kvichak River–Lake Iliamna drainage from 2 fish to 5 fish and reopened the 4 areas closed to sport fishing for sockeye salmon by 2-RS-5-32-18.

Justification: With an increase in sockeye salmon passage, escapement projections exceeded 2 million fish.

### Emergency Order 2-RS-5-39-18

This emergency order increased the bag and possession limits for sockeye salmon from 5 to 10 fish in all waters of the Nushagak–Mulchatna River drainage, excluding the Wood River drainage. The bag and possession limits for other salmon, except king and sockeye salmon, remained at 5 fish. These limits were in combination with the more liberal limit for sockeye salmon.

Justification: The passage of sockeye salmon had exceeded the escapement goal for the Nushagak River drainage.

### Emergency Order 2-RS-5-42-18

This emergency order increased the bag and possession limits for sockeye salmon from 5 per day to 10 per day in all waters of the Alagnak River drainage. The limit for other salmon, except king, coho, and sockeye salmon, remained at 5 per day, 5 in possession. These limits were in combination with the more liberal limit for sockeye salmon.

Justification: The passage of sockeye salmon had exceeded the escapement goal for the Alagnak River drainage.

### Emergency Order 2-RS-5-43-18

This emergency order increased the bag and possession limits for sockeye salmon from 5 per day to 10 per day in all waters of the Naknek River drainage. The limit for other salmon, except king and sockeye salmon, remained at 5 per day, 5 in possession. These limits were in combination with the more liberal limit for sockeye salmon.

Justification: The passage of sockeye salmon had exceeded the escapement goal for the Naknek River drainage.

# CHINOOK SALMON FISHERIES

## AREAWIDE FISHERY DESCRIPTION

The Bristol Bay commercial fishery, in contrast to the sport and subsistence fisheries, generally takes the majority of the area's annual Chinook salmon harvest. Most of these Chinook salmon are harvested during the sockeye salmon commercial fishery. From 1997 through 2006, the annual commercial harvest ranged from 15,750 to 135,816 Chinook salmon with an average of nearly 62,000 fish (Elison et al. 2018). Since 2006, the commercial take has ranged from 14,487 (2015) to 63,121 (2007) with an average of 32,908 fish annually (Elison et al. 2018). Subsistence harvests from 2007 through 2016 averaged 14,363 Chinook salmon annually, ranging from a low of 10,852 (2010) fish to a high of 17,757 fish (2016) (Elison et al. 2018).

Bristol Bay is home to several world-class Chinook salmon sport fisheries. The peak of these sport fisheries occurs from mid-June to late July in the lower reaches of the Alagnak, Nushagak, Naknek, and Togiak rivers, as well as several smaller rivers (Figure 3). In the BBMA, the Chinook salmon sport fisheries, like the sport fisheries for most other species, are fished primarily by guided anglers. With few exceptions, the guided to unguided angler ratio is about 3 to 1. Anglers usually keep less than 50% of the fish they catch, especially since the adoption of areawide annual bag limits (see management section below).

Beginning in 1977, sport fishing harvests of Chinook salmon reached historical peaks of 18,622 fish in 1987 and 19,333 fish in 1994 (Dunaway et al. 2000; Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/; Table 3). Chinook salmon typically account for approximately 20–30% of the sport salmon harvest in Bristol Bay. The 2012–2016 sport harvest estimate averaged 10,533 Chinook salmon (Table 6). The 2017 sport harvest for the entire Bristol Bay Management Area was 9,844 Chinook salmon (Table 6) compared to the 2017 commercial harvest of 41,399 Chinook salmon (Elison et al. 2018).

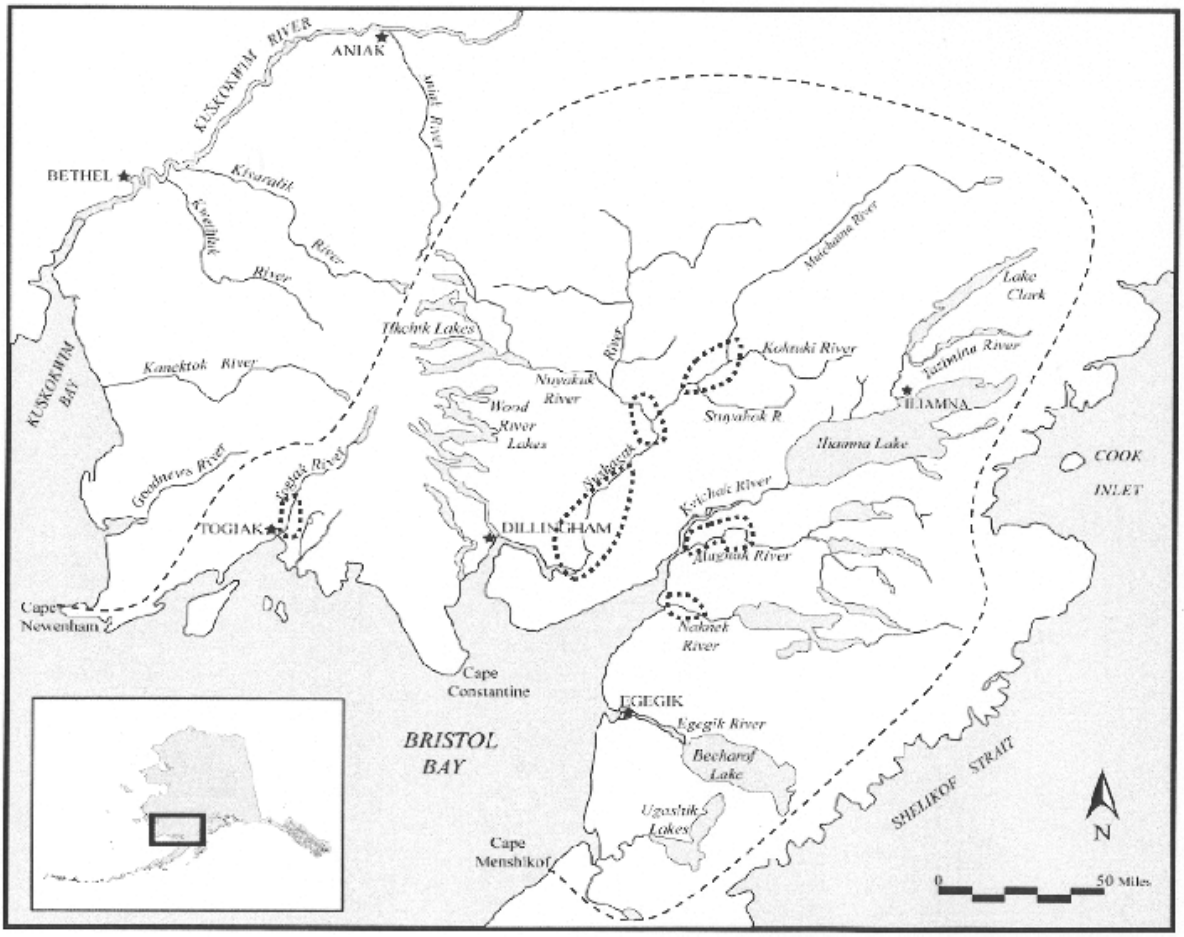


Figure 3.–Popular Chinook salmon sport fisheries (delineated with dark dots) in the Bristol Bay Sport Fish Management Area.

Table 6.–Sport harvest of Chinook salmon by section and drainage in the BBMA, 2004–2017, including 1977–2003 average.

| Section and drainage | Average 1977–2003 | Year | | | | | | | | | | | | | Average 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | | |
| Eastern | | | | | | | | | | | | | | | | |
| Naknek R. | 2,451 | 3,004 | 2,140 | 2,558 | 1,431 | 1,285 | 2,279 | 1,266 | 2,416 | 2,288 | 1,242 | 1,071 | 1,096 | 2,070 | 1,553 | 2,073 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 3 | 0 |
| Kvichak R. | 166 | 27 | 217 | 80 | 68 | 344 | 91 | 0 | 110 | 56 | 111 | 41 | 0 | 17 | 45 | 263 |
| Copper R. | 2 | 27 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 307 | 0 | 0 | 0 | 0 | 61 | 0 |
| Alagnak R. | 402 | 1,146 | 1,008 | 1,052 | 1,007 | 394 | 199 | 418 | 1,317 | 512 | 823 | 983 | 206 | 385 | 582 | 394 |
| Newhalen R. | 0 | 13 | 0 | 0 | 0 | 78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 188 | 557 | 267 | 460 | 0 | 156 | 10 | 26 | 40 | 42 | 15 | 134 | 379 | 465 | 207 | 100 |
| Subtotal [a] | 3,210 | 4,774 | 3,632 | 4,150 | 2,506 | 2,325 | 2,579 | 1,710 | 3,883 | 3,205 | 2,191 | 2,229 | 1,681 | 2,951 | 2,451 | 2,830 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 5,451 | 6,773 | 7,399 | 7,429 | 9,212 | 6,505 | 6,217 | 3,843 | 4,762 | 5,276 | 6,332 | 5,796 | 6,988 | 8,328 | 6,544 | 5,671 |
| Mulchatna R. | 300 | 40 | 134 | 44 | 287 | 91 | 58 | 0 | 82 | 351 | 236 | 337 | 138 | 83 | 229 | 95 |
| Agulowak R. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 17 | 7 | 0 |
| Agulukpak R. | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood River L. [b] | 167 | 87 | 15 | 94 | 111 | 26 | 48 | 16 | 8 | 14 | 0 | 0 | 0 | 0 | 3 | 21 |
| Tikchik–Nuyakuk | 49 | 93 | 61 | 0 | 170 | 104 | 0 | 64 | 50 | 304 | 117 | 0 | 108 | 0 | 106 | 82 |
| Other | 49 | 40 | 101 | 57 | 34 | 26 | 163 | 0 | 32 | 0 | 0 | 127 | 59 | 68 | 51 | 147 |
| Subtotal [a] | 6,019 | 7,033 | 7,710 | 7,624 | 9,814 | 6,752 | 6,486 | 3,923 | 4,956 | 5,945 | 6,685 | 6,276 | 7,293 | 8,496 | 6,939 | 6,016 |
| Western | | | | | | | | | | | | | | | | |
| Togiak R. | 684 | 1,388 | 1,734 | 1,064 | 1,501 | 892 | 606 | 591 | 1,438 | 859 | 900 | 2,166 | 983 | 787 | 1,139 | 978 |
| Other | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 0 | 18 | 0 | 0 | 0 | 4 | 20 |
| Subtotal [a] | 689 | 1,388 | 1,734 | 1,064 | 1,501 | 892 | 606 | 591 | 1,573 | 859 | 918 | 2,166 | 983 | 787 | 1,143 | 998 |
| Total | 7,570 | 13,195 | 13,076 | 12,838 | 13,821 | 9,969 | 9,671 | 6,224 | 10,412 | 10,009 | 9,794 | 10,671 | 9,957 | 12,234 | 10,533 | 9,844 |

*Source*: Estimates from Alaska Statewide Harvest Survey (SWHS) were obtained from the Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

## AREAWIDE FISHERY MANAGEMENT AND OBJECTIVES

Since 1960, bag limits for Chinook salmon in the Bristol Bay Management Area have become increasingly conservative and complex (Table 7). The most conservative and sweeping regulatory changes to the area's Chinook salmon fisheries were adopted during the November and December 1997 BOF meetings. A Bristol Bay–wide annual limit of 5 Chinook salmon was adopted, and in the Nushagak River drainage, anglers were further restricted to an annual limit of 4 Chinook salmon. The daily bag limits in several other major fisheries were reduced slightly. Season closures of July 25 or July 31 were adopted for all Bristol Bay waters to protect spawning Chinook salmon.

In 2001, a statewide regulation (5 AAC 67.010 [b]) created a daily bag and possession limit for Chinook salmon under 20 inches of 10 per day in all fresh waters open to Chinook salmon sport fishing, except for the Nushagak River drainage. This limit is in addition to the daily limits for Chinook salmon 20 inches or longer. Chinook salmon under 20 inches do not count toward the annual limit and are in addition to the daily bag limit for Chinook salmon 20 inches or longer. The sole exception is the Nushagak River, which has a daily bag and possession limit of 5 Chinook salmon under 20 inches per day.

In the drainages of the Alagnak, Egegik, Kvichak, Igushik, Naknek, Snake, Togiak, and Ugashik rivers, the bag and possession limits for Chinook salmon are all 3 per day, 1 of which may exceed 28 inches in length (5 AAC 67.020 [1]).

Anglers are prohibited from removing a Chinook salmon from the water before releasing the fish in all fresh waters of Bristol Bay. Any Chinook salmon removed from the water must be kept and becomes part of an angler's daily bag limit. The goal of this regulation is to improve the potential survival of released Chinook salmon and to encourage anglers to be more careful with the fish they release.

Table 7.–Bag limit regulatory changes affecting Chinook salmon in the BBMA.

| Effective year | Regulation |
|---|---|
| 1965 | 10 salmon (all species combined) per day, no size limit |
| 1972 | 5 king per day, only 2 may be over 26 inches |
| 1976 | 5 king per day, only 2 may be over 28 inches |
| 1988 | 3 king per day, only 2 may be over 28 inches |
| 1998 | Daily bag and possession limits on several waters reduced to 3 per day, only 2 over 28 inches. |
| | Annual limit of 5 king salmon. |
| | Spawning closures for all waters. |
| 2001 | Daily bag and possession limits on most Eastern and most Central section waters |
| | (except Nushagak and Wood River drainages) reduced to 3 per day, only 1 over 28 inches. |
| | All waters except Nushagak drainage allow harvest of 10 per day under 20 inches. |
| | All fish released must remain in the water from Cape Menshikof to Cape Constantine. |
| 2003 | All fish released must remain in the water from Cape Menshikof to Cape Pierce. |
| | Harvest of 5 per day under 20 inches allowed in the Nushagak drainage. |
| 2012 | Bag and possession limit for king salmon in all drainages from Cape Constantine to Cape Newenham changed to 3, only 1 fish over 28 inches in length. |

*Note:* Chinook salmon are referred to as king salmon in the regulatory language.

## NAKNEK RIVER

### Fishery Description

The Naknek River (Figure 3) is located on the Alaska Peninsula near the communities of King Salmon, Naknek, and South Naknek. The Naknek River Chinook salmon sport fishery commences May 1 and continues through July 31, when it closes by regulation to protect spawning fish. The peak angling weeks are from about June 22 to July 15. Effort is concentrated in a 15-mile stretch of the Naknek River adjacent to the community of King Salmon. This fishery is one of the most popular sport fisheries in the area and accounts for roughly 21% of all the Chinook salmon harvested by sport fishermen in the BBMA. Several factors contribute to the popularity of the Naknek River, including ease of access and regularly scheduled airline service into King Salmon. This fishery has a significant amount of unguided effort, reasonably good catch rates, and a relatively high retention rate. Of the estimated catch of 4,421 Chinook salmon in 2017, 2,073 or nearly 47% were kept[3].

Based on the SWHS, the estimated Naknek River drainage Chinook salmon sport harvest from 2012 through 2016 ranged from a high of 2,288 in 2012 to a low of 1,071 in 2014, with an average of 1,553 fish (Table 6). Angler effort for all species on the Naknek River has decreased from highs of over 20,000 angler-days in the early 2000s to a 5-year (2012–2016) average of 13,716 (Table 1; Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/).

Based on freshwater logbook data from 2007 through 2016, guided effort has remained close to the recent 5-year average of 3,854 angler-days (2012–2016; Table 2).

### Fishery Management and Objectives

The escapement goal and surveys to estimate abundance for Naknek River Chinook salmon were dropped in 2015 due to budget shortfalls and concerns over the ability to reliably estimate abundance via aerial surveys (Table 8). Sport harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by the Division of Commercial Fisheries (CF) and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018). The Division of Sport Fish (SF) has also conducted significant monitoring and stock assessment projects (Coggins and Bingham 1993; Gryska and Naughton 2001).

Historically, escapement of Chinook salmon was estimated by fixed-wing aerial surveys of the 4 primary spawning areas during the presumed peak of spawning in early to mid-August. Aerial counts were left unexpanded and were considered minimum estimates of escapement. Results of the escapement surveys indicated the mainstem of the Naknek River, along with Big Creek, composes approximately 90% of the observed escapement. Except in 2000 and 2015, most escapements generally met or exceeded the former escapement goal. Surveys were not conducted from 2010 through 2014 due to budget shortfalls and from 2015 through 2018 due to budget shortfalls and because the escapement goal was dropped.

[3] Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited October 14, 2018]

Table 8.–Chinook salmon commercial, subsistence, and sport harvest plus escapement for the Naknek River, 1995–2018, including 1985–1994 average.

| | Harvest | | | | |
|---|---|---|---|---|---|
| Year | Commercial [a] | Subsistence [b] | Sport | Total | Escapement index [c] |
| 1995 | 5,130 | 1,431 | 4,153 | 10,714 | 4,960 |
| 1996 | 4,273 | 1,574 | 2,984 | 8,831 | 5,010 |
| 1997 | 3,132 | 2,764 | 4,231 | 10,127 | 10,453 |
| 1998 | 2,722 | 2,433 | 3,443 | 8,598 | 5,505 |
| 1999 | 1,439 | 1,567 | 2,856 | 5,862 | NA |
| 2000 | 1,077 | 894 | 2,105 | 4,076 | 3,233 |
| 2001 | 995 | 869 | 2,656 | 4,520 | 6,340 |
| 2002 | 1,002 | 837 | 2,170 | 4,009 | 7,593 |
| 2003 | 611 | 1,221 | 2,412 | 4,244 | 6,081 |
| 2004 | 1,496 | 1,075 | 3,004 | 5,575 | 12,878 |
| 2005 | 1,458 | 1,047 | 2,140 | 4,645 | NA |
| 2006 | 2,333 | 881 | 2,558 | 5,772 | NA |
| 2007 | 1,520 | 672 | 1,431 | 3,623 | 5,498 |
| 2008 | 1,344 | 719 | 1,285 | 3,348 | 5,390 |
| 2009 [d] | 1,026 | 392 | 2,279 | 3,697 | NA |
| 2010 [d] | 1,060 | 422 | 1,266 | 2,748 | NA |
| 2011 [d] | 1,962 | 550 | 2,416 | 4,928 | NA |
| 2012 [d] | 2,306 | 785 | 2,288 | 5,379 | NA |
| 2013 [d] | 1,360 | 321 | 1,242 | 3,104 | NA |
| 2014 [d] | 1,526 | 530 | 1,071 | 3,127 | NA |
| 2015 [d] | 740 | 604 | 1,096 | 2,440 | NA |
| 2016 [d] | 1,473 | 896 | 2,070 | 4,439 | NA |
| 2017 [d] | 1,050 | 694 | 2,073 | 3,123 | NA |
| Average | | | | | |
| 1985–1994 | 5,508 | 1,329 | 4,362 | 11,199 | 6,065 |
| 1995–2017 | 1,784 | 1,022 | 2,314 | 5,084 | 6,631 |
| 2013–2017 | 1,230 | 588 | 1,510 | 3,247 | NA |
| Percent | | | | | |
| 1995–2014 | | 20% | 45% | | |
| 2010–2014 | | 14% | 43% | | |
| 2018 [e] | 1,330 | NA | NA | NA | NA |

*Source:* Commercial: Jones et al. (2014: Appendix A4); Elison et al. (2018: Appendix A4). Sport: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Howe et al. (1996).

*Note*: "NA" means data not available.

[a] Naknek–Kvichak district commercial harvests probably include Naknek, Alagnak, and Kvichak stocks. The harvests reported for Naknek River stocks are therefore considered maximums.

[b] Naknek–Kvichak District harvests.

[c] Actual raw counts made from fixed-wing aerial surveys.

[d] No escapement surveys conducted due to budget constraints.

[e] Aerial survey was conducted by an inexperienced surveyor; this is considered a minimum estimate.

Concern over low escapements and increasing sport harvest prompted the 1987 BOF to adopt regulations addressing Naknek River Chinook salmon. The key elements were as follows:

1) Establish a season for Chinook salmon (May 1 to July 31).
2) Designate artificial-lure-only.
3) Reduce bag and possession limits to 3 per day, 1 of which may be over 28 inches.

Beginning in the early 1990s, increasing portions of Pauls and King Salmon creeks were closed to Chinook salmon fishing to protect spawning stocks in these waters. In 1995, the outlets of Pauls and King Salmon creeks into the Naknek River were closed to angling to protect important holding areas for Chinook salmon.

In 1997, closures to Chinook salmon angling in Pauls and King Salmon creeks were clarified, and an annual limit of 5 Chinook salmon per angler was adopted for this fishery. This annual harvest limit was also areawide in the BBMA and required anglers to record the date and location of each Chinook salmon taken.

With the advent of the annual limit on Chinook salmon, local anglers expressed strong interest in taking smaller Chinook salmon on the Naknek River. In January 2001, the BOF added the opportunity to harvest 10 Chinook salmon per day under 20 inches in length and prohibited anglers from removing Chinook salmon from the water if the fish were to be released[4]. During the January 2001 meeting, the BOF also restricted most of Big Creek to catch-and-release angling for Chinook salmon. The Big Creek regulation grew from a locally generated proposal addressing concerns for the Big Creek Chinook salmon escapement. In 2013, Big Creek and waters of the Naknek River drainage within a one-quarter mile radius of its confluence with Big Creek were closed to sport fishing for Chinook salmon.

As described earlier in this report, some Naknek River anglers were concerned about the management of the Naknek–Kvichak District commercial sockeye salmon fishery. When conservation concerns for the Kvichak River sockeye salmon stocks require area restrictions in the Naknek–Kvichak District, commercial fishing may be allowed in the lower reaches of the Naknek River under the terms of the *Naknek River Sockeye Salmon Special Harvest Area Plan* (NRSHA; 5 AAC 06.360). The plan was adopted by the BOF in 1986. This management strategy can result in a higher percentage of the Naknek River escapement being exposed to gillnets, raising the concern of some guides and anglers. The BOF has amended the plan several times and in 2001, adopted amendments to address the quality of salmon of all species escaping through the NRSHA openings.

### 2018 Season

Sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for Chinook salmon on the Naknek River was good in 2018. Commercial harvest of Chinook salmon in the Naknek–Kvichak District during 2018 was approximately 1,330.

[4] Southwest Alaska sport fishing regulations summary, 2018 (effective until the 2019 summary is issued) Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

# ALAGNAK (BRANCH) RIVER

## Fishery Description

The Alagnak River (Figure 3), known locally as the Branch River, is located in the Kvichak River drainage, approximately 40 miles north of the community of King Salmon. The Alagnak River's proximity to the community of King Salmon makes it an attractive alternative to fishing the more crowded Naknek River. In addition, it is the closest Chinook salmon fishery for many of the lodges near Iliamna Lake, where few Chinook salmon spawn. The Chinook salmon fishery in the Alagnak River occurs mainly in the lower 15 miles of the river and peaks in mid to late July, roughly 2 weeks later than other Chinook salmon fisheries in the area. Chinook salmon returning to the Alagnak River are typically larger than those found in other systems. Effort is primarily guided (about 80%) and nonresident (more than 90%) (Dunaway 1990a, 1994; Naughton and Gryska 2000). Most anglers either fly in with float-equipped aircraft for 1-day trips or base themselves in one of several lodges located along the river. Retention rates for Chinook salmon average approximately 20% (Dunaway 1990a, 1994; Naughton and Gryska 2000), typical of most of the area's Chinook salmon fisheries.

From 2007 through 2016, the largest estimated annual harvest of Chinook salmon from the Alagnak River was 1,317 fish in 2011 (Table 6). From 2012 through 2016, the average harvest of Chinook salmon in the Alagnak River was 582 fish (Table 6). The 2017 harvest of 394 fish was below the recent average (Table 6) but the 2017 total estimated effort of 7,001 angler-days exceeded the 2012–2016 average effort of 5,682 angler-days (Table 1).

Based on freshwater logbook data from 2012 through 2016, annual guided effort has remained close to the average of 2,857 angler-days (Table 2).

From 2008 through 2017, only 4 unexpanded escapement index counts of Chinook salmon were conducted in the Alagnak River and they averaged 1,375 fish (Table 9).

## Fishery Management and Objectives

Alagnak River drainage Chinook salmon fisheries are managed to achieve a sustainable escapement goal (SEG) of 2,700 Chinook salmon as assessed by aerial survey.

Sport harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018). Commercial harvests are reported for the Naknek–Kvichak District, which is a mixed-stock fishery composed of Kvichak, Naknek, and Alagnak river stocks. It is not possible to separate the commercial harvests by river of origin. SF has conducted significant monitoring and stock assessment projects on the Alagnak River in the recent past (Brookover 1989; Dunaway 1990a, 1994; Naughton and Gryska 2000).

Management concerns for Chinook salmon stocks of the Alagnak River drainage center on an inability to estimate total exploitation rates. Allocation of commercial catches from the Naknek–Kvichak District to the river of origin is not yet possible, and the lack of inseason assessment of escapement makes it difficult to effectively manage this stock. Run timing of Chinook salmon stocks to the Alagnak River coincides with peak periods of commercial sockeye salmon fishing in the Naknek–Kvichak District. When sockeye salmon runs are sufficient to allow for liberal fishing schedules, substantial harvest of the Alagnak River Chinook salmon stocks is possible.

Table 9.–Unexpanded escapement counts and total sport fishing effort and harvest of Chinook salmon in the Alagnak River, 1995–2018, including 1985–1994 average.

| Year | Index count [a] | Effort [b] | Harvest [b] |
|---|---|---|---|
| 1995 | 6,860 | 13,232 | 891 |
| 1996 | 9,885 | 8,121 | 931 |
| 1997 | 15,210 | 11,062 | 972 |
| 1998 | 4,148 | 7,715 | 1,531 |
| 1999 | 2,178 | 6,411 | 592 |
| 2000 | 2,220 | 7,589 | 501 |
| 2001 | 5,458 | 4,391 | 508 |
| 2002 | 3,765 | 7,886 | 305 |
| 2003 | 8,209 | 9,956 | 334 |
| 2004 | 6,755 | 8,267 | 1,146 |
| 2005 | 5,084 | 11,228 | 1,008 |
| 2006 | 4,278 | 11,747 | 1,052 |
| 2007 | 3,455 | 8,881 | 1,007 |
| 2008 | 1,825 | 8,652 | 394 |
| 2009 | 1,957 | 5,541 | 199 |
| 2010 [c] | NC | 6,459 | 405 |
| 2011 | NC | 5,669 | 1,317 |
| 2012 | NC | 5,039 | 572 |
| 2013 | NC | 4,782 | 823 |
| 2014 | NC | 6,013 | 983 |
| 2015 | NC | 6,908 | 206 |
| 2016 [d] | 1,283 | 5,668 | 385 |
| 2017 [d] | 435 | 7,001 | 394 |
| Average | | | |
| 1985–1994 | 4,362 | 6,715 | 945 |
| 2008–2017 | 1,375 | 6,173 | 568 |
| 2018 [d] | 988 | NA | NA |

*Source:* Total effort and harvest: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Howe et al. (1996).

*Note*: "NC" means count not conducted.

[a] Maximum index count; escapement goal is 2,700.

[b] Commercial fishing occurred in the Alagnak River Special Harvest Area.

[c] Emergency order issued July 15 reducing the bag limit to 1 fish over 20 inches and the seasonal limit to 3.

[d] Escapement survey considered a minimum estimate.

In 2015, a management plan was developed at the Bristol Bay BOF meeting to create an inriver sockeye salmon fishery to harvest surplus Alagnak River sockeye salmon. The plan included a stipulation that Alagnak River Chinook salmon needed to be surveyed in the previous year and the escapement goal achieved for the inriver sockeye salmon fishery to occur. However, index counts since 2015, now conducted with multiple observers and flights and staff from both fisheries divisions, have been some of the lowest on record, and yet estimated catch and catch-per-unit effort from the SWHS have been well above average in these same years, casting doubt on the ability to consistently estimate Chinook salmon spawning escapement in the Alagnak River via aerial survey.

Terminal tackle in this river system has been restricted to single-hook artificial lures only for many years to protect rainbow trout. Through 1988, the bag and possession limits for Chinook salmon in the Alagnak River were 5 fish, only 2 over 28 inches in length. From 1989 through 1997, the limits were 3 fish, only 2 over 28 inches in length. Finally, in addition to a 5 fish annual limit and a spawning season closure on July 31, the BOF established a daily bag and possession limit of 3 fish, only 1 of which could exceed 28 inches in length[5]. As mentioned in the introduction of this section, in January 2001, the BOF added the opportunity to harvest 10 Chinook salmon under 20 inches in length per day and prohibited anglers from removing Chinook salmon from the water if the fish were to be released.

### 2018 Season

Based on recent returns and relatively low productivity of Chinook salmon stocks statewide, a below-average to average run of Chinook salmon was expected to the Alagnak River drainage. However, information from anglers and guides indicated that angling success in the sport fishery was above average. Aerial surveys counted 988 Chinook salmon within the drainage index areas, well below both historical (1985–1994) and recent (2008–2017) averages (Table 9); however, this is considered a minimum estimate because anecdotal information did not corroborate a count this low and there have been some concerns regarding the reliability of these aerial counts to index escapement. Estimates of sport fishing effort, catch, and harvest will not be available until 2019.

## NUSHAGAK AND MULCHATNA RIVERS

### Fishery Description

The Nushagak River drainage (Figure 3) supports the largest sport, commercial, and subsistence fisheries for Chinook salmon in the BBMA (Tables 6 and 10).

Sport fishing effort is concentrated in 3 areas: the lower Nushagak River near the village of Portage Creek, the middle section of the Nushagak River near the village of Ekwok, and the midsection of the Mulchatna River between the Stuyahok and Koktuli rivers. Between 1992 and 1997, effort in the Ekwok area was highly variable. Since about 1999, the lower river fishery has begun to expand steadily upriver to Ekwok and the 2 areas are merging into a single fishery. The amount of angling for Chinook salmon in the middle section of the Mulchatna River seems to have diminished since bait was prohibited there in 1992. Although sport fishing for Chinook salmon does occur in some tributaries of the drainage, the overall impact on harvest is considered slight.

The uplands along much of the Nushagak River are privately owned. Choggiung Limited, an Alaska Native village corporation, administers a recreational land management program. Since its inception in the mid-1980s, this program has grown to include the lands of the adjoining villages of Ekwok, New Stuyahok, and in some years, Koliganek. Private and commercial land-use permits sold by the program allow anglers access to desirable campsites while engaged in sport fishing and hunting.

[5] Southwest Alaska sport fishing regulations summary, 2018 (effective until the 2019 summary is issued) Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

Table 10.–Chinook salmon commercial, subsistence, and sport harvests, and escapement for the Nushagak River drainage, 1989–2018.

| | | Harvests below sonar | | | | Harvests above sonar | | Spawning escapement | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Total run | Commercial [a] | Subsistence [c] | Sport [d] | Inriver sonar estimate | Subsistence [e] | Sport [f] | Sonar estimate [g] | Aerial survey estimate [g] |
| 1989 | 102,241 | 17,637 | 4,898 | 1,404 | 78,302 | 2,217 | 2,210 | 73,875 | |
| 1990 | 85,792 | 14,812 | 6,228 | 797 | 63,955 | 3,325 | 2,689 | 57,941 | |
| 1991 | 132,769 | 19,718 | 6,907 | 1,793 | 104,351 | 3,127 | 3,758 | 97,466 | |
| 1992 | 139,943 | 47,563 | 7,688 | 1,844 | 82,848 | 2,499 | 2,911 | 77,438 | |
| 1993 | 173,747 | 62,976 | 10,552 | 2,408 | 97,812 | 2,919 | 3,492 | 91,401 | |
| 1994 | 332,388 | 119,480 | 8,829 | 4,436 | 199,643 | 6,661 | 6,191 | 186,792 | |
| 1995 | 268,137 | 79,943 | 7,810 | 2,238 | 178,146 | 5,891 | 2,713 | 169,542 | |
| 1996 | 192,011 | 72,123 | 9,086 | 2,346 | 108,456 | 6,855 | 3,045 | 98,557 | |
| 1997 | 156,052 | 64,390 | 8,731 | 931 | 170,610 | 6,587 | 2,567 | | 82,000 |
| 1998 | 370,908 | 117,820 | 6,987 | 1,640 | 244,461 | 5,271 | 4,188 | 235,003 | |
| 1999 | 147,530 | 11,178 | 5,732 | 934 | 129,686 | 4,325 | 3,304 | 122,058 | |
| 2000 | 136,194 | 12,120 | 5,398 | 1,389 | 117,288 | 4,072 | 4,628 | 108,588 | |
| 2001 | 212,037 | 11,746 | 6,703 | 1,600 | 191,988 | 5,057 | 4,299 | 182,632 | |
| 2002 | 228,969 | 40,039 | 6,430 | 1,193 | 181,307 | 4,851 | 2,500 | 173,956 | |
| 2003 | 222,846 | 43,485 | 10,651 | 2,203 | 166,507 | 8,035 | 3,752 | 154,720 | |
| 2004 | 350,407 | 96,759 | 8,898 | 2,567 | 242,183 | 6,712 | 4,339 | 231,132 | |
| 2005 | 306,892 | 62,764 | 7,142 | 2,863 | 234,123 | 5,387 | 5,702 | 223,034 | |
| 2006 | 218,413 | 84,881 | 5,683 | 3,166 | 124,683 | 4,288 | 4,307 | 116,088 | |
| 2007 | 121,959 | 51,831 | 7,598 | 3,581 | 60,464 | 5,732 | 6,088 | 48,644 | |
| 2008 | 126,301 | 18,968 | 7,387 | 3,305 | 96,641 | 5,573 | 3,395 | 87,673 | |
| 2009 | 115,884 | 24,693 | 7,260 | 2,451 | 81,480 | 5,477 | 3,903 | 72,100 | |
| 2010 | 69,556 | 26,056 | 5,216 | 1,659 | 36,625 | 3,935 | 2,248 | 30,443 | |
| 2011 | 95,300 | 26,927 | 7,103 | 1,542 | 59,728 | 5,358 | 3,302 | 51,068 | |
| 2012 | 129,282 | 11,952 | 7,711 | 1,833 | 107,786 | 2,639 | 4,098 | 101,049 | |
| 2013 | 133,246 | 10,213 | 6,613 | 1,971 | 113,709 | 4,989 | 4,714 | 104,746 | |
| 2014 | 95,091 | 11,862 | 10,378 | 2,369 | 70,482 | 3,790 | 3,891 | 62,801 | |
| 2015 | 159,695 | 50,675 | 8,487 | 2,514 | 98,019 | 2,209 | 4,720 | 91,090 | |
| 2016 | 163,268 | 23,783 | 11,064 | 3,053 | 125,368 | 1,933 | 5,358 | 118,077 | |
| 2017 | 99,648 | 32,194 | 7,659 | 2,834 | 56,961 | 1,826 | 2,837 | 52,298 | |

-continued-

Table 10.–Page 2 of 2.

| Year | Total run | Harvests below sonar | | | Inriver sonar estimate | Harvests above sonar | | Spawning escapement | |
|---|---|---|---|---|---|---|---|---|---|
| | | Commercial [a] | Subsistence [c] | Sport [d] | | Subsistence [e] | Sport [f] | Sonar estimate [g] | Aerial survey estimate [g] |
| Average | | | | | | | | | |
| 1989–2017 | 175,397 | 43,744 | 7,615 | 2,168 | 124,952 | 4,536 | 3,833 | 115,008 | |
| 2013–2017 | 130,190 | 25,745 | 8,840 | 2,548 | 92,908 | 2,949 | 4,304 | 85,802 | |
| Percent | | | | | | | | | |
| 1989–2017 | | 1 | 0 | 0 | | 0 | 0 | | |
| 2013–2017 | | 1 | 0 | 0 | | 0 | 0 | | |
| 2018 | NA | 35,243 | NA | NA | 97,239 | NA | NA | NA | |

*Source:* Commercial harvest (total Nushagak District): 1989–1996, Morstad et al. (2010: Appendix A19); 1997–2017, Elison et al. (2018: Appendix A19). Subsistence harvests above and below sonar: ADF&G Subsistence Division, Subsistence Database from Charles Utermohle, Program Coordinator, Subsistence Division, Region II, Anchorage, Nov. 20, 2000. Data for 2000–2008 provided by James Fall, Subsistence Division, Region II, Anchorage. Sport harvests above and below the sonar: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1990–1994) and Howe et al. (1995, 1996). Sonar estimates: 1989–1996, Morstad et al. (2010: Appendix A19); 1997–2014, Elison et al. (2018: Appendix A19).

*Note*: "NA" means data not available.

[a] Run refers to an aggregation of salmon of all ages returning from ocean feeding grounds to spawn in any given year.

[b] Total Nushagak District commercial harvest.

[c] Includes Nushagak Bay and Igushik.

[d] Sport harvest total for 1989–1996 is 50% of the Nushagak River system sport harvest. Sport harvest total for 1997–2009 is Nushagak River sport harvest from Black Point to sonar.

[e] Includes Ekwok area, Iowithla River, Klutuk River, Koliganek area, New Stuyahok area, Portage Creek area, Kokwok area, Mulchatna River, and an unknown Nushagak River watershed site.

[f] Sport harvest total for 1989–1996 is 50% of the Nushagak River system sport harvest plus the Mulchatna River system, Tikchik–Nuyakuk rivers, and Koktuli River sport harvests. Sport harvest total for 1997 to 2001 is 50% of the Nushagak River harvest plus the Black Point to Iowithla River, Nushagak River upstream of Iowithla River, Mulchatna River system, Tikchik–Nuyakuk rivers and the Koktuli River harvests. Sport harvest total for 2002–2011 is Nushagak River excluding Black Point to sonar.

[g] Sonar estimates for 1989–1996, and 1998–2017 are sonar estimates minus subsistence and sport harvest above sonar.

Chinook salmon escapement into the Nushagak and Mulchatna rivers was estimated by aerial surveys beginning in 1967. Since 1987, sonar has been used to estimate the inriver run of Chinook salmon to the Nushagak River drainage. The sonar is considered an improvement over the aerial survey program because it gives a real-time estimate of escapement on which management decisions can be based.

Sonar counts of the Chinook salmon stocks in the Nushagak–Mulchatna drainage have been somewhat variable in recent years. The 2014 run was below average and did not achieve the inriver goal, but the 2013, 2015, 2016, and 2018 runs exceeded the inriver goal. The 2017 count indicated a below-average run; however, several inseason factors confounded the 2017 counts, including extremely low water levels and a record run of sockeye salmon. These factors, coupled with inseason catches and anecdotal information indicating an average return, resulted in ADF&G deciding to fly postseason aerial spawning ground surveys to get additional assessments of spawning escapement. Although the counts were incomplete and the total spawning escapement was not estimated, these aerial counts indicated that the escapement was near average and probably greater than the sonar indicated. Total runs of Nushagak–Mulchatna rivers Chinook salmon averaged 130,190 fish from 2013 through 2017, ranging from 95,091 to 163,268 fish (Table 10).

Total harvest by commercial, subsistence, and sport fisheries averaged 44,386 Chinook salmon from 2013 through 2017 (calculated from Table 10). The majority (58%) of the harvest was taken by the commercial fishery, 26% was taken by the subsistence fishery, and 16% by sport anglers. Sport harvest of Chinook salmon averaged 6,852 fish from 2013 through 2017 (calculated from Table 10).

Based on freshwater logbook data from 2007 through 2016, guided effort downstream of the Mulchatna River has varied from 3,920 angler-days in 2010 to 8,185 angler-days in 2005. From 2012 through 2016, effort averaged 7,165 angler-days (Table 2).

## Fishery Management and Objectives

Under the *Nushagak and Mulchatna King Salmon Management Plan* (5 AAC 06.361, adopted January 1992 and amended 5 times), Chinook salmon are managed to attain an inriver run of 95,000 fish, which is expected to provide 55,000 to 120,000 spawning fish per year, a reasonable opportunity to harvest Chinook salmon in the inriver subsistence fishery, and a guideline harvest level in the sport fishery of 5,000 fish (Table 11). If the inriver run exceeds 95,000 Chinook salmon, then the guideline harvest level does not apply. If the inriver run falls below 95,000 Chinook salmon, then restrictive actions are required for the sport fishery and the directed Chinook salmon commercial fishery is closed. If the inriver run falls below 70,000 Chinook salmon, then additional restrictive actions are required for the sport fishery. If the inriver run falls below 55,000 Chinook salmon, the sport fishery is to be closed, and the sockeye salmon commercial fishery in the Nushagak District is closed until the projected sockeye salmon escapement into the Wood River exceeds 100,000 fish; the subsistence fishery may be restricted.

Table 11.–A chronology of significant regulation changes for the Nushagak and Mulchatna rivers.

| Effective year | Regulation |
|---|---|
| 1990 | Sport season established from January 1 to July 25 upstream of and including the Iowithla River. Spawning season closure adopted to afford drainagewide protection to spawning king salmon stocks. |
| 1992 | Gear restricted to single-hook artificial lures for the portion of the Mulchatna River between the Koktuli and Stuyahok rivers.<br>*Nushagak and Mulchatna King Salmon Management Plan* (5 AAC 06.361) is adopted, capping the sport harvest at 5,000 fish and establishing an escapement projection of 65,000 as the trigger for inseason restrictions in the sport fishery. |
| 1994 | *Nushagak and Mulchatna King Salmon Management Plan* (5 AAC 06.361) is amended, setting the sport allocation as a guideline harvest rather than a cap. |
| 1997 | *Nushagak and Mulchatna King Salmon Management Plan* (5 AAC 06.361) was amended, by establishing an escapement projection of 55,000 king salmon below which inseason restrictions in the sport fishery must be imposed. The 55,000 fish "trigger" was adopted when analysis showed this escapement level was not likely to show a difference in the expected productivity versus that expected at the 65,000 fish trigger. In addition, the 65,000 fish "trigger" had become quite disruptive to the sport fishery by precipitating frequent inseason restrictions.<br>The daily bag and possession limits were reduced to 2 king per day, only 1 over 28 inches. An annual harvest limit of 4 king salmon was adopted for the whole Nushagak–Mulchatna rivers drainage.<br>Guides were prohibited from retaining any species of fish while guiding (all Bristol Bay.)<br>The Kokwok River and the Nushagak River upstream from its confluence with Harris Creek were closed to angling for king salmon.<br>A July 31 spawning season closure was adopted for the Nushagak River drainage downstream from the Iowithla River outlet.<br>The commercial fishery was to be managed to allow pulses of king salmon to enter the Nushagak River untouched. |
| 2001 | The BOF amended the management plan to allow a catch-and-release fishery when the final inriver abundance is projected to be below 55,000 fish but above 40,000 fish. The amended plan also stipulates that when the king salmon sport fishery is restricted to catch-and-release or is closed for conservation, the use of bait must be prohibited.<br>A regulation allowing a daily bag limit of 10 king salmon less than 20 inches total length (508 mm TL) statewide, specifically excluded the Nushagak–Mulchatna river drainages until ADF&G could study the potential effects of the regulation on the spawning populations and the escapement goal.<br>As with most other Bristol Bay drainages, the Nushagak River drainage was included in the regulation prohibiting anglers from removing king salmon from the water if the fish were to be released. |
| 2003 | A daily bag and possession limit for king salmon under 20 inches of 5 per day is implemented on the Nushagak drainage. King salmon under 20 inches do not count toward the annual limit of 4 and are in addition to the bag limit for king salmon 20 inches or longer. The *Nushagak and Mulchatna King Salmon Management Plan* (5 AAC 06.361) was amended so that if inriver projections fall below 75,000, a bag limit of 1 per day, 1 in possession, no size limit, is imposed on the sport fishery. The seasonal limit would not be adjusted. |
| 2012 | The BOF adopted the following regulations: from May 1 to July 31, only 1 single-hook or single-hook lure may be used and the use of bait is allowed until an angler harvests a daily bag limit of king salmon 20 inches or greater in length, then that angler can only fish with 1 unbaited, single-hook or single-hook lure for the remainder of that day. Additionally, the numbers in the *Nushagak and Mulchatna King Salmon Management Plan* were updated to reflect counts from the new dual frequency identification sonar counter. |

*Note*: Chinook salmon are referred to as king salmon in the regulatory language.

Since 1972, smaller runs and increasing sport fishing effort have prompted restrictive actions on the inshore commercial and sport fisheries. To remain within the sport fishery guideline harvest level of 5,000 fish, the bag and possession limit is 2 Chinook salmon per day, of which only 1 may be longer than 28 inches in length (ADF&G 2009). Only 4 of the 5 Chinook salmon allowed in an angler's Bristol Bay annual harvest may come from the Nushagak–Mulchatna drainage. Additionally, in the Nushagak–Mulchatna drainage, there is a bag and possession limit of 5 per day for Chinook salmon under 20 inches. Chinook salmon under 20 inches do not count toward the annual limit of 4 and are in addition to the daily bag limit for Chinook salmon 20 inches or longer. Due to concerns over catch-and-release mortality, BOF adopted regulations in 2012 requiring anglers to use single hooks and, after harvesting a bag limit, to use only unbaited, single-hook, artificial lures for the remainder of that day.

Due to continued concerns regarding catch-and-release mortality of Chinook salmon caught in the Nushagak River sport fishery, SF began a 2-year study in 2017 estimating the 5-day survival of Chinook salmon caught and released on sport tackle in the lower Nushagak River. Preliminary results indicate that the 5-day mortality of catch-and-release Chinook salmon in the Nushagak River sport fishery is approximately 6.7% (Borden and Dye *In prep*).

Sport harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018).

### 2018 Season

Due to uncertainty with past estimates of escapement, there was no preseason forecast for the 2018 Nushagak–Mulchatna rivers Chinook salmon run. However, inriver escapement projections remained above the inriver goal throughout the entire season and, in accordance with the *Nushagak and Mulchatna King Salmon Management Plan*, no inseason restrictions were implemented on the sport fishery. The preliminary total estimate of Chinook salmon passing the sonar was 97,239 fish (Table 10). No directed Chinook salmon commercial fishing periods allowing large mesh gillnets occurred in the Nushagak District. A total of 35,243 Chinook salmon were harvested during commercial sockeye salmon fishery openings (Table 10). Harvest estimates for the sport and subsistence fisheries are not yet available, but anecdotal information suggests that average to above-average harvests occurred in both fisheries. By assuming that the sport harvest in 2018 was near the 2013–2017 average of approximately 6,852 fish and that an average subsistence harvest of approximately 11,789 fish occurred, the 2018 total run was probably about 151,000 Chinook salmon. This total is larger than the 2013–2017 average total run of 130,190 Chinook salmon (Table 10).

## TOGIAK RIVER

### Fishery Description

The Togiak River (Figure 3) is one of 3 major river systems within the Togiak National Wildlife Refuge. The Chinook salmon sport fishery on the Togiak River is concentrated along the lower 15 miles of the river and runs from late June through the month of July. The Togiak River supports the second largest Chinook salmon run in Bristol Bay, but its remote location, refuge regulations on guides, and ongoing friction between user groups have limited development of the fishery.

Based on SWHS estimates, the Chinook salmon sport harvest from 2013 through 2017 has ranged from a high of 2,166 in 2014 to a low of 787 in 2016 with an average of 1,139 fish from the Togiak River drainage (Table 12). From 2012 through 2017, angler effort for the Togiak River drainage peaked in 2012 with a high of 9,526 angler days; average effort for 2012–2016 was 5,616 angler-days (Table 1). During 2017, effort was 4,960 angler-days.

Based on freshwater logbook data from 2007 through 2016, guided angler-days have ranged from 873 in 2010 to 2,211 in 2007 with an average of 1,633 angler-days from 2012 through 2016 (Table 2).

## Fishery Management and Objectives

Escapement of Chinook salmon into the Togiak River has been estimated inconsistently by aerial survey from fixed-wing aircraft since 1980. Aerial counts are expanded to account for missed fish and therefore represent total escapement estimates. Due to budget constraints, aerial Chinook salmon counts were not conducted by SF from 2010 through 2018. In 2006, the escapement goal for Togiak River Chinook salmon became a sustainable escapement goal (SEG) of 9,300 fish; however, lacking annual escapement information, this goal was dropped in 2012.

Sport harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018). SF has conducted significant monitoring and stock assessment projects (Dunaway 1990b; Gryska and Naughton 2000).

In 1997, the BOF adopted several regulation changes that affected the Togiak Chinook salmon sport fishery. The May 1 through July 31 Chinook salmon sport fishery season was established by the BOF to protect spawning salmon. An annual limit of 5 Chinook salmon for sport anglers throughout Bristol Bay waters was adopted. In addition, guides were no longer allowed to harvest fish while guiding. These measures were designed to moderate the brief fishing season throughout the Bristol Bay drainage and to spread the harvest among more anglers. In 2012, the BOF reduced the area open to commercial fishing near the outlet of the Togiak River to minimize harvest of Chinook salmon.

## 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for Chinook salmon on the Togiak River was above average in 2018. Commercial harvest was 3,715, slightly above the 2013 through 2017 average of 2,950 (Table 12).

Table 12.–Escapement and commercial (Togiak Section only), subsistence, and sport harvests of Chinook salmon from the Togiak River, 1995–2018, including 1983–1994 average.

| | Harvest | | | | |
|---|---|---|---|---|---|
| Year | Commercial [a] | Subsistence [a] | Sport [b] | Total | Escapement [c] |
| 1995 | 10,768 | 448 | 581 | 11,797 | 12,600 |
| 1996 | 8,113 | 471 | 790 | 9,374 | 8,299 |
| 1997 | 5,357 | 667 | 1,165 | 7,189 | 10,300 |
| 1998 | 12,867 | 782 | 763 | 14,412 | 9,856 |
| 1999 | 10,830 | 1,244 | 644 | 12,718 | 9,520 |
| 2000 | 7,258 | 1,116 | 470 | 8,844 | 11,813 |
| 2001 | 9,518 | 1,612 | 1,006 | 12,136 | 13,110 |
| 2002 | 2,682 | 703 | 76 | 3,461 | 9,515 |
| 2003[e] | 3,078 | 1,208 | 706 | 4,992 | 3,050 [d] |
| 2004 | 7,673 | 1,094 | 1,388 | 10,155 | 12,324 |
| 2005 | 10,125 | 1,528 | 1,734 | 13,387 | 10,200 |
| 2006 | 15,078 | 1,630 | 1,064 | 17,772 | NA |
| 2007 | 7,142 | 1,234 | 1,501 | 9,877 | NA |
| 2008 | 2,891 | 1,337 | 892 | 5,120 | 2,140 [d] |
| 2009 | 4,429 | 827 | 606 | 5,862 | NA |
| 2010 | 5,160 | 1,162 | 591 | 6,913 | 10,096 |
| 2011 | 5,780 | 966 | 1,438 | 8,184 | 2,140 [d] |
| 2012 | 4,357 | 951 | 859 | 6,167 | 1,503 |
| 2013 | 2,458 | 691 | 900 | 4,049 | NA |
| 2014 | 1,477 | 919 | 2,166 | 4,562 | 3,994 |
| 2015 | 2,896 | 876 | 983 | 4,755 | 2,922 |
| 2016 | 3,562 | 949 | 787 | 5,298 | NA |
| 2017 | 4,660 | 949 | 978 | 6,587 | NA |
| Average | | | | | |
| 1983–1994 | 15,725 | 690 | 280 | 16,695 | 13,740 |
| 1995–2017 | 6,442 | 1,016 | 960 | 8,418 | 7,846 |
| 2013–2017 | 2,950 | 877 | 1,139 | 4,966 | 2,806 |
| Percent | | | | | |
| 1995–2017 | 77% | 12% | 11% | | |
| 2013–2017 | 59% | 18% | 23% | | |
| 2018 | 3,715 | NA | NA | NA | NA |

*Source*: Commercial and subsistence: Elison et al. (2018). Sport: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Howe et al. (1996).

[a] Sport harvest from Togiak River system.

[b] Togiak River drainage total estimated by aerial survey and expanded for missed fish.

[c] Aerial survey was incomplete; 3 sections of the mainstem and 2 tributaries were not surveyed.

# COHO SALMON FISHERIES

## AREAWIDE FISHERY DESCRIPTION

Coho salmon are a very popular component of the Bristol Bay sport fishery. Coho salmon fisheries occur from late July through September with some isolated runs of fish available into October. While many BBMA anglers pursue coho salmon with the assistance of a guide, this

readily caught species is quite popular with unguided anglers. Given the run timing, this species often serves as a popular activity for hunters and rainbow trout anglers visiting the area. Significant fisheries occur in the Alagnak, Egegik, Mulchatna, Naknek, Nushagak, Togiak, and Ugashik rivers, as well as a host of smaller, lesser known waters (Figure 4).

The Bristol Bay commercial fishery generally takes the majority of the area's annual coho salmon harvest. Since 1997, the annual commercial harvest ranged from 8,410 to 287,292 coho salmon with an average of 82,014 fish harvested annually (Elison et al. 2018). Subsistence harvests from 1997 through 2016 averaged over 6,900 coho salmon annually (Elison et al. 2018). From 2012 through 2016, the annual estimated sport harvest averaged 16,436 coho salmon and peaked at 20,699 fish in 2014 (Table 13). In 2017, anglers harvested 19,794 fish (Table 13).

## AREAWIDE MANAGEMENT AND OBJECTIVES

Except for the Kvichak River drainage, where the limit is 2 coho salmon per day, and the Alagnak River drainage, where the limit is 3 per day, the limits for coho salmon are 5 salmon per day with no size limit. The 5-per-day limit has been in effect since 1972. The lower limits for the Kvichak and Alagnak river drainages were adopted during the 1997 BOF meetings (first effective in the 1998 season) to protect the small runs in the Kvichak River system and to address modest runs and large angling effort on the Alagnak River. The lack of escapement data to establish escapement goals and harvest strategies for all user groups continues to be a concern.

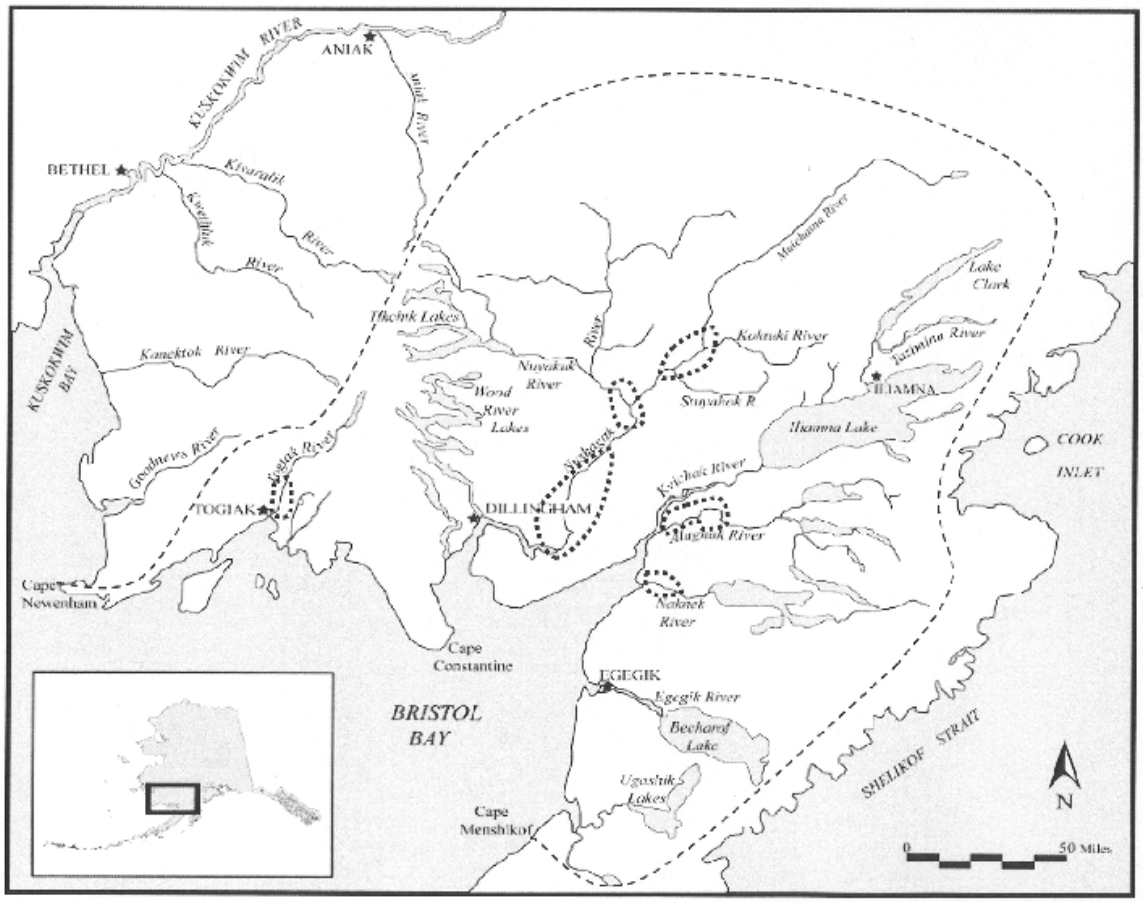


Figure 4.–Popular coho salmon sport fisheries (delineated with dark square dots) in the Bristol Bay Management Area.

Table 13.–Sport harvest of coho salmon from the waters of the BBMA by fishery, 2004–2017, including the 1977–2003 average.

| Section and drainage | Avg. 1977–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Naknek R. | 2,618 | 7,333 | 2,714 | 4,015 | 4,218 | 5,830 | 4,325 | 4,970 | 2,879 | 3,239 | 2,987 | 6,026 | 3,942 | 3,346 | 3,908 | 5,521 |
| Brooks R. | 60 | 275 | 0 | 49 | 53 | 118 | 72 | 57 | 0 | 0 | 0 | 13 | 0 | 0 | 3 | 102 |
| Kvichak R. | 263 | 594 | 1,186 | 700 | 588 | 1,070 | 839 | 1,031 | 1,212 | 1,300 | 715 | 235 | 485 | 632 | 673 | 385 |
| Copper R. | 26 | 0 | 0 | 0 | 138 | 48 | 105 | 16 | 36 | 0 | 0 | 64 | 128 | 0 | 38 | 0 |
| Alagnak R. | 512 | 1,550 | 756 | 1,466 | 493 | 1,022 | 785 | 764 | 819 | 892 | 1,030 | 1,754 | 660 | 741 | 1,015 | 2,034 |
| Newhalen R. | 229 | 366 | 0 | 0 | 58 | 54 | 0 | 32 | 0 | 0 | 115 | 0 | 148 | 127 | 78 | 80 |
| Lake Clark | 30 | 65 | 0 | 0 | 0 | 77 | 0 | 0 | 9 | 0 | 0 | 41 | 83 | 206 | 66 | 70 |
| Other | 1,108 | 994 | 2,763 | 2,115 | 1,470 | 1,438 | 1,224 | 1,726 | 2,494 | 2,959 | 848 | 3,051 | 2,315 | 2,588 | 2,352 | 4,570 |
| Subtotal [a] | 4,846 | 11,177 | 7,419 | 8,345 | 7,018 | 9,657 | 7,350 | 8,596 | 7,449 | 8,390 | 5,695 | 11,184 | 7,761 | 7,640 | 8,134 | 12,762 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 716 | 2,814 | 1,835 | 1,810 | 2,399 | 6,390 | 3,371 | 2,261 | 2,997 | 5,076 | 3,318 | 5,319 | 3,260 | 2,529 | 3,900 | 1,420 |
| Mulchatna R. | 191 | 181 | 244 | 546 | 460 | 29 | 31 | 111 | 127 | 106 | 114 | 246 | 779 | 353 | 320 | 247 |
| Agulowak R. | 20 | 0 | 0 | 129 | 210 | 110 | 181 | 42 | 100 | 19 | 23 | 0 | 84 | 57 | 37 | 23 |
| Agulukpak R. | 11 | 52 | 0 | 61 | 38 | 0 | 0 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 11 | 243 |
| Wood River L. [b] | 444 | 799 | 857 | 628 | 752 | 182 | 636 | 378 | 1,038 | 482 | 1,479 | 410 | 1,242 | 754 | 873 | 12 |
| Tikchik–Nuyakuk | 106 | 418 | 0 | 36 | 48 | 77 | 76 | 448 | 46 | 0 | 0 | 20 | 24 | 0 | 9 | 500 |
| Other | 180 | 215 | 133 | 395 | 244 | 287 | 174 | 309 | 199 | 19 | 11 | 194 | 201 | 0 | 85 | 1,354 |
| Subtotal [a] | 1,090 | 4,479 | 3,069 | 3,605 | 4,151 | 7,075 | 4,469 | 3,549 | 4,507 | 5,702 | 5,002 | 6,189 | 5,590 | 3,693 | 5,235 | 3,799 |
| Western | | | | | | | | | | | | | | | | |
| Togiak R. | 739 | 2,321 | 1,959 | 2,214 | 1,970 | 3,420 | 1,556 | 772 | 1,232 | 2,506 | 1,534 | 3,319 | 4,653 | 2,719 | 2,946 | 2,985 |
| Other | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 347 | 124 | 149 | 7 | 141 | 183 | 121 | 248 |
| Subtotal [a] | 769 | 2,321 | 1,959 | 2,214 | 1,970 | 3,420 | 1,556 | 772 | 1,579 | 2,630 | 1,683 | 3,326 | 4,794 | 2,902 | 3,067 | 3,233 |
| Total | 6,705 | 17,977 | 12,447 | 14,164 | 13,139 | 20,152 | 13,375 | 12,917 | 13,535 | 16,722 | 12,380 | 20,699 | 18,145 | 14,235 | 16,436 | 19,794 |

*Source*: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

## UGASHIK RIVER DRAINAGE

### Fishery Description

The Ugashik River drainage (Figure 4) is located on the Alaska Peninsula about 128 km south of the community of King Salmon. Much of the drainage is within the boundaries of the Alaska Peninsula National Wildlife Refuge. The local population center of Pilot Point, at the outlet of the Ugashik River, has a long history of a commercial fishing and a subsistence-based economy. The drainage is well known for producing some of the biggest Arctic grayling in Alaska, as well as providing good angling for sockeye and coho salmon, and Dolly Varden and Arctic char. The Ugashik Lakes area is accessible only by float plane or by boat from the village of Ugashik and Pilot Point, 40 km downstream from the Lower Ugashik Lake outlet. Most angler effort is nonresident guided anglers who access the river by flying out from nearby area lodges for day-fishing trips.

Coho salmon angling is popular in the drainage from mid-August through early September and combines well with anglers seeking a mixed bag of Dolly Varden, Arctic char, and Arctic grayling. Available information suggests peak coho salmon run timing to the Ugashik drainage occurs in late August. The most popular fishing sites are the "Narrows," a short stream connecting upper and lower Ugashik Lake, the outlet of lower Ugashik Lake, and the outlets of larger streams where they flow into the big lakes.

The Ugashik River drainage has historically been a popular destination for coho salmon anglers from lodges in Bristol Bay; however, recent angling effort in the drainage has decreased from over 2,000 angler-days during 1999–2001 to a 2013–2017 average of 1,106 angler-days (Table 14). The sport harvest of coho salmon decreased from a high of 921 in 2005 to a 2013–2017 average of 338 fish (Table 14).

Based on freshwater logbook data from 2012 through 2016, the average estimated coho salmon harvest by guided anglers from 2012 through 2016 was 98 fish from the Ugashik River drainage, which includes the Ugashik, King Salmon, and Dog Salmon rivers (Table 4). Annual guided effort during the same period was close to the average of 314 angler-days (Table 2).

### Fishery Management and Objectives

Escapement of coho salmon in the Ugashik River drainage had been estimated with aerial surveys since 1981. Estimated escapement has ranged from 400 in 1991 to 20,100 in 2006; however, during many years the drainage survey was not completed due to poor weather and survey conditions (e.g., see Table 14). As a result, survey results are minimum estimates of escapement and do not provide a reliable index to assess Ugashik River drainage coho salmon escapement.

Sport harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018).

### 2018 Season

Estimates of sport fishery effort, catch, and harvest will not be available until 2019; however, reports from anglers during the 2018 season indicated an average coho salmon return. An aerial survey was not conducted to assess coho salmon escapement.

Table 14.–Angler effort and coho salmon harvest plus escapement for the Ugashik River drainage, 1995–2018, with 1977–1994 average.

| | | Harvest | | | | |
|---|---|---|---|---|---|---|
| Year | Effort [a] | Sport [a] | Commercial | Subsistence | Total | Escapement |
| 1995 | 905 | 346 | 13,800 | 290 | 14,436 | NA |
| 1996 | 2,098 | 392 | 13,163 | 298 | 13,853 | 8,275 |
| 1997 | 2,551 | 631 | 7,156 | 311 | 8,098 | 9,400 |
| 1998 | 1,534 | 223 | 13,007 | 485 | 13,715 | 1,459 |
| 1999 | 2,008 | 830 | 2,289 | 271 | 3,390 | 10,210 |
| 2000 | 2,403 | 513 | 1,269 | 467 | 2,249 | 12,070 |
| 2001 | 2,471 | 690 | 976 | 357 | 2,023 | 4,540 |
| 2002 | 1,350 | 724 | 464 | 460 | 1,648 | 3,805 |
| 2003 | 1,317 | 529 | 994 | 392 | 1,915 | 19,670 |
| 2004 | 1,017 | 408 | 4,744 | 234 | 5,386 | 5,440 |
| 2005 | 882 | 921 | 8,162 | 249 | 9,332 | 9,850 |
| 2006 | 541 | 571 | 3,087 | 339 | 3,997 | 20,100 |
| 2007 | 1,393 | 336 | 1,954 | 281 | 2,571 | 3,500 |
| 2008 | 615 | 74 | 2,220 | 222 | 2,516 | 6,240 |
| 2009 | 868 | 233 | 2,602 | 131 | 2,966 | NA |
| 2010 | 1,390 | 251 | 407 | 135 | 793 | NA |
| 2011 | 1,844 | 72 | 84 | 136 | 292 | 4,900 |
| 2012 | 1,756 | 116 | 0 | 228 | 344 | NA |
| 2013 | 1,471 | 411 | 479 | 106 | 996 | NA |
| 2014 | 1,019 | 604 | 435 | 147 | 1,186 | NA |
| 2015 | 887 | 271 | 2,533 | 217 | 3,021 | NA |
| 2016 | 1,169 | 156 | 171 | 199 | 526 | NA |
| 2017 | 984 | 249 | 7 | 199 | 455 | NA |
| Average | | | | | | |
| 1977–1994 | 1,278 | 243 | 28,952 | 342 | 29,537 | 9,907 |
| 1995–2017 | 1,412 | 415 | 3,478 | 268 | 4,161 | 8,533 |
| 2013–2017 | 1,106 | 338 | 725 | 174 | 1,237 | NA |
| Percent | | | | | | |
| 1995–2017 | | 1% | 98% | 1% | | |
| 2013–2017 | | 27% | 59% | 14% | | |
| 2018 | NA | NA | 0 | NA | NA | NA |

*Source*: Effort and sport harvest: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996). Commercial and subsistence harvests: Elison et al. (2018). Escapement: estimates from ADF&G-Division of Commercial Fisheries Salmon Spawning Ground Surveys in the Bristol Bay, Alaska.

*Note*: "NA" means data not available.

[a] Counts may be variable due to timing, conditions, etc. Escapement estimates were not made in 1995, 2009–2010, and 2012–2018 due to poor survey conditions.

## NAKNEK RIVER

### Fishery Description

The Naknek River coho salmon sport fishery (Figure 4) occurs in late July and continues well into September. The peak fishing period is normally from August 7 to August 21. Effort is concentrated along a 12-mile stretch of the Naknek River adjacent to the community of King Salmon, but significant and possibly increasing effort occurs upstream from Rapids Camp to Lake Camp. This fishery is the most popular coho salmon fishery in the area and provides significant recreational opportunity and economic benefit for the community of King Salmon. Most anglers in the coho salmon fishery are unguided and are not Alaskan residents (Gryska and Naughton 2001).

Harvests of coho salmon by the sport fishery averaged 3,815 fish during 2013–2017 (Table 15). Sport harvests of coho salmon from the Naknek River since 2008 have ranged from a high of 6,026 coho salmon in 2014 to a low of 2,879 in 2011 (Table 15).

Based on freshwater logbook data from 2007 through 2016, guided effort has remained close to the recent 5-year average of 3,854 angler-days (2012–2016; Table 2).

In recent years, the fall commercial fishery has not been active and its impact on coho salmon has been modest to nonexistent. Most of the commercial take is incidental to the sockeye salmon fishery. Subsistence harvests of coho salmon have varied since 2008, reaching a low of 399 in 2013 and increasing to 1,100 in 2017 (Table 15).

### Fishery Management and Objectives

No biological escapement goal (BEG) has been established for Naknek River coho salmon stocks. Because of the lack of escapement information, it is impossible to assess fishery impacts on the total run. In addition, the commercial harvest occurs on stocks returning to 3 different major rivers, further confounding ADF&G's ability to calculate the spawner-return relationships needed to develop an escapement goal.

Sport harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018). SF has conducted significant monitoring and stock assessment projects in the recent past (Minard and Brookover III 1988b; Minard 1989a; Coggins 1992; Dunaway and Fleischman 1996a; Gryska and Naughton 2001).

The present bag and possession limits for coho salmon on the Naknek River are 5 fish per day with no size limit; the same limits have been in effect since 1972. No adjustments to the Naknek River coho salmon fishery bag and possession limits have occurred by inseason emergency order since 1999. In 1999, the coho salmon runs were so poor throughout Bristol Bay that the coho salmon sport fishery was restricted by emergency order to 1 coho salmon per day beginning on August 23.

Management concerns for this fishery include the lack of escapement data and the lack of a management goal or target for this fishery. Without a clearer management target, justification for adjusting fishing time in the various fisheries is tenuous.

## 2018 Season

Sport fishing effort, catch, and harvest will not be available until 2019; however, reports from anglers during the 2018 season indicated an average to above-average coho salmon run. Harvest in the commercial fishery was 6,503 fish (Table 15). No aerial escapement survey was conducted during 2018.

Table 15.–Coho salmon commercial, subsistence, and sport harvests from the Naknek River, 1995–2018, with the 1971–1994 average.

| | Harvest | | | |
|---|---|---|---|---|
| Year | Commercial | Subsistence | Sport | Total |
| 1995 | 981 | 1,791 | 1,788 | 4,560 |
| 1996 | 3,601 | 1,482 | 4,754 | 9,837 |
| 1997 | 718 | 1,457 | 3,879 | 6,054 |
| 1998 | 1,587 | 1,592 | 2,547 | 5,726 |
| 1999 | 303 | 856 | 3,672 | 4,831 |
| 2000 | 952 | 937 | 3,549 | 5,438 |
| 2001 | 3 | 740 | 4,795 | 5,538 |
| 2002 | 0 | 943 | 4,756 | 5,699 |
| 2003 | 42 | 812 | 6,393 | 7,247 |
| 2004 | 2,142 | 566 | 7,333 | 10,041 |
| 2005 | 3,314 | 1,224 | 2,714 | 7,252 |
| 2006 | 5,163 | 720 | 4,015 | 9,898 |
| 2007 | 2,180 | 1,104 | 4,218 | 7,502 |
| 2008 | 7,059 | 1,437 | 5,830 | 14,326 |
| 2009 | 732 | 669 | 4,325 | 5,726 |
| 2010 | 901 | 645 | 4,970 | 6,516 |
| 2011 | 633 | 690 | 2,879 | 4,202 |
| 2012 | 431 | 485 | 3,239 | 4,155 |
| 2013 | 467 | 399 | 2,987 | 3,853 |
| 2014 | 646 | 578 | 6,026 | 7,250 |
| 2015 | 1,253 | 796 | 3,942 | 5,991 |
| 2016 | 1,110 | 609 | 3,346 | 5,065 |
| 2017 | 4,754 | 1,100 | 5,521 | 11,375 |
| Average | | | | |
| 1971–1994 | 7,634 | 844 | 1,781 | 12,830 |
| 1995–2017 | 1,694 | 941 | 4,238 | 6,873 |
| 2013–2017 | 686 | 590 | 3,815 | 5,090 |
| Percent | | | | |
| 1995–2017 | 25% | 14% | 62% | |
| 2013–2017 | 13% | 12% | 75% | |
| 2018 | 6,503 | NA | NA | NA |

*Source*: Commercial and subsistence: Elison et al. (2018). Sport: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Howe et al. (1996).

## NUSHAGAK–MULCHATNA DRAINAGE

### Fishery Description

The Nushagak–Mulchatna river drainages (Figure 4) produce the largest runs of coho salmon in Bristol Bay. Within the drainage, there are 4 areas of concentrated sport fishing effort: the lower 15 miles of the Nushagak River near the village of Portage Creek, the middle section of the Nushagak River near the village of Ekwok, the section of the Mulchatna River between the Stuyahok and Koktuli rivers, and the upper Nushagak River from the outlet of Nuyakuk River upstream to the outlet of the King Salmon River (Figure 4). Of the areas mentioned above, the lower portion of the Nushagak River and the fishery in the immediate vicinity of the Nuyakuk River outlet have long been the most significant. Although sport fishing for coho salmon occurs in some of the tributaries of the drainage, the overall harvest is considered slight. The lower Nushagak River provides fishing opportunity for early coho salmon in late July and early August when other coho salmon fisheries have not yet begun. Increased guided rainbow trout angling as well as caribou hunting in the upper Nushagak River area may contribute to increased coho salmon angling in this remote portion of the drainage. Combination hunting and fishing (coho salmon, rainbow trout) float trips have been popular for years in the Mulchatna River drainage.

Most recently (2013–2017), sport fishing harvest has averaged 3,046 fish or 2% of the total harvest of Nushagak–Mulchatna coho salmon (Table 16). Commercial harvest accounted for 93% and subsistence 5% of the total annual harvest for the same period. Subsistence harvest has varied between 2,600 and 7,700 fish since 1995. At current levels, the coho salmon sport fishery has little impact on the overall productivity of Nushagak–Mulchatna rivers coho salmon stocks.

Based on freshwater logbook data from 2007 through 2016, guided effort downstream of the Mulchatna River has varied from 3,920 angler-days in 2010 to 8,185 angler-days in 2007. From 2012 through 2016, total effort averaged 7,165 angler-days (Table 2).

### Fishery Management and Objectives

There are currently no conservation concerns for Nushagak River coho salmon stocks. Since 1995, the 60,000–120,000 fish escapement goal was achieved in 9 of those years, although the sonar did not operate during the coho salmon run in 11 of those years due to budget shortfalls (Table 16). In the past, significant restrictions have been placed on all fisheries, including closure of the subsistence fishery, to reduce exploitation on this stock in poor years (e.g., in 1999, when the inriver sonar estimate was the lowest on record since 1987; Table 16). Recent runs have been well above average and the inriver and escapement goals have been exceeded. Current management of Nushagak–Mulchatna rivers coho salmon is governed by 5 AAC 06.368 *Nushagak River Coho Salmon Management Plan*, adopted by the BOF in December 1995. The plan calls for managing the commercial fishery for an inriver run of 70,000–130,000 coho salmon, providing a spawning escapement of 60,000–120,000 fish, a reasonable opportunity in the subsistence fishery, and a 2,000-fish guideline harvest in the sport fishery. The plan addresses management actions to take if the inriver run falls short of the goal. If the inriver run falls below 95,000 fish, then ADF&G may implement restrictions on the sport fishery to maintain the sport harvest below 2,000 fish. If the inriver run is less than 70,000 fish, then closure of the sport fishery is required. Along with sport fishery management actions, the plan directs ADF&G to take actions in the commercial and subsistence fisheries; all fisheries must close when the inriver run falls below 60,000 coho salmon.

Table 16.–Coho salmon commercial, subsistence, and sport harvest, plus inriver abundance for the Nushagak River drainage, 1995–2018 with the 1980–1994 average.

| Year | Commercial harvest [a] | Subsistence harvest | Sport harvest | Inriver abundance estimate [b] | Estimated spawning escapement |
|---|---|---|---|---|---|
| 1995 | 4,181 | 3,905 | 725 | 53,510 | 51,519 |
| 1996 | 11,401 | 5,217 | 3,488 | 235,007 | 231,264 |
| 1997 | 4,110 | 3,433 | 500 | 46,243 | 44,552 |
| 1998 | 22,703 | 5,316 | 1,368 | 127,199 | 124,325 |
| 1999 | 2,836 | 3,993 | 618 | 38,697 | 36,714 |
| 2000 | 112,852 | 5,983 | 2,219 | 219,328 | 215,801 |
| 2001 | 3,218 | 5,993 | 2,113 | 86,822 | 83,337 |
| 2002 | 93 | 4,565 | 1,415 | 53,775 | 51,204 |
| 2003 | 583 | 5,432 | 917 | NA | NA |
| 2004 | 47,706 | 4,240 | 2,814 | 152,613 | 149,580 |
| 2005 | 42,456 | 5,596 | 1,835 | NA | NA |
| 2006 | 44,385 | 3,590 | 1,810 | NA | NA |
| 2007 | 29,578 | 3,050 | 2,399 | NA | NA |
| 2008 | 76,932 | 5,133 | 6,390 | NA | NA |
| 2009 | 35,171 | 6,777 | 3,222 | NA | NA |
| 2010 | 72,909 | 2,983 | 2,261 | NA | NA |
| 2011 | 4,712 | 5,746 | 2,997 | NA | NA |
| 2012 | 97,382 | 2,642 | 3,208 | 329,946 | 327,431 |
| 2013 | 124,182 | 7,717 | 2,700 | 200,718 | 196,239 |
| 2014 | 242,604 | 7,463 | 5,319 | 483,219 | 477,723 |
| 2015 | 6,614 | 5,644 | 3,260 | NA | NA |
| 2016 | 79,538 | 4,219 | 2,529 | NA | NA |
| 2017 | 167,347 | 5,732 | 1,420 | NA | NA |
| Average | | | | | |
| 1980–1994 | 93,901 | 6,411 | 808 | 101,753 | 98,649 |
| 1995–2017 | 53,630 | 4,973 | 2,414 | 168,923 | 165,807 |
| 2013–2017 | 124,057 | 6,155 | 3,046 | 341,969 | 336,981 |
| Percent | | | | | |
| 1995–2017 | 88% | 8% | 4% | | |
| 2013–2017 | 93% | 5% | 2% | | |
| 2018 | 74,317 | NA | NA | 111,245 | NA |

*Source:* Commercial and subsistence harvest: Elison et al. (2018). Sport: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1981b, 1982-1994) and Howe et al. (1995, 1996).

*Note*: "NA" means data not available.

[a] Total Nushagak District commercial harvest.

[b] Inriver abundance estimated by sonar counter at Portage Creek.

Sport harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018). Inriver abundance of coho salmon in the Nushagak River is estimated by side-scan sonar operated near the village of Portage Creek. Sport and subsistence harvests are assumed to occur above the sonar site; therefore, estimated spawning escapement is equal to the sonar count minus sport and subsistence harvests.

From 1984 through 1992, Nushagak River coho salmon stocks were managed to achieve a biological escapement goal (BEG) of 150,000 fish, estimated by sonar at Portage Creek. However, spawning escapements during that period consistently fell short of the goal, averaging 85,020 fish. Subsequent spawner–recruit analysis suggested the 150,000 fish goal was higher than necessary to manage for maximum sustained yield. ADF&G used new spawner–recruit data to reduce the BEG to 90,000 spawners in 1992. The present bag and possession limits for coho salmon on the Nushagak–Mulchatna drainage are 5 fish per day with no size limit[6]. That is the same limit which has been in effect since 1972 for most of the region.

### 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported good sport fishing. Inriver escapement projections remained above the inriver goal throughout the entire season and, in accordance with the *Nushagak and Mulchatna Coho Salmon Management Plan*, no inseason restrictions were implemented on the sport fishery. The preliminary inriver abundance estimate of coho salmon passing the sonar was 111,245 (Table 16). The commercial harvest was 74,317 fish (Table 16).

## TOGIAK RIVER

### Fishery Description

The bulk of the Togiak River coho salmon fishery occurs in the lower 20 miles of the Togiak River (Figure 4) below the Wilderness boundary of the Togiak National Wildlife Refuge. The sport fishery occurs from early August to the middle of September. The best angling usually occurs between August 21 and September 7 when coho salmon enter in the greatest abundance. Angler effort is largely nonresident guided anglers who access the river by flying out from nearby lodges to fish for the day. In addition, there are 2 river-based lodges that cater to nonresident anglers, one of which is owned by the local native corporation in Togiak and leased to a concession group.

Sport harvest of coho salmon from the Togiak River averaged 2,649 fish annually from 2013 through 2017, or about 12% of the total Togiak River coho salmon harvest (Table 17). Annual sport harvest peaked in 2015 at 4,653 fish. A high degree of voluntary catch-and-release angling has been documented for this fishery and ranges up to 60% of the catch (Gryska and Naughton 2000). Given previous studies (Vincent-Lang et al. 1993), concern over hook-induced mortality prompted staff to evaluate the potential catch-and-release mortality in this fishery. ADF&G concluded that although the released proportion of the catch was large, the total number of fish caught is small relative to total run size. Therefore, catch-and-release is believed to affect only a

[6] Southwest Alaska sport fishing regulations summary, 2018 (effective until the 2019 summary is issued) Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

small proportion of fish and is expected to have only a minor impact on the overall abundance of the stocks. In addition, Vincent-Lang et al. (1993) and Stuby (2002) have demonstrated that the mortality of released coho salmon is low when catches are made above the intertidal area, as is the case for much of the Togiak River fishery.

Table 17.–Coho salmon commercial, subsistence, and sport harvest plus escapement for the Togiak River, 1995–2018, with the 1977–1994 average.

| | Harvest | | | | | |
|---|---|---|---|---|---|---|
| Year | Commercial | Subsistence | Sport | Total | Escapement [a] | Total run |
| 1995 | 8,871 | 703 | 408 | 9,982 | NA | NA |
| 1996 | 58,978 | 199 | 1,382 | 60,559 | 64,980 | 125,539 |
| 1997 | 2,970 | 260 | 780 | 4,010 | 20,625 | 24,635 |
| 1998 | 58,688 | 310 | 1,020 | 60,018 | 25,335 | 85,353 |
| 1999 | 2,653 | 217 | 1,109 | 3,979 | 3,855 | NA |
| 2000 | 2,758 | 342 | 840 | 3,940 | NA | NA |
| 2001 | 284 | 388 | 1,004 | 1,676 | NA | NA |
| 2002 | 754 | 241 | 1,475 | 2,470 | NA | NA |
| 2003 | 1,047 | 883 | 2,086 | 4,016 | NA | NA |
| 2004 | 15,463 | 204 | 2,321 | 17,988 | NA | NA |
| 2005 | 8 | 295 | 1,959 | 2,262 | NA | NA |
| 2006 | 449 | 408 | 2,214 | 3,071 | NA | NA |
| 2007 | 157 | 110 | 1,970 | 2,237 | NA | NA |
| 2008 | 1,159 | 541 | 3,420 | 5,120 | NA | NA |
| 2009 | 9,209 | 272 | 1,556 | 11,037 | NA | NA |
| 2010 | 24,065 | 514 | 772 | 25,351 | NA | NA |
| 2011 | 7,605 | 545 | 1,232 | 9,382 | NA | NA |
| 2012 | 15,977 | 293 | 2,506 | 18,776 | NA | NA |
| 2013 | 11,420 | 208 | 1,534 | 13,162 | NA | NA |
| 2014 | 32,134 | 486 | 3,319 | 35,939 | NA | NA |
| 2015 | 26,080 | 650 | 4,653 | 31,383 | NA | NA |
| 2016 | 9,346 | 283 | 2,719 | 12,348 | NA | NA |
| 2017 | 54,503 | 900 | 2,985 | 58,388 | NA | NA |
| Average | | | | | | |
| 1977–1994 | 37,484 | 1,233 | 543 | 39,260 | 42,045 | 83,752 |
| 1995–2017 | 14,282 | 425 | 1,887 | 16,595 | 22,965 | 64,580 |
| 2013–2017 | 18,643 | 436 | 2,649 | 21,728 | NA | NA |
| Percent | | | | | | |
| 1995–2017 | 86% | 3% | 11% | | | |
| 2013–2017 | 86% | 2% | 12% | | | |
| 2018 | 42,891 | NA | NA | NA | NA | NA |

*Source:* Commercial and subsistence harvest and escapement: Elison et al. (2018). Sport: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

*Note*: "NA" means data not available.

[a] Escapement estimates are based on fixed wing aerial surveys. Peak counts are expanded by a factor of 3 to account for missed fish. In 1985–1987, expansion factors were greater due to incomplete surveys or poor survey conditions.

Based on freshwater logbook data from 2007 through 2016, guided angler-days have ranged from 873 in 2010 to 2,211 in 2011 with an average of 1,633 angler-days from 2012 through 2016 (Table 2).

Since 1995, commercial catches in the Togiak Section have varied, ranging from a high of 58,978 fish in 1996 to a low of 8 in 2005. The annual average commercial harvest from 2013 through 2017 was 18,643 fish, accounting for 86% of the total Togiak coho salmon harvest (Table 17).

From 2013 through 2017, subsistence harvests were variable and ranged from 208 to 900 fish per year (Table 17).

## Fishery Management and Objectives

Currently, there is no escapement goal for Togiak River coho salmon due to a lack of annual escapement information. Coho salmon runs have been highly variable; weather frequently prohibits escapement assessment, and occasional illegal fishing with unknown harvest has confounded ADF&G's ability to consistently collect accurate run size information.

Sport fishery harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2015). SF conducted significant monitoring and stock assessment projects in 1984 and 1989 (Minard and Lisac 1984; Dunaway 1990b). A creel survey to estimate catch and harvest rates in the sport fishery was conducted in 1999 (Gryska and Naughton 2000). When weather and water conditions permit, CF estimates annual spawning escapement of Togiak River coho salmon by conducting aerial escapement index counts.

Since 1972, the bag and possession limits for coho salmon on the Togiak River have been 5 per day with no size limit[7]. For years when spawner escapements have been adequate (e.g., 1996) the current bag limit of 5 has been satisfactory, but in poor years, ADF&G has responded with emergency order restrictions to restrict the bag limit and reduce overall harvest. Prior to 1999, the limit was restricted 4 times in response to conservation concerns. There were no inseason restrictions placed on this fishery from 2013 through 2018.

## 2018 Season

Sport fishing effort, catch, and harvest will not be available until 2019. Anglers reported better than average sport fishing success throughout the season. No inseason restrictions were made and the sport fishery was allowed to proceed normally. Harvest in the commercial fishery was 42,891, well above the 2013–2017 average of 18,643 (Table 17). Aerial surveys were not conducted in 2019 (Tim Sands, Area Management Biologist, ADF&G CF, Dillingham, personal communication).

[7] Southwest Alaska sport fishing regulations summary, 2018 (effective until the 2019 summary is issued) Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

# SOCKEYE SALMON FISHERIES

Sockeye salmon is the most numerous of the Pacific salmon species to spawn in Bristol Bay, which is the world's largest producer of sockeye salmon. Their prized eating qualities make sockeye salmon the most popular species of salmon on the commercial market. Sockeye salmon are often indifferent to most fishing lures, making them difficult to catch. Since the late 1960s, however, anglers have discovered innovative ways to legally catch sockeye salmon with customary sport gear, and the species has rapidly gained favor as a hard-fighting and delectable game fish. The most popular fisheries exist in the Naknek and Kvichak river drainages, but effort is growing in other waters of the BBMA as well (Figure 5).

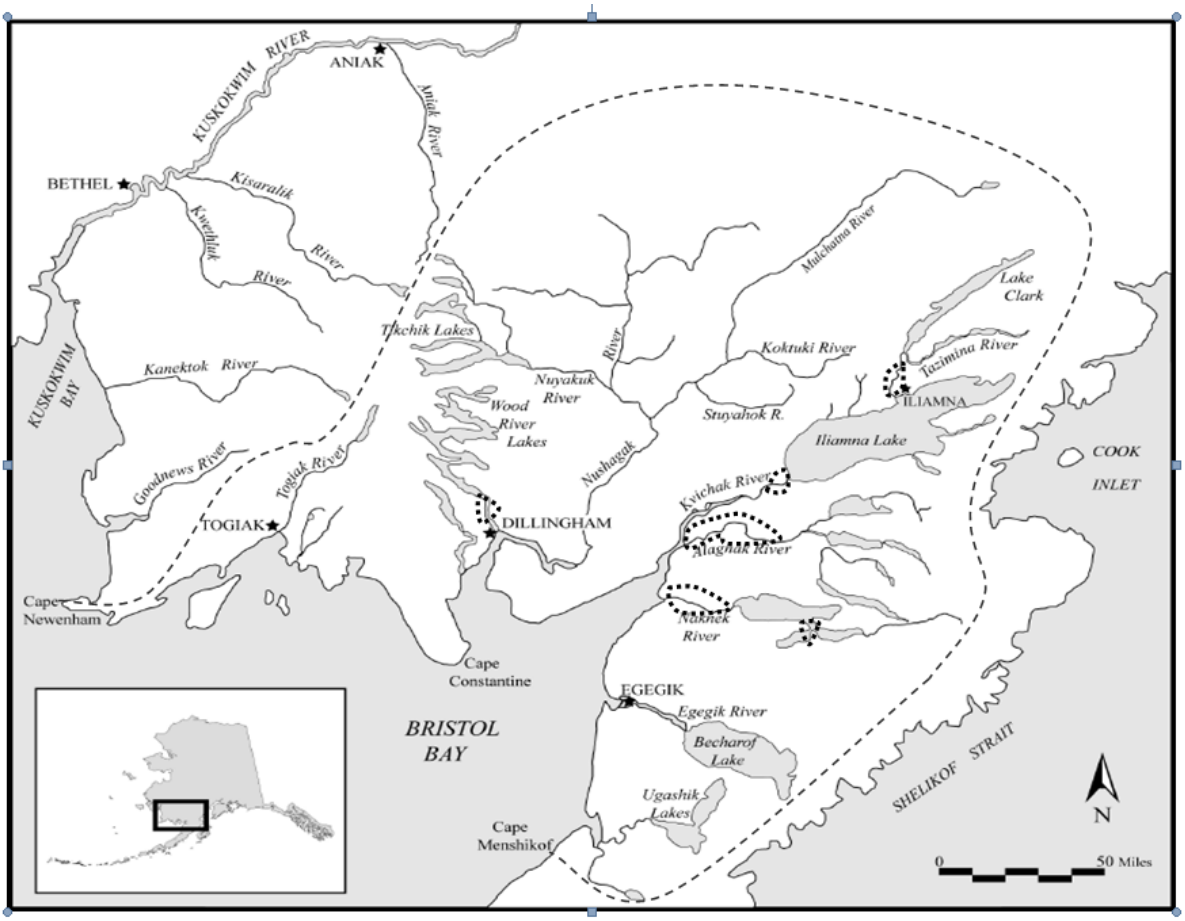


Figure 5.–Popular sockeye salmon sport fisheries (delineated with dark square dots) in the Bristol Bay Management Area.

Sport harvest of sockeye salmon in the BBMA has averaged 15,336 from 2012 through 2016 (Table 18) with an estimated peak of 18,837 fish taken in 2015 and a low of 13,218 fish in 2013. The most active sport fisheries occur in the Eastern section of the management area, where an average (2012–2016) of 13,040 fish or about 83% of the annual harvest was taken. The Central section fishery harvest has averaged 1,862 sockeye salmon per year and harvest in the Western section has averaged 434 fish annually (Table 18). Even at its highest levels, the sport harvest is less than 0.05% of the 2007 through 2016 average annual run of 40.3 million sockeye salmon (Elison et al. 2018). Subsistence fishermen have harvested approximately 0.2% of the annual sockeye salmon run from 2007 through 2016 (Elison et al. 2018).

Table 18.–Sport harvest of sockeye salmon by section for the BBMA, 2004–2017, with the 1977–2003 average.

| Section and drainage | Avg. 1977–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Naknek R. | 882 | 1,525 | 1,098 | 4,670 | 4,346 | 6,008 | 4,404 | 4,025 | 3,486 | 3,324 | 5,924 | 4,586 | 4,939 | 5,904 | 4,935 | 4,932 |
| Brooks R. | 429 | 996 | 133 | 415 | 61 | 353 | 238 | 311 | 263 | 584 | 23 | 411 | 93 | 241 | 270 | 39 |
| Kvichak R. | 1,633 | 2,210 | 2,431 | 927 | 873 | 2,777 | 2,711 | 2,628 | 2,100 | 1,689 | 1,244 | 2,427 | 1,947 | 2,997 | 2,061 | 2,634 |
| Copper R. | 380 | 73 | 97 | 158 | 225 | 195 | 201 | 229 | 258 | 517 | 123 | 657 | 277 | 180 | 351 | 277 |
| Alagnak R. | 711 | 2,121 | 3,340 | 3,346 | 2,101 | 2,849 | 2,070 | 1,553 | 2,082 | 2,770 | 611 | 1,032 | 2,821 | 2,134 | 1,874 | 3,575 |
| Newhalen R. | 4,019 | 2,741 | 1,528 | 2,085 | 1,886 | 1,039 | 2,662 | 753 | 920 | 772 | 2,182 | 559 | 4,598 | 734 | 1,769 | 6,024 |
| Lake Clark | 312 | 147 | 236 | 122 | 0 | 225 | 69 | 51 | 203 | 243 | 630 | 181 | 337 | 519 | 382 | 468 |
| Other | 1,878 | 813 | 166 | 1,778 | 1,837 | 2,690 | 2,034 | 1,861 | 2,811 | 2,028 | 1,204 | 1,188 | 1,474 | 1,095 | 1,398 | 389 |
| Subtotal [a] | 10,243 | 10,626 | 9,029 | 13,501 | 11,329 | 16,136 | 14,389 | 11,411 | 12,123 | 11,927 | 11,941 | 11,041 | 16,486 | 13,804 | 13,040 | 18,338 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 460 | 252 | 721 | 442 | 342 | 568 | 408 | 1,196 | 355 | 344 | 403 | 209 | 462 | 250 | 334 | 2,346 |
| Mulchatna R. | 300 | 67 | 355 | 134 | 580 | 65 | 107 | 30 | 302 | 164 | 445 | 446 | 497 | 150 | 340 | 211 |
| Agulowak R. | 251 | 22 | 618 | 689 | 171 | 250 | 234 | 1,498 | 166 | 702 | 91 | 317 | 424 | 192 | 345 | 545 |
| Agulukpak R. | 100 | 169 | 0 | 412 | 125 | 65 | 1,282 | 0 | 0 | 169 | 14 | 0 | 112 | 31 | 65 | 0 |
| Wood River L. [b] | 672 | 427 | 575 | 2,243 | 1,769 | 1,210 | 1,122 | 481 | 834 | 236 | 80 | 2,356 | 418 | 60 | 630 | 1,636 |
| Tikchik–Nuyakuk | 84 | 0 | 0 | 0 | 0 | 195 | 179 | 50 | 0 | 120 | 14 | 0 | 0 | 0 | 27 | 132 |
| Other | 189 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 143 | 11 | 111 | 94 | 0 | 386 | 120 | 0 |
| Subtotal [a] | 2,057 | 960 | 2,269 | 3,920 | 2,987 | 2,353 | 3,332 | 3,255 | 1,800 | 1,746 | 1,158 | 3,422 | 1,913 | 1,069 | 1,862 | 4,870 |
| Western | | | | | | | | | | | | | | | | |
| Togiak R. | 157 | 485 | 627 | 237 | 519 | 104 | 153 | 59 | 145 | 668 | 119 | 284 | 438 | 647 | 431 | 594 |
| Other | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 3 | 40 |
| Subtotal [a] | 161 | 485 | 627 | 237 | 519 | 104 | 153 | 59 | 145 | 668 | 119 | 284 | 438 | 662 | 434 | 634 |
| Total | 12,460 | 12,071 | 11,925 | 17,658 | 14,835 | 18,593 | 17,874 | 14,725 | 14,068 | 14,341 | 13,218 | 14,747 | 18,837 | 15,535 | 15,336 | 23,842 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

Sockeye salmon share the same bag and possession limits with all salmon except Chinook salmon: 5 salmon per day with no size limit. This regionwide limit has been in effect since 1972. ADF&G's ability to manage for sustained yield is essentially unaffected by the sport harvest of sockeye salmon. Several adjustments were made to the bag and possession limits in the 2017 and 2018 seasons in the form of emergency orders to liberalize bag limits in several drainages and one brief bag limit reduction in the Kvichak River that was subsequently rescinded. The emergency orders (2-RS-5-21-17, 2-RS-5-25-17, 2-RS-5-29-17, 2-RS-5-28-18, 2-RS-5-32-18, 2-RS-5-38-18, 2-RS-5-39-18, 2-RS-5-42-18, 2-RS-5-43-18) are outlined in "Emergency Orders Issued in 2016 through 2018" in the introduction. Sockeye salmon continue to play an important role in the development and expansion of the sport fishery in the BBMA.

## BROOKS RIVER

### Fishery Description

The Brooks River, which drains Brooks Lake into Naknek Lake (Figure 5), is a 2-mile long stretch of water located within the boundaries of Katmai National Park and Preserve. This river is cherished by some anglers because of its classic pool-and-riffle structure and excellent fishing opportunities. Brooks Camp, located on Naknek Lake, was established in 1960 by Northern Consolidated Airlines as primarily a sport fishing facility, but in recent years it has also become popular with tourists for hiking and bear viewing opportunities. Access to Brooks River and Brooks Camp is by float-equipped aircraft or boat. In addition to guest cabins, a campground facility is available for overnight visitors. At the lower end of Brooks River is a footbridge that allows visitors to cross between the south and north shores without wading. The sport fishery for sockeye salmon generally takes place below the bridge in the lower quarter mile of the river where it empties into Naknek Lake. The sockeye salmon fishery begins in late June when the first salmon arrive and peaks over the Fourth of July weekend. The sport fishery occupies waters also used by brown bears fishing for salmon. This overlap has caused management problems and conflicts for ADF&G and the National Park Service. At issue is the safety of visitors and priority in access for different groups (bear viewers, sport fishermen, hikers).

Since 2004, annual estimates of sport harvests of Brooks River sockeye salmon have ranged from a low of 23 in 2013 to a high of 996 in 2004 (Table 18). The recent 5-year (2012–2016) average annual harvest of 270 fish (Table 18) is easily sustained by this run, which is part of the Naknek escapement of about 1 million fish.

Based on freshwater logbook data from 2012 through 2016, guided effort has been slowly decreasing, with an average of 1,004 angler-days (Table 2).

### Fishery Management and Objectives

The abundance of sockeye salmon at Brooks River is a function of the escapement into the Naknek River. The Naknek River drainage escapement goal is 800,000 to 1.4 million sockeye salmon (Elison et al. 2015). The magnitude of the escapement is such that variations in inriver abundance have little effect on sport fishery performance in the Brooks River.

Sport fishery harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018). SF has not conducted any significant monitoring or stock assessment projects for this fishery in recent seasons. Forecasts of next season's run are provided by CF and

are reported in a statewide salmon forecast summary (Geiger and Hart 1999). Escapement of sockeye salmon in the Brooks River is estimated from fixed-wing aerial surveys during the presumed peak of spawning.

There has been a complicated history of regulations regarding this sport fishery. The current regulations are the result of the BOF overhauling the regulations in 1990 as part of the development of a rainbow trout management plan for the area. The regulation allowing catch-and-release fishing only for all species for the Brooks River from Brooks Lake downstream to the foot bridge was adopted during the fall of 1997 to address bear–human concerns raised by the National Park Service. From the bridge downstream to Naknek Lake, anglers may keep 1 fish per day and in possession except rainbow trout, which are managed for catch-and-release fishing for the entire river[8]. Anglers are restricted to single-hook artificial lures below the footbridge and unbaited single-hook artificial flies above the bridge. Over the years, significant restrictions to sport fishing have been made under the premise of ensuring the safety of sport anglers using the Brooks River. These concessions include reductions in bag limits from 5 sockeye salmon to 1, restrictions in terminal tackle to include single-hook artificial lures below the bridge, and the previously mentioned catch-and-release only, fly-fishing-only, above the bridge.

The Brooks River is managed to provide a diversity of angling opportunity by providing a special management area restricted to unbaited, single-hook, artificial flies.

### 2018 Season

In 2018, escapement of sockeye salmon into the Naknek River drainage totaled 2,221,152 exceeding the goal of 800,000 to 1.4 million fish. The large sockeye salmon escapement into the Naknek River system provided plenty of fish for anglers in the Brooks River and for anglers throughout the Naknek River drainage. No inseason restrictions were imposed on the sport fishery.

## KVICHAK RIVER

### Fishery Description

The Kvichak River drainage (Figure 5) hosts the single largest sockeye salmon run in the world and the river is a popular destination for anglers targeting this species. Two locations within the drainage support the biggest sport fisheries for sockeye salmon in Bristol Bay. The first is the fishery on the Kvichak River at the outlet of Lake Iliamna. The other, often larger, fishery occurs on the Newhalen River near the community of Iliamna. Smaller tributaries within the drainage are fished less intensively and sport harvests are relatively minor comparatively.

Sockeye salmon first appear in the Kvichak River during the last week of June. The run peaks in the first week of July, then declines steadily until late July or early August. In peak years, the sport fishery may be active for much of the month of July.

A modern airstrip and trail system in the village of Igiugig provides easy access to the river where it drains out of Lake Iliamna and floatplanes can land on the lake or on the river. Although much of the sport fishing effort is from nonresident guided anglers, a growing component is the resident unguided angler arriving from Anchorage in private, chartered, or scheduled aircraft.

[8] Alaska sport fishing regulations summary—Bristol Bay drainages (effective April 15, 2015 through April 14, 2016) Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

The Igiugig Native Corporation owns most of the uplands along the upper Kvichak River, and charges anglers modest daily fees for access. Commercial operators are charged more substantial fees for annual leases.

Historically, the Bristol Bay commercial salmon fleet harvests roughly half of the annual Kvichak River sockeye salmon run and until 1995, the subsistence fishery took an average of approximately 78,000 fish annually, or about 1% of the total run (Table 19). Since 1995, the annual subsistence harvest has averaged 45,261 fish.

Estimates of sockeye salmon sport harvest from the Kvichak River drainage since 1995 have ranged from 1,244 in 2013 to 15,023 in 1995 (Table 19). From 2012 through 2016, the annual sport harvest averaged 2,061 fish from Kvichak River alone (from Table 19). On average, the sport harvest accounts for less than 0.1% of the total harvest. From 2012 through 2016, average annual sport fishing effort was about 4,436 angler-days (effort is for all species, though anglers mainly fish for rainbow trout and sockeye salmon at the Kvichak River; Table 1). At such low levels, the sport fishery has little effect on ADF&G's ability to manage for sustained yield.

Based on freshwater logbook data from 2012 through 2016, guided effort averaged 1,464 angler-days (Table 2).

## Fishery Management and Objectives

Kvichak River sockeye salmon stocks are managed to achieve a sustainable escapement goal (SEG) range of 2 million to 10 million fish (Elison et al. 2018).

The sport fishery is managed with the *Kvichak Drainage Sockeye Salmon Management Plan* (5 AAC 67.025). This plan provides increased participation and opportunity and reduces potential conflicts between sport and subsistence users. Participation in this fishery could grow quickly by improving access to desirable fishing sites, promoting the fishery as a destination, and ensuring necessary facilities are provided to accommodate growth in a responsible manner. To this end, ADF&G has worked closely with the Igiugig City Council on a project to build trails to desirable fishing locations close to the village airfield. For example, a trail was completed from the village road system to a prime sockeye salmon fishing site along the Kvichak River in fall 2001.

Sport fishery harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/) Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018).

## 2018 Season

The 2018 sockeye salmon run to the Kvichak River achieved the minimum SEG of 2.0 million fish. Approximately 4.4 million sockeye salmon were counted at the Igiugig tower.

Although no estimate is available at this time, we expect the subsistence harvest to be within the normal historical range of 40,000 to 60,000 sockeye salmon.

Due to a variety of factors such as a large forecast, an inseason emergency order restricting the sport fishery (2-RS-5-32-18) but rescinded shortly after being issued (2-RS-5-38-18), and a late run, the number of anglers targeting sockeye salmon in the Iliamna drainage during 2018 is difficult to estimate at this time; however, it is anticipated that the sport fishery harvest will be similar to the recent 20-year average. Estimates of sport fishery effort, catch, and harvest will not be available until 2019.

Table 19.–Sockeye salmon harvests and escapements for the Kvichak River, 1995–2018, with the 1974–1994 average.

| | Harvest | | | | |
|---|---|---|---|---|---|
| Year | Commercial [a] | Subsistence [b] | Sport | Total | Escapement [d] |
| 1995 | 20,279,581 | 54,679 | 15,023 | 20,349,283 | 10,038,720 |
| 1996 | 8,215,028 | 54,872 | 6,078 | 8,275,978 | 1,450,578 |
| 1997 | 589,545 | 59,508 | 7,875 | 656,928 | 1,503,732 |
| 1998 | 2,596,490 | 53,656 | 13,119 | 2,663,265 | 2,296,074 |
| 1999 | 9,454,109 | 57,723 | 12,760 | 9,524,592 | 6,196,914 |
| 2000 | 4,728,095 | 36,990 | 8,479 | 4,773,564 | 1,827,780 |
| 2001 | 5,281,837 | 32,808 | 4,538 | 5,319,183 | 1,095,348 |
| 2002 | 1,419,630 | 33,001 | 2,256 | 1,454,887 | 703,884 |
| 2003 | 3,350,656 | 38,495 | 3,068 | 3,392,219 | 1,686,804 |
| 2004 | 4,716,715 | 53,225 | 5,098 | 4,775,038 | 5,500,134 |
| 2005 | 6,730,812 | 48,263 | 4,292 | 6,783,367 | 2,320,422 |
| 2006 | 7,151,741 | 49,850 | 4,398 | 7,205,989 | 3,068,226 |
| 2007 | 9,027,161 | 47,473 | 3,697 | 9,078,331 | 2,810,208 |
| 2008 | 10,385,172 | 49,563 | 9,274 | 10,444,009 | 2,757,912 |
| 2009 | 8,517,450 | 46,772 | 2,711 | 8,566,933 | 2,266,140 |
| 2010 | 10,861,016 | 40,688 | 2,628 | 10,904,332 | 4,207,410 |
| 2011 | 9,019,372 | 45,226 | 2,100 | 9,066,698 | 2,264,352 |
| 2012 | 10,152,917 | 52,370 | 1,689 | 10,206,976 | 4,164,444 |
| 2013 | 4,853,030 | 42,556 | 1,244 | 4,896,830 | 2,088,576 |
| 2014 | 13,791,053 | 45,522 | 2,423 | 13,838,998 | 4,458,540 |
| 2015 | 16,531,193 | 39,279 | 1,947 | 16,572,419 | 7,349,712 |
| 2016 | 13,466,245 | 30,649 | 2,997 | 13,499,891 | 4,462,728 |
| 2017 | 8,256,304 | 27,832 | 2,634 | 8,286,770 | 3,163,404 |
| Average | | | | | |
| 1974–1994 | 6,487,708 | 78,014 | 7,384 | 6,573,107 | 6,229,724 |
| 1995–2017 | 8,233,702 | 45,261 | 5,232 | 8,284,195 | 3,377,480 |
| 2013–2017 | 11,379,565 | 37,168 | 2,249 | 11,418,982 | 4,304,592 |
| Percent | | | | | |
| 1995–2017 | 99% | <1% | <1% | | |
| 2013–2017 | 100% | <1% | <1% | | |
| 2018 | 8,606,353 | NA | NA | NA | 4,398,708 |

*Source:* Commercial: 1997-2017, Elison et al (2018: Appendix A3), 1995–1996 Elison et al (2015: Appendix A3), 1974–1994 Browning and Miller (1995: Appendix 5). Subsistence: 1997-2017, Elison et al (2018: Appendix A3), 1995–1996, Elison et al (2015: Appendix A28), 1974-1994, Browning and Miller (1995: Appendix 40). Sport: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Howe et al. (1996). Escapement: 1997-2017, Elison et al (2018: Appendix A1), 1995–1996, Elison et al (2015: Appendix A1), 1974–1994 Browning and Miller (1995: Appendix Table 1).

[a] Estimated Kvichak River fish captured in Naknek–Kvichak District commercial fishery.

[b] Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates prior to 1991 are rounded to the nearest hundred fish. Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Kvichak District.

[c] Kvichak River sport harvest only.

[d] Tower counts conducted at Igiugig.

## NEWHALEN RIVER

### Fishery Description

The Newhalen River is the largest tributary in the Kvichak River drainage. It flows from Lake Clark into the north side of Lake Iliamna near the communities of Iliamna and Newhalen (Figure 5). Because it is farther inland, sockeye salmon reach the Newhalen River a few days later than the Kvichak River, and the best angling usually occurs during the middle 2 weeks of July.

The Newhalen River is more easily accessed than the Kvichak River and supports a large run of sockeye salmon. Several businesses and lodges in the town of Iliamna cater to anglers' needs, and a large runway serviced by regularly scheduled commercial airlines provides economical access from Anchorage. From the runway, a mile-long trail leads to the river. The trail ends near a series of cascades where large numbers of sockeye salmon congregate on their way to spawning grounds in the Lake Clark drainage. The sockeye salmon entering the Newhalen River are one segment of the large Kvichak River run. Hence, comments on the character of the commercial and subsistence harvests for the Kvichak River apply equally for the Newhalen River stocks. The sport fishery on the Newhalen River is unique in the BBMA due to the large component of unguided anglers and for its history of regularly producing up to 25% of the entire BBMA's annual sport harvest of sockeye salmon (Table 18). For the period 2012 through 2016, the annual sport harvest averaged 1,769 sockeye salmon (Table 18). ADF&G has not conducted any onsite studies of this fishery to evaluate angler catch and harvest distribution, angler demographics, or to conduct bag limit analysis.

Based on freshwater logbook data from 2012 through 2016, there has been some increase in guided effort with an average of 288 angler-days (Table 2).

### Fishery Management and Objectives

Newhalen River sockeye salmon escapement is addressed by achieving the biological escapement goal (BEG) for the Kvichak River.

Sport fishery harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Commercial and subsistence harvests are monitored by CF and are reported in the ADF&G Annual Management Report series (e.g., Elison et al. 2018). SF has not conducted any significant monitoring or stock assessment projects for this fishery. Escapement is estimated by counts made from towers at the village of Igiugig as the salmon migrate up the Kvichak River. Escapement distribution is assessed by aerial index surveys of drainage tributaries by CF.

### 2018 Season

The preceding segment on the Kvichak River sockeye salmon sport fishery thoroughly describes the 2018 season run. Sport fishing was reported as average to above-average throughout the season.

## CENTRAL SECTION SOCKEYE SALMON FISHERIES

About 15% of Bristol Bay sockeye salmon return to the Central Section. Anglers do not fish this section heavily for sockeye salmon, and sport harvests average 2,400 fish, or 14% of the area's total annual sport harvest (Table 18). Angler harvest of sockeye salmon from the Central Section

in 2017 totaled 4,870 fish and was the highest reported since 2006[9]. The stocks are generally abundant enough to be virtually unaffected by the sport harvest, and there is a lot of potential for this fishery to grow. The subsistence and sport harvests are each less than 1% of the run. The waters most commonly used by sport anglers are the Nushagak River, Mulchatna River, and the Wood River Lakes system.

# RAINBOW TROUT FISHERIES

## AREAWIDE FISHERY DESCRIPTION

Wild rainbow trout stocks are a cornerstone of the multimillion-dollar BBMA sport fishing industry. Sport fishing opportunity for both guided and unguided anglers occurs primarily during the ice-free season, generally from June through October, although fisheries in early and late winter are gaining some popularity. Found throughout the area, the most popular rainbow trout waters include tributaries of the Kvichak River drainage, the Naknek River drainage, portions of the Nushagak–Mulchatna drainage, and streams of the Wood River Lakes system (Figure 6).

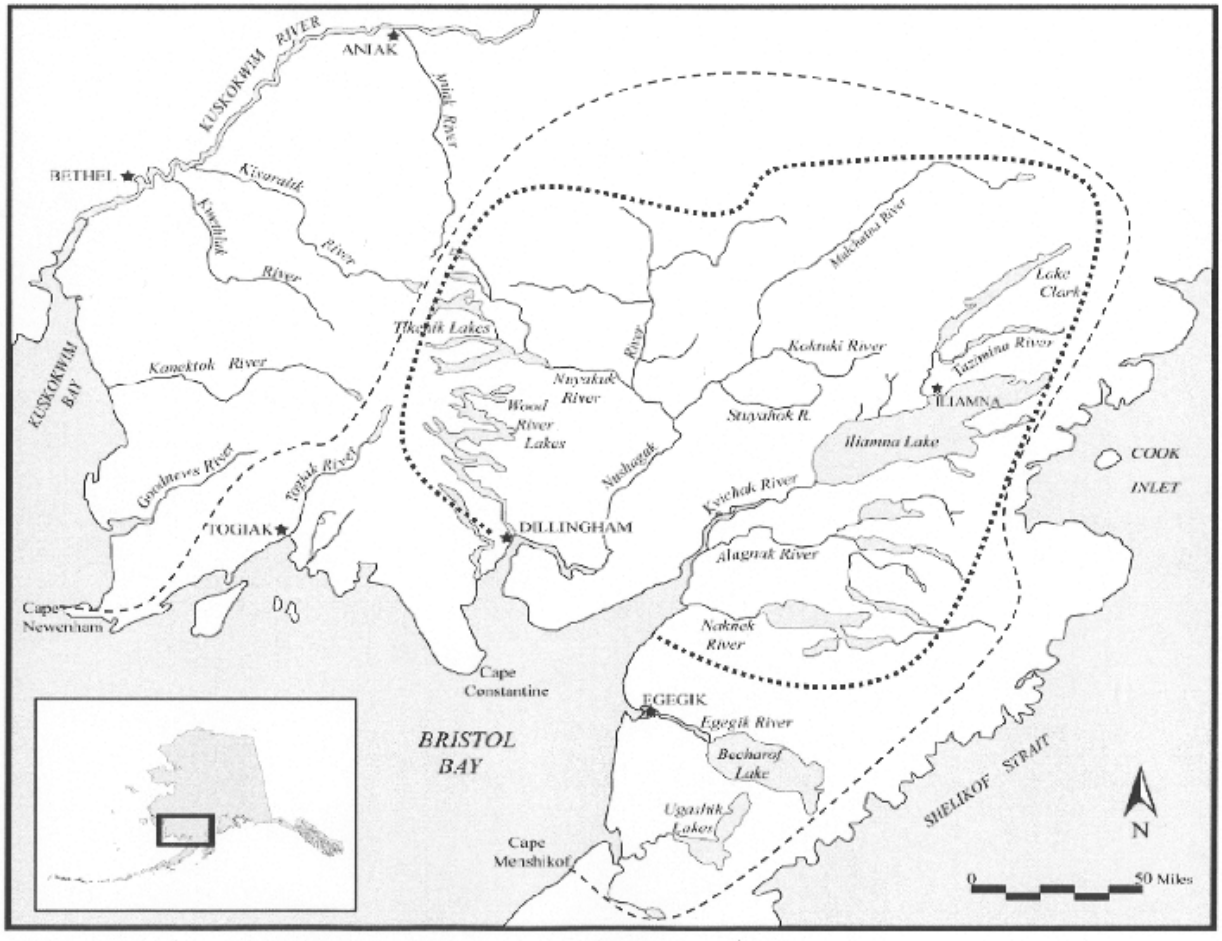


Figure 6.–Popular rainbow trout sport fisheries (delineated with black dots) in the Bristol Bay sport fish management area.

[9] Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited October 16, 2018].

The rainbow trout fisheries within the BBMA underwent rapid growth from the late 1970s to mid-1980s, with annual harvests averaging 4,905 fish from 1977 through 2003 (Table 20). From 2013 through 2017, annual harvests averaged 638 fish (calculated from Table 19). However, the importance of this species to the sport fishery is not adequately described by estimates of harvest. Results of the SWHS, as well as field studies, show clearly that during the last 20 to 25 years, the retention rate (number of fish kept from the total catch), has declined steadily whereas total effort and catch have remained stable or increased (Minard 1989b, 1990; Brookover 1989; Dunaway 1993; Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Estimates of catch (number of fish harvested plus fish released) were first available from the SWHS for rainbow trout in 1991 and have averaged 247,060 annually through 2003 (Appendix A4; Figure 7). From 2012 through 2016, the annual catch averaged 169,314 rainbow trout (Appendix A4, Figure 7). It is evident the angling public has embraced the concept of catch-and-release for rainbow trout and has voluntarily reduced harvests throughout the area.

Prior to 1993, rainbow trout were explicitly excluded from harvest under the subsistence priority. The status of rainbow trout as a subsistence species was changed in 1993 when the BOF allowed rainbow trout caught incidentally to other species to be retained by subsistence users. In 1994, the BOF recognized subsistence use of rainbow trout among all other finfish in Bristol Bay (5 AAC 01.336). The subsistence taking of rainbow trout from non-navigable waters located within federal land holdings (National Wildlife Refuges and National Parks) has been allowed since December 1991. In 2002, the Federal Subsistence Board adopted regulations allowing rod and reel subsistence harvest of rainbow trout in federally managed subsistence fisheries in the Bristol Bay area.

Many quality rainbow trout sport fisheries exist throughout the BBMA. Other smaller rainbow trout fisheries not discussed below include Brooks River, Moraine, and Funnel creeks, American Creek, Gibraltar River, Copper River, Upper Talarik Creek, Tazimina River, Mulchatna River and Togiak River.

## SOUTHWEST ALASKA RAINBOW TROUT MANAGEMENT PLAN

In February 1990, the BOF adopted regulations implementing a comprehensive management plan for rainbow trout in the area previously known as the Southwest Alaska Management Area. This area included the BBMA, the waters flowing into Kuskokwim Bay from Cape Newenham to the outlet of the Kuskokwim River, and the Kuskokwim River and tributaries from the Aniak River to Kuskokwim Bay[10]. Still in force, this plan is not a regulation but is used as a policy for guiding the BOF and the public. It provides a clear understanding of the underlying principles by which rainbow trout stocks are to be managed and provides guidance for the BOF in developing future regulations. In 1998, the BOF adopted *Criteria for Establishing Special Management Areas for Trout* (5 AAC 75.013). This regulation embodies most of the criteria that originated, and are still used, in the Southwest Alaska Rainbow Trout Management Plan.

[10] ADF&G. 1990. Southwest Alaska rainbow trout management plan. Located at: Alaska Department of Fish and Game, Division of Sport Fish, 333 Raspberry Road, Anchorage.

Table 20.–Sport harvest of rainbow trout by section and drainage in the BBMA, 2004–2017, with the 1977–2003 average.

| Section and drainage | Average 1977–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Naknek R. | 1,012 | 272 | 175 | 196 | 307 | 175 | 60 | 226 | 589 | 48 | 47 | 78 | 416 | 101 | 138 | 151 |
| Brooks R. | 74 | 0 | 358 | 22 | 152 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 33 | 129 | 37 | 0 |
| Kvichak R. | 269 | 193 | 221 | 0 | 457 | 136 | 38 | 60 | 20 | 0 | 0 | 102 | 0 | 179 | 56 | 23 |
| Copper R. | 69 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 133 | 0 | 320 | 205 | 0 | 132 | 0 |
| Alagnak R. | 220 | 163 | 413 | 47 | 20 | 66 | 0 | 0 | 20 | 0 | 124 | 64 | 0 | 72 | 52 | 0 |
| Newhalen R. | 248 | 89 | 77 | 72 | 10 | 272 | 0 | 87 | 0 | 21 | 35 | 0 | 20 | 80 | 31 | 0 |
| Lake Clark | 19 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 5 | 0 |
| Other | 1,375 | 212 | 31 | 191 | 677 | 430 | 187 | 57 | 971 | 0 | 13 | 32 | 44 | 0 | 18 | 84 |
| Subtotal [a] | 3,286 | 970 | 1,275 | 528 | 1,623 | 1,079 | 285 | 430 | 1,600 | 202 | 265 | 596 | 718 | 561 | 468 | 258 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 228 | 164 | 74 | 39 | 243 | 32 | 105 | 99 | 98 | 17 | 0 | 0 | 20 | 64 | 20 | 41 |
| Mulchatna R. | 371 | 37 | 36 | 298 | 262 | 25 | 23 | 186 | 96 | 309 | 0 | 0 | 39 | 0 | 70 | 43 |
| Agulowak R. | 4 | 397 | 22 | 72 | 76 | 77 | 9 | 0 | 67 | 17 | 58 | 52 | 0 | 0 | 25 | 33 |
| Agulukpak R. | 2 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood River L. [b] | 378 | 156 | 55 | 104 | 169 | 31 | 17 | 34 | 33 | 50 | 0 | 0 | 0 | 32 | 16 | 106 |
| Tikchik–Nuyakuk | 72 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 43 | 0 | 9 | 0 |
| Other | 479 | 117 | 132 | 67 | 0 | 0 | 0 | 17 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal [a] | 1,534 | 871 | 340 | 580 | 750 | 165 | 164 | 336 | 314 | 393 | 58 | 52 | 102 | 96 | 140 | 223 |
| Western | | | | | | | | | | | | | | | | |
| Togiak R. | 77 | 102 | 287 | 0 | 152 | 11 | 13 | 0 | 47 | 57 | 0 | 0 | 205 | 37 | 60 | 18 |
| Other | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal [a] | 86 | 102 | 287 | 0 | 152 | 11 | 13 | 0 | 47 | 57 | 0 | 0 | 205 | 37 | 60 | 18 |
| Total | 4,905 | 1,943 | 1,902 | 1,108 | 2,525 | 1,255 | 462 | 766 | 1,961 | 652 | 323 | 648 | 1,025 | 694 | 668 | 499 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

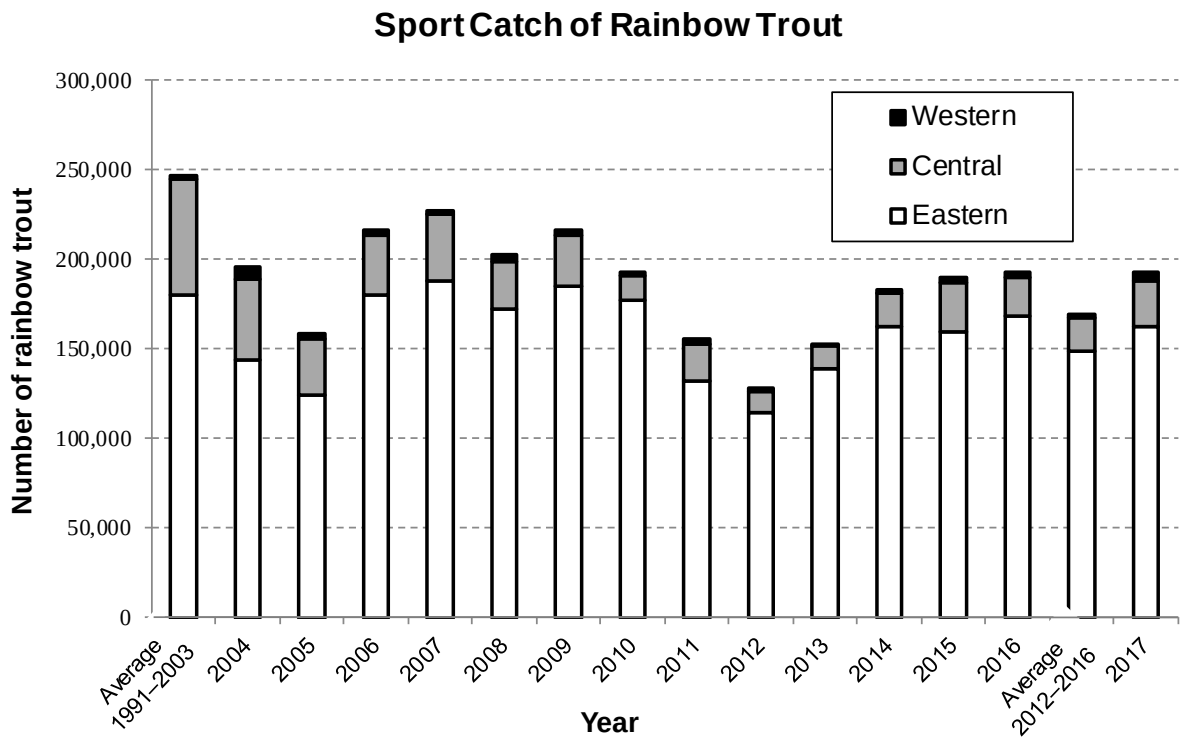


Figure 7.–Sport catch of rainbow trout by section for the Bristol Bay Sport Fish Management Area, 2004–2017, with averages for 1991–2003 and 2012–2016.

## Philosophy of the Plan

The overriding philosophy of the *Southwest Alaska Rainbow Trout Management Plan* is one of conservative wild stock management. Conservative wild stock management does not necessarily preclude limited harvest of rainbow trout for food or trophies. However, maximum yield principles that emphasize harvest are ruled out. Additionally, under a philosophy that emphasizes wild trout management, mitigating losses of wild stocks through enhancement or stocking is not considered a desirable management alternative.

Conservative wild stock management is guided by both biological considerations and social concerns. Growth in the region's rainbow trout sport fisheries is inevitable, but by managing the area's wild rainbow trout stocks conservatively, the potential for serious long-term resource problems is minimized. From a social perspective, conservative wild stock management is consistent with the priorities of most of the public presently using the resource. The *Southwest Alaska Rainbow Trout Management Plan* contains 3 policies that are intended to protect the biological integrity of the region's wild trout stocks and maximize their recreational benefit and economic potential. The policies guide the development of sport fishing regulations and provide ADF&G management biologists, BOF members, and the public with clear direction as to how rainbow trout fisheries in the BBMA should be managed. The 3 policies are as follows:

1) Native rainbow trout populations will be managed to maintain historical size and age compositions and at population levels sufficient such that stocking is not needed to enhance or supplement the wild population.

2) A diversity of sport fishing opportunities for wild rainbow trout should be provided through establishment of special management areas by regulation. Selection of areas for special management will be based on criteria to be adopted by the BOF.

3) Management strategies should be consistent with the prudent economic development of the state's sport fishing industry while at the same time acknowledging the intrinsic value of this fishery resource to the people of Alaska.

## Plan Implementation

Regulations based on the *Southwest Alaska Rainbow Trout Management Plan* were adopted by the BOF in February 1990. These regulations were designed to implement the 3 management policies contained in the rainbow trout management plan. Specifically, BOF did as follows:

1) Expanded the Wild Trout Zone from the Iliamna drainage to include the drainages of Bristol Bay and Kuskokwim Bay and the Kuskokwim River from Aniak River downstream.

2) Established 8 catch-and-release areas in the BBMA and 3 catch-and-release areas in the Lower Kuskokwim Management Area (Figure 8).

3) Established 6 artificial fly-only, catch-and-release-only areas (Figure 9).

4) Established 11 unbaited single-hook artificial lure only areas to protect rainbow trout stocks (Figure 10).

Adoption of regulations implementing the management policies contained in this plan was not expected to be a one-time effort. Rather, policy implementation was understood to be a long-term process, with the policies used as the framework to develop a very important and unique resource. Special management regulations have since been adopted using this process for the Kvichak River in Bristol Bay, and the Kanektok, Kwethluk, Kasigluk, and Kisaralik rivers in the Kuskokwim area during the BOF meetings held in the fall and winter of 1997. This plan has also proved to be a useful guide for rainbow trout management in other parts of the state.

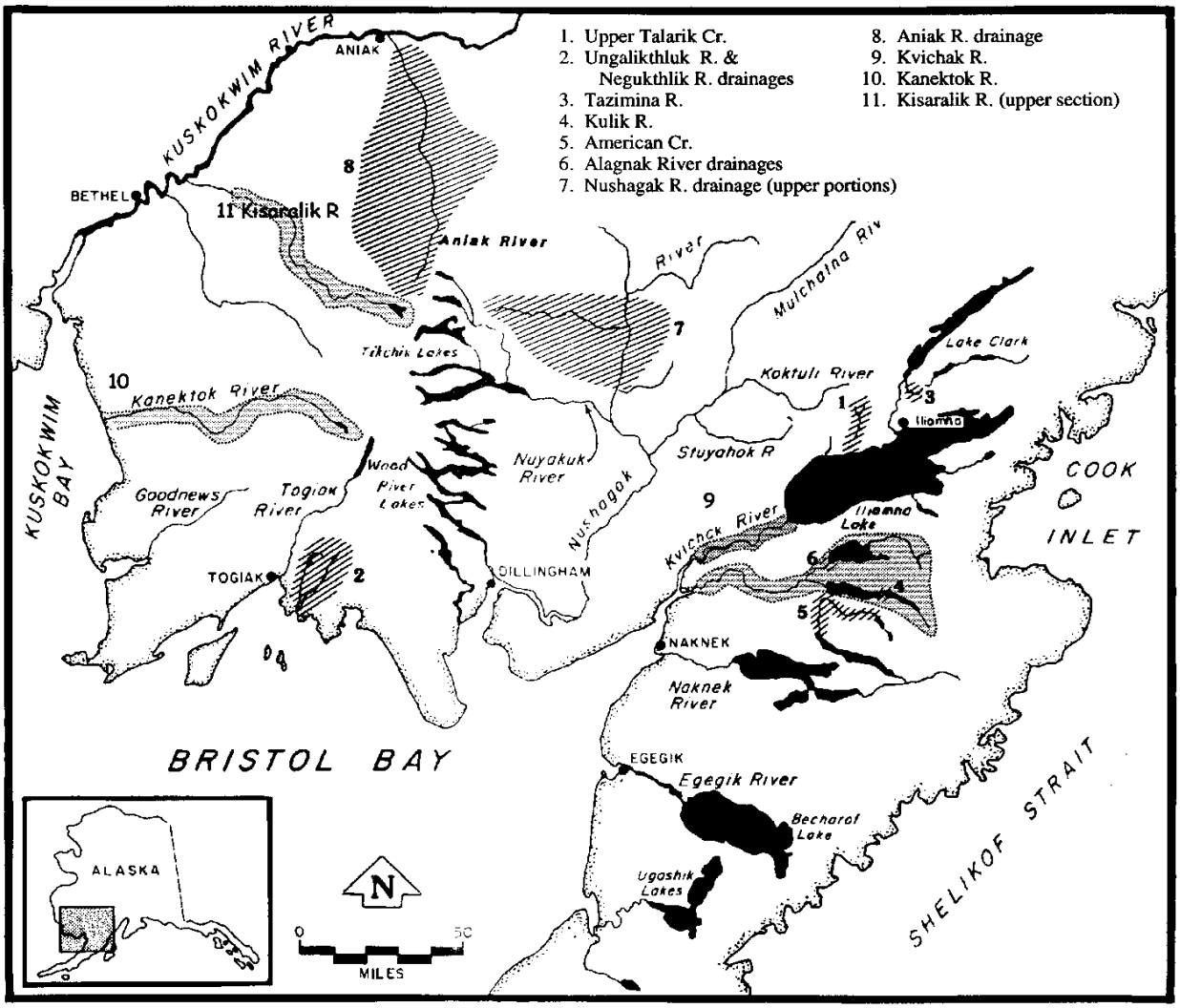


Figure 8.–Catch-and-release special management areas for rainbow trout in the Bristol Bay Sport Fish Management area.

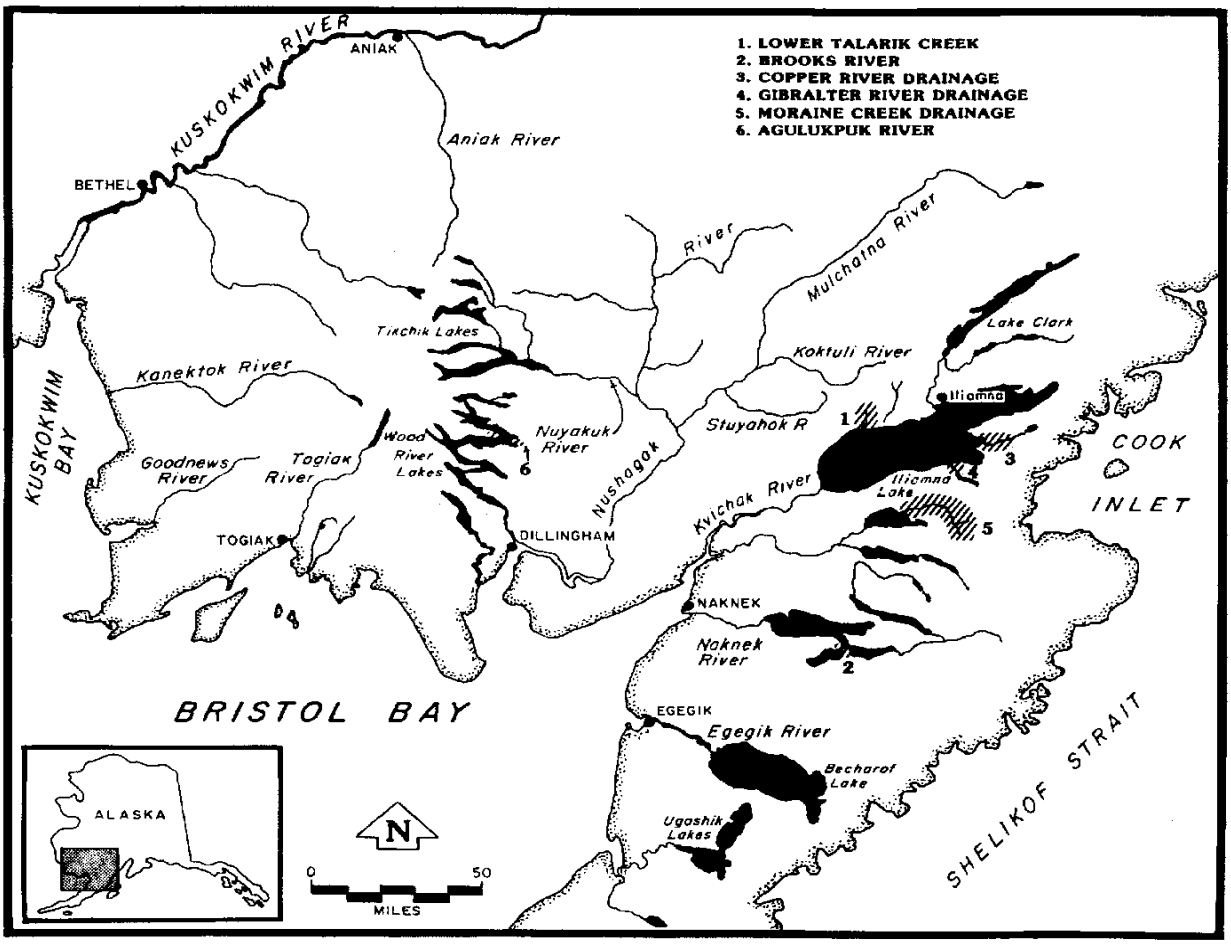


Figure 9.–Fly-only, catch-and-release special management areas for rainbow trout in the Bristol Bay Sport Fish Management Area.

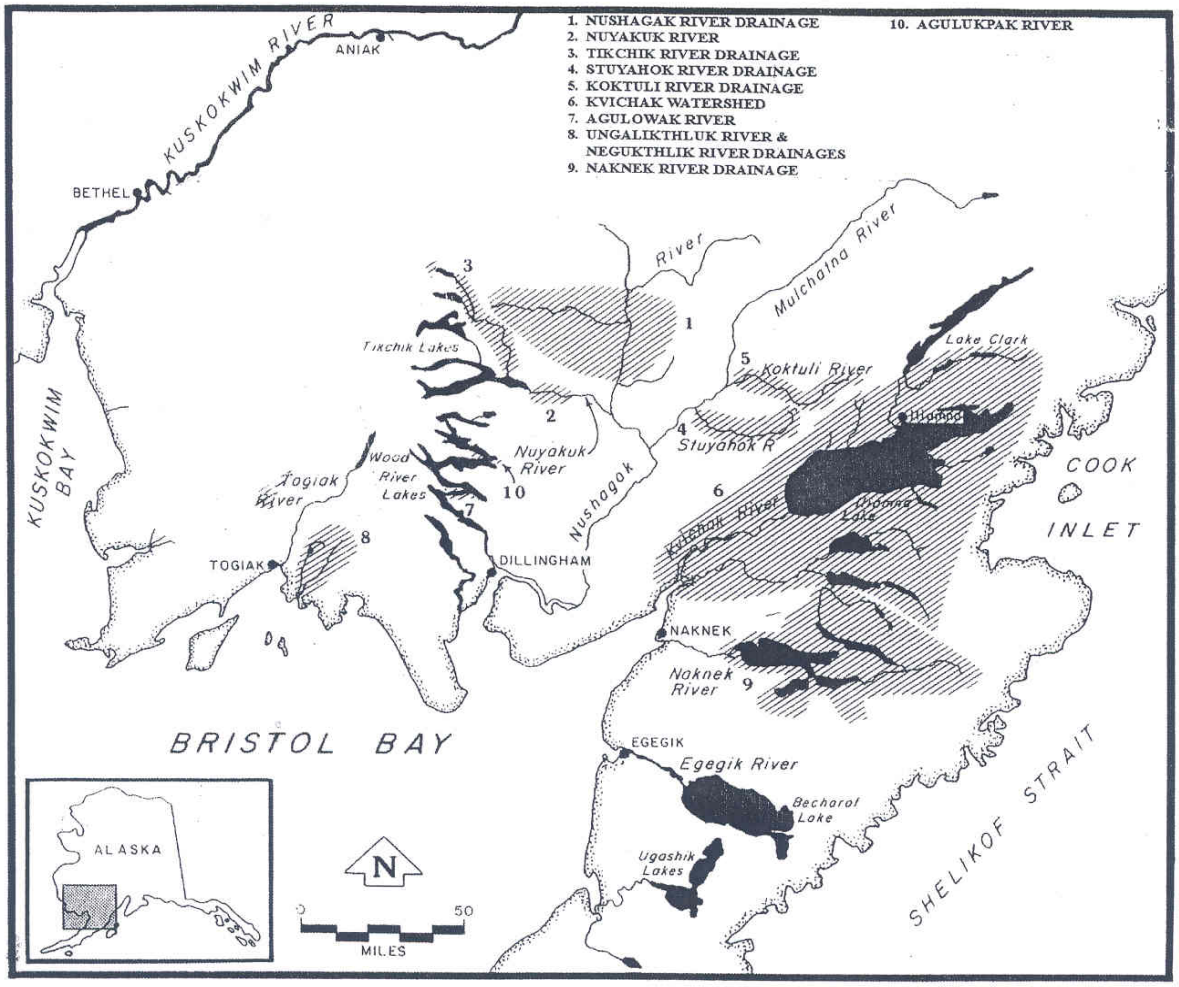


Figure 10.–Unbaited single-hook artificial lure special management areas for rainbow trout in the Bristol Bay Sport Fish Management Area.

## LOWER TALARIK CREEK

### Fishery Description

Lower Talarik Creek, located at the northwest corner of Lake Iliamna, is renowned for its high-quality rainbow trout sport fishery. The creek is relatively small and most anglers only fish along the first 2 miles above its entrance into Lake Iliamna. The large fish, for which Lower Talarik Creek is so famous, enter the creek from Iliamna Lake to feed on salmon eggs and salmon carcasses in the fall. The sport fishery takes advantage of this migration and is most active from mid-August until late September or October. Most anglers fishing Lower Talarik Creek are guided nonresidents who make daily fly-in trips from the many lodges operating in the Lake Iliamna area (Table 2). As many as 30 anglers can be accommodated at any given time in the commonly fished lower portion of the creek.

In 1992, a Native land claim had the potential to eliminate public access to this world-class rainbow trout fishery. Through an agreement with the claimant, the Nature Conservancy (TNC) obtained the land and coordinated a land management agreement with ADF&G and the Alaska Department of Natural Resources (DNR). One stipulation of the agreement was to create a

Special Use Area along the lower reaches of Lower Talarik Creek that would allow public access. After extensive discussions with local leaders, the Special Use Area was created in August 1999. In the spring of 2001, TNC initiated a process to convey these lands to the state for management. The DNR-Realty Section has finalized the transfer.

Fisheries managers first estimated angler effort and harvest on Lower Talarik Creek rainbow trout with onsite creel surveys from 1970 through 1976. Annual harvest ranged from a high of 433 fish in 1971 to 73 fish in 1974 (Table 21). Since 1977, effort (measured in angler-days) and harvest have been estimated from the SWHS (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996; Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Onsite creel surveys conducted during the fall fisheries of 1989–1991 and 1993–2001 found effort was similar to the upper range of levels observed in the 1970s (Table 21). Small estimates of catch and effort in 1997 and 2001 are due to the short duration of those surveys (Table 21).

Based on freshwater logbook data from 2012 through 2016, guided effort has remained close to the average of 172 angler-days (Table 2).

Table 21.–Angler effort, catch, catch per angler-hour, harvest, and retention rate for rainbow trout in Lower Talarik Creek, 1970–1976, 1986, 1987, 1990, 1991, 1993–2005.

| Year | Survey dates | Angler-hours | Catch | Catch/hour [a] | Mean angler-hours per day | Harvest | Percent retained |
|---|---|---|---|---|---|---|---|
| 1970 | 26 Aug–11 Oct | 1,315 | 600 | 0.46 | 27.4 | 119 | 20% |
| 1971 | 8 Jun–30 Sep | 2,604 | 2,300 | 0.88 | 26.3 | 433 | 19% |
| 1972 | 8 Jun–30 Sep | 1,718 | 834 | 0.49 | 17.4 | 141 | 17% |
| 1973 | 8 Jun–30 Sep | 1,376 | 780 | 0.57 | 13.9 | 113 | 14% |
| 1974 | 8 Jun–30 Sep | 1,037 | 498 | 0.48 | 10.5 | 73 | 15% |
| 1975 | 8 Jun–30 Sep | 1,048 | 1,648 | 1.57 | 10.6 | 127 | 8% |
| 1976 | 8–15 Jun; 12–23 Sep | 438 | 843 | 1.92 | 21.9 | 92 | 11% |
| 1986 | 8–15 Jun; 15 Aug–9 Oct | 2,063 | 2,389 | 1.16 | 62.5 | 16 | 1% |
| 1987 | 22 Aug–22 Sep | 1,893 | 2,844 | 1.50 | 59.2 | 4 | 1% |
| 1990 | 1–27 Sep | 2,086 | 2,910 | 1.40 | 77.3 | 0 | NA [b] |
| 1991 | 30 Aug–25 Sep | 1,729 | 2,363 | 1.37 | 64.0 | 0 | |
| 1993 | 10–20 Sep | 1,080 | 699 | 0.65 | 98.2 | 0 | |
| 1994 | 2–29 Sep | 2,462 | 3,273 | 1.33 | 87.9 | 0 | |
| 1995 | 1–29 Sep | 2,496 | 3,200 | 1.28 | 86.1 | 0 | |
| 1996 | 3–30 Sep | 1,930 | 1,655 | 0.86 | 68.9 | 0 | |
| 1997[c] | 1–15 Sep | 1,210 | 1,794 | 1.48 | 80.7 | 0 | |
| 1998 | 31 Aug–21 Sep | 2,596 | 1,698 | 0.65 | 118.0 | 0 | |
| 1999 | 29 Aug–23 Sep | 2,121 | 1,192 | 0.57 | 81.6 | 0 | |
| 2000 | 28 Aug–23 Sep | 2,813 | 4,868 | 1.73 | 104.2 | 0 | |
| 2001[c] | 2–13 Sep | 934 | 692 | 0.74 | 77.8 | 0 | |
| 2002[c] | 5–19 Sep | 1014 | 770 | 0.76 | 67.6 | 0 | |
| 2003[c] | 1–13 Sep | 789 | 685 | 0.87 | 60.7 | 0 | |
| 2004 | 1–29 Sep | 1,321 | 1,044 | 0.84 | 45.8 | 0 | |

-continued-

Table 21. Page 2 of 2.

| Year | Survey dates | Angler-hours | Catch | Catch/hour [a] | Mean angler-hours per day | Harvest | Percent retained |
|---|---|---|---|---|---|---|---|
| Average | | | | | | | |
| All years | | 1,655 | 1,721 | 1.02 | 59.5 | 48.6 | |
| 2000–2004 | | 1,374 | 1,612 | 0.99 | 71.2 | 0 | |
| 2005 | 2–29 Sep | 1,002 | 2,100 | 2.10 | 35.8 | 0 | |

*Source*: Russell (1977), Minard (1990), Minard et al. (1992), Jaecks (2005 unpublished data).

[a] Unstratified catch per unit effort, recalculated from total catch and hours in original reports.

[b] Lower Talarik Creek became a catch-and-release fishery beginning in 1990.

[c] Small total catch and effort is due to the short duration of the survey.

## Fishery Management and Objectives

The Lower Talarik Creek rainbow trout fishery is managed to maintain historical age and size composition and a diversity of angling opportunity by maintaining the special management designation with artificial fly-only, catch-and-release.

Lower Talarik Creek was designated a special management area in 1990 as part of the implementation of the *Southwest Alaska Rainbow Trout Management Plan*. Sport fishing is restricted to unbaited artificial flies, and the area is catch-and-release only for rainbow trout. A season closure from April 10 through June 7 provides protection for spawning rainbow trout during this critical life stage.

Sport fishery harvests and effort are estimated through the SWHS (Alaska sport fishing database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Subsistence harvest data are collected by CF with onsite surveys that yield detailed estimates of angler use and success. Biological information and demographic information are also collected. Significant stock assessment and creel survey results are reported by Russell (1977), Minard (1990), Minard et al. (1992).

Lower Talarik Creek's small size, accessibility, and abundant large rainbow trout garnered early regulatory attention. A synopsis of significant regulation changes can be found in Table 22.

A Native Allotment claim that could have jeopardized public access to the Lower Talarik Creek fishery has recently been resolved. TNC of Alaska acquired title to the claim, which included the land adjacent to the most popular fishing sites along Lower Talarik Creek, through a special agreement with the claimant. In December 1995, TNC coordinated a 3-way land management agreement with ADF&G and DNR. One stipulation of the agreement was to establish a Special Use Area (SUA) for the lower reaches of Lower Talarik Creek and nearby uplands. This was completed in August 1999 with some controversy and after extensive discussions with local municipalities and leaders. Finalizing the SUA allowed the DNR to enter into an Interagency Land Management Agreement (ILMA) with ADF&G for the land on which the ADF&G-owned cabin sits. The ILMA was completed at about the same time as the SUA. The next steps in the agreement are to obtain Critical Habitat status for the drainage and the eventual conveyance of the TNC holdings to the State of Alaska for long-term management. During the spring of 2001, TNC advised the State of Alaska of its interest in conveying its lands to the state but there was little movement until late in the year. The conveyance is now complete.

In 2018, a commercial sport fishing operator purchased a private inholding on the east fork of Lower Talarik Creek within the SUA and applied for permits to install a float plane dock and construct bridges for ATV trails to provide clients with easy access to Lower Talarik Creek. A

DNR Land Use Permit was issued to the commercial operator for the installation and use of a float plane dock on Char Lake immediately adjacent to the SUA. Installation of this dock will allow ATV travel from Char Lake throughout the SUA, including the private inholding as well as popular fishing locations.

Table 22.–A chronology of significant regulation changes for Lower Talarik Creek rainbow trout.

| Effective year | Regulation |
|---|---|
| 1965 | Spawning season closure imposed on Lower Talarik Creek. Lower Talarik Creek closed to all fishing from April 10 to June 8. |
| 1968 | Lower Talarik Creek was included in the "Bristol Bay Trophy Fish Area." |
| 1969 | Bag and possession limits reduced to 5 trout, only 1 over 20 inches in length. Helicopter access was forbidden, single hooks were required on tackle. |
| 1974 | The use of bait was prohibited during the summer months. |
| 1977 | Trophy Fish Area renamed the Bristol Bay Wild Trout Area, retaining the regulations accumulated since 1965. |
| 1981 | Gear was limited to single-hook artificial flies from June to October. |
| 1984 | Reduced the bag and possession limit to 2 rainbow trout, 1 over 20 inches. |
| 1985 | Reduced the bag limit to 1 rainbow trout during the summer. |
| 1990 | Adopted the Southwest Alaska Rainbow Trout Management Plan. Lower Talarik Creek was designated as a special management area to be managed under fly-fishing-only, catch-and-release restrictions. |
| 1999 | Alaska Department of Natural Resources (DNR) designated as a Special Use Area, the 5 sections of state-owned land immediately surrounding the lower reaches of Lower Talarik Creek. Guidelines for overnight camping and commercial activities were established. |
| | The DNR entered into an Interagency Land Management Agreement (ILMA) for approximately 2 acres of land on which stands the Division of Sport Fish (SF) cabin. |
| 2001 | The Nature Conservancy initiated a transfer of its privately held lands to the DNR with management responsibilities to be delegated to ADF&G SF. |

## Research

From 2009 through 2015, a weir was operated each season from breakup in April or May until approximately June 7 (Fo 2015). Consecutive years of weir data were collected to assess spawning abundance, length composition, and life history of Lower Talarik Creek rainbow trout. Weir counts of spawning rainbow trout ranged from 49 to 181 moving upstream and 163 to 794 moving downstream during the 2009–2015 seasons (Table 23). Comparisons of weir counts, visual counts, and length compositions with past data indicate fewer mature rainbow trout and fewer large rainbow trout than observed in the 1970s and 1997 (Russell 1977).

## 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for rainbow trout was average to good in 2018.

Table 23.–Lower Talarik Creek rainbow trout weir counts, 2009–2015.

| | Upstream passage | | | Downstream passage | | |
|---|---|---|---|---|---|---|
| Year | Spawner | Nonspawner | Total | Spawner | Nonspawner | Total |
| 2009 | 98 | 86 | 184 | 271 | 261 | 532 |
| 2010 | 78 | 99 | 177 | 511 | 152 | 663 |
| 2011 | 103 | 125 | 228 | 330 | 169 | 499 |
| 2012 | 99 | 27 | 126 | 456 | 745 | 1,201 |
| 2013 | 49 | 169 | 218 | 163 | 170 | 333 |
| 2014 | 32 | 39 | 71 | 435 | 983 | 1,418 |
| 2015 | 181 | 63 | 244 | 794 | 857 | 1,651 |

# KVICHAK RIVER

## Fishery Description

The Kvichak River (Figure 1) is recognized around the world for its large rainbow trout. Presently, the river is one of the few waters in Southwest Alaska where anglers may still harvest large rainbow trout. Studies (unpublished) by ADF&G of rainbow trout in the Kvichak River provide opportunity to examine changes in abundance, recruitment, survival, and age and length compositions of a moderately exploited wild Alaskan rainbow trout population. Additionally, as part of a regionwide comprehensive management planning exercise, SF is developing concise, measurable management objectives for this important fishery. Stock status information is needed to develop specific management objectives for this fishery.

In late winter and spring, rainbow trout aggregate in the upper Kvichak River near the outlet of Lake Iliamna. From 1987 through 1997, ADF&G conducted a mark–recapture study to estimate the abundance and survival of fish in this aggregation (ADF&G, Dillingham, unpublished data). Findings from this study have raised questions about the nature of the aggregation (i.e., whether it is composed of overwintering fish from several natal streams or prespawning fish from the Kvichak River only). If some rainbow trout marked at the upper Kvichak River during a spring sampling event subsequently emigrate and spawn in other streams in future years, then survival estimates from the mark–recapture study are a measure of both mortality and emigration. Radiotelemetry data from sexually mature Lower Talarik Creek rainbow trout suggest the majority of rainbow trout that spawn in Lower Talarik Creek are not susceptible to angling pressure on the Kvichak River and do not appear to significantly contribute to the prespawning population of rainbow trout in the Kvichak River.

## Fishery Management and Objectives

Sport fishery harvests and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/).

The Kvichak River rainbow trout fishery is managed to maintain historical abundance and size composition of rainbow trout.

## 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for rainbow trout was good in 2018.

# ALAGNAK (BRANCH) RIVER

## Fishery Description

The Alagnak River, locally referred to as the Branch River, is located in the eastern section of the BBMA and flows into the Kvichak River approximately 40 miles north of King Salmon. The Alagnak River originates in Katmai National Park and Preserve, and the upper 55 miles have been designated a Wild and Scenic River.

Two large lakes, Kukaklek and Nonvianuk, feed this drainage. Kukaklek Lake is drained by the Alagnak River whereas the Nonvianuk River flows 11 miles from Nonvianuk Lake to join the Alagnak River from the south. The Nonvianuk River is a wide, relatively gently flowing river (class 2 or less) that provides the most convenient float trip access to the upper drainage. The upper Alagnak River is characterized by a narrow canyon and class 3 rapids that provide a more rigorous boating experience. Below its confluence with the Nonvianuk River, the Alagnak River is slower and easily navigated. At the proper water levels, both rivers can be navigated their entire lengths with power boats. The water is clear throughout its length, though the lower 20 miles are colored lightly from silt and bog-stained runoff.

In the lower portion of the drainage, anglers pursue Chinook, sockeye, chum, and coho salmon. In the upper reaches, rainbow trout are the big attraction, with some lake trout (*Salvelinus namaycush*) at headwater lakes and Arctic char and Arctic grayling in the river, adding diversity to the angling experience. The fisheries are accessed with power boats, particularly the lower one-half to two-thirds of the river, whereas float trips are the most common access in the upper reaches. Several lodges are based along the river and many other lodges from the surrounding area fly clients to the river for day-trip fishing.

The easy access and abundant fish populations of the Alagnak River are major reasons the popularity of this river has grown quickly. Rainbow trout from the Alagnak River drainage, like those of the nearby Kvichak and Naknek river drainages, are known for their abundance and large size.

In terms of angler effort, the Alagnak River is among the top 3 most popular fishing destinations in Southwest Alaska, along with the Naknek and Nushagak rivers (Tables 1 and 2). Estimates of effort and harvest for rainbow trout from the Alagnak River were first available in 1981 from the SWHS. Historically, effort averaged 6,982 angler days annually from 1977 through 2006 (Table 1). Effort peaked at 8,881 angler-days in 2007 and has since decreased with a recent 5-year average from 2012 through 2016 of 5,682 angler-days. In 2017, effort increased to 7,001 angler-days (Table 1). Since estimates of catch were first made in 1991, the annual average sport catch (fish released plus fish harvested) of rainbow trout from 1991 through 2003 was estimated at 34,518 fish, giving the sport fishery in the Alagnak River the largest catch of rainbow trout in the BBMA during that time (Appendix A4). Harvest rates have dropped dramatically since 1998, when catch-and-release only regulations were instituted to address concerns for the rainbow trout population.

## Fishery Management and Objectives

The Alagnak River rainbow trout fishery is managed to maintain historical abundance and size composition.

Sport fishery effort, catch, and harvest are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Subsistence harvests are considered slight but are not well monitored. Onsite surveys yield detailed estimates of angler use and success as well as data on angler demographics and biological samples from the catch. Significant stock assessment and creel survey results, focused on the lower river salmon fisheries but containing some rainbow trout data, have been collected and reported by Brookover (1989), Dunaway (1990a, 1994), and by Naughton and Gryska (2000). Surveys of the spring sport fisheries were conducted jointly with the National Park Service and ADF&G in 1996 at the outlet of Nonvianuk Lake and at the outlet of Kukaklek Lake in 1997 (Jaenicke 1998 a, b).

Located between the Kvichak and Naknek river drainages, the Alagnak–Nonvianuk rivers rainbow trout fishery has been managed like adjacent fisheries. For quite some time, the sport fishing season has featured a spring spawning closure from April 10 through June 7 and single-hook artificial lure only restrictions. Until 1998, regulations for the open water season allowed the retention of 1 rainbow trout per day with no size limit.

In the 1997 fall BOF meeting, the Alagnak River rainbow trout fishery was restricted by regulation to catch-and-release only out of concerns for the stock. This no-harvest regulation for the period of June 8 through October 31 has been in effect in the Alagnak and Nonvianuk rivers ever since[11]. From November 1 through April 9, anglers may retain 5 rainbow trout less than 18 inches in length. The new regulations were generally well received by anglers and are expected to provide a measure of protection to this population until better information becomes available. The relatively large rainbow trout and salmon fisheries, coupled with significant float trip and motorboat use, has been a concern of the National Park Service (NPS), nearby communities, and some anglers. NPS has designated the 55-mile portion of the river as a wild and scenic river. Human impacts to uplands, stock status of fish populations, and boat wake erosion are high priority issues.

### 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for rainbow trout was above average in 2018.

## UPPER NUSHAGAK RIVER

### Fishery Description

The upper Nushagak River consists of the stretch of river upstream of the confluence with the Nuyakuk River. The upper Nushagak River provides an attractive alternative to more crowded rainbow trout fisheries in the area. The rainbow trout are not as large as those in other rivers of the area, but they are abundant. There are approximately 5 camps situated in this section of river that are operated by sport guide services. In addition, this section of the river is popular for float trips.

Sport fishing effort in the Nushagak River upstream of the Mulchatna River has averaged 2,113 angler-days from 2012 through 2016, with a low of 1,318 angler days in 2012. In 2017, effort was down from recent years with 909 angler-days (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/).

[11] Southwest Alaska sport fishing regulations summary, 2018 (effective until the 2019 summary is issued) Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

### Fishery Management and Objectives

Sport fishery effort, catch, and harvest are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/).

The upper Nushagak River rainbow trout fishery is managed to maintain historical abundance and size composition of rainbow trout.

The upper Nushagak River upstream of Harris Creek, including the King Salmon River, has been designated as a special management area, restricted to unbaited single hook tackle and catch-and-release for rainbow trout since 1990. Sport fishery effort, catch, and harvest are estimated via the SWHS. Subsistence harvests are not well monitored and the best information is obtained from a household survey of freshwater fish harvest conducted by the Division of Subsistence.

Size composition data for rainbow trout between Harris Creek and the Chichitnok River was collected by SF in 1999 and 2006. The average size of fish was approximately 16 inches, and no fish larger than 23 inches were sampled.

### 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for rainbow trout was average to good in 2018.

## NAKNEK RIVER

### Fishery Description

The first significant recreational use of Naknek River rainbow trout stocks occurred in the mid-1950s when 2 recreational camps were constructed by the military for use by military personnel. The camps, one located at the outlet of Naknek Lake (Lake Camp) and one at the lower reach of the rapids (Rapids Camp), provided a base for significant sport fishing opportunity until 1974. During that time, civilians also discovered the bountiful fish resources and effort continued to grow. By the mid-1980s, there were approximately 12 guiding services working the river regularly, with others less frequently. Boat rental and lodging services, available in King Salmon, provided the necessary support needed by the unguided angler.

Most of the rainbow trout sport fishery takes place in the upper reach of the river from Rapids Camp upstream to the outlet of Naknek Lake and has 3 periods of activity: March to April 10, June 8 to June 30, and August 15 to freeze-up in October. Although rainbow trout may be found during July and early August, the huge influx of salmon during this time tends to depress rainbow trout angling. A few determined anglers seek rainbow trout whenever there is open water, and fishing through the ice is a popular activity for some anglers and some subsistence users.

Guided sport fishing effort on the Naknek River has varied little since 2007, ranging from a low of 3,160 angler-days in 2010 to a high of 4,273 angler-days in 2008 and averaging 3,854 (Table 2). Total sport fishing effort in the Naknek River has also varied little from the historical average (1977–2006) of 14,147 angler-days to the recent average (2012–2016) of 13,716 angler-days (Table 1). Rainbow trout catch in the Naknek River in the last 10 years (2008–2017) has ranged from a low of 15,779 fish in 2013 to a high of 36,277 fish in 2016 (Table 24).

Following the 2018 season, ADF&G received reports that the quality of the experience was declining due to overcrowding. SF staff traveled to King Salmon in late September 2018 to

observe the rainbow trout sport fishery. On September 28th, a boat survey from Rapids Camp to Lake Camp counted 22 boats and 62 anglers. Concerns about overcrowding generated a larger than usual number of BOF proposals to address this issue for the Naknek River.

Table 24.–Naknek River sport fishing effort and rainbow trout harvest and catch, 1991–2018.

| Year | Total effort (angler-days) | Harvest | Catch |
|---|---|---|---|
| 1996 | 11,971 | 603 | 16,888 |
| 1997 | 13,673 | 246 | 13,737 |
| 1998 | 13,988 | 388 | 12,795 |
| 1999 | 21,189 | 343 | 17,946 |
| 2000 | 22,529 | 450 | 30,738 |
| 2001 | 12,401 | 160 | 16,198 |
| 2002 | 21,020 | 760 | 30,635 |
| 2003 | 13,398 | 171 | 26,183 |
| 2004 | 16,956 | 272 | 20,497 |
| 2005 | 12,699 | 175 | 16,431 |
| 2006 | 14,928 | 196 | 15,555 |
| 2007 | 17,744 | 307 | 25,692 |
| 2008 | 14,444 | 175 | 19,886 |
| 2009 | 16,850 | 60 | 31,097 |
| 2010 | 16,828 | 226 | 22,555 |
| 2011 | 14,465 | 589 | 21,869 |
| 2012 | 12,704 | 48 | 15,794 |
| 2013 | 12,723 | 47 | 15,779 |
| 2014 | 16,202 | 94 | 21,650 |
| 2015 | 14,621 | 416 | 21,311 |
| 2016 | 15,813 | 101 | 36,277 |
| 2017 | 14,854 | 151 | 21,362 |
| Average | | | |
| 1991–2017 | 15,545 | 272 | 21,403 |
| 2013–2017 | 14,843 | 162 | 23,276 |
| 2018 | NA | NA | NA |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Howe et al. (1995, 1996).

*Note*: "NA" means data not available.

## Fishery Management and Objectives

Naknek River rainbow trout stocks are managed to maintain the historical abundance and size composition reported in the early 1980s. Sport catch and harvest of rainbow trout in the Naknek River, as well as angler reports strongly suggest the rainbow trout population is currently near historical abundance and size composition (Table 24).

There is a long history of special regulations for Naknek River rainbow trout stocks dating back to statehood. Seasons, limits, and gear restrictions were initially liberal. However, as effort increased, reports of declining catch rates and smaller size of the catchable population increased. ADF&G studies conducted in the late 1980s verified the suspected decline (Minard and Brookover III 1988b). Recent catch and harvest data and public opinion indicate the stocks are near historical levels (Table 24). Current regulations still reflect the remedial actions adopted in

1990 and allow for harvest of 1 rainbow trout per day less than 18 inches in length during summer and fall, and a winter season harvest of 5 per day less than 18 inches in length. The spawning season closure is in effect from April 10 to June 7, and only single-hook artificial lures may be used in the area above Rapids Camp. In 1997, the BOF restricted hook gap size to one-half inch or less March 1–April 9 and June 8–July 31 to protect rainbow trout.

In the late 1990s, growing interest in the spring fishery that occurs prior to April 9 sparked heated public requests for more intensive management during this time. Some anglers supported managing portions of the river for quality of experience by advocating restrictions to angler access. Other management suggestions included managing for a particular size composition in the sport catch with emphasis on providing very large fish. Another group of anglers was convinced that growth of the rainbow trout fishery on the Naknek River required a spawning season closure earlier than April 10 to maintain the biological integrity of the population. Regardless the perspective, it appears clear that the angling public is extremely interested in maintaining and enhancing this fishery.

Strong fishery performance seems to have allayed the concerns of some individuals. Angler success throughout the recent seasons has been good and there are numerous accounts of large rainbow trout being caught.

### 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for rainbow trout was good throughout the 2018 season.

# OTHER SPECIES FISHERIES

The BBMA offers diverse sport fishing opportunity for a large variety of species that often go unnoticed because of the publicity given to the more popular species. Arctic char or Dolly Varden, Arctic grayling, lake trout, northern pike, and chum and pink salmon are 6 species that contribute to the sport fishing enjoyment of many anglers who fish the area. Catch and harvest estimates are made annually for these other species and trends in catch are followed for the more popular sport species (Appendices A5 and A6).

## WOOD RIVER LAKES SYSTEM ARCTIC CHAR

### Fishery Description

The Wood River Lake system is a series of 5 large connected lakes north of Dillingham that drain into Wood River and Nushagak Bay at Dillingham (Figure 1). All of these lakes except the eastern two-thirds of Lake Aleknagik are included in the boundaries of the Wood–Tikchik State Park. This lake system sustains large populations of Dolly Varden and Arctic char, which are very popular with sport anglers and subsistence users. The most popular angling sites are the Agulowak River, which connects Lake Nerka with Lake Aleknagik, and the Agulukpak River connecting Lake Beverly with Lake Nerka (Figure 1). There are many other good fishing spots throughout the system but these 2 rivers (often called “wak” and “pak”) and the outlets of other tributaries into Lake Aleknagik probably support most of the Arctic char angling effort in the system.

By catch and harvest, the sport fishery for Dolly Varden and Arctic char in the Wood River Lakes is one of the largest fisheries for these species in the BBMA (Table 25 and Appendix A5).

Between 1977 and 2006, sport fishing effort in the Wood River Lakes averaged 6,003 angler-days per year, and the most recent 5-year average from 2012 through 2016 is 4,747 angler-days (Table 1). Much of the effort is aimed at Arctic char and Dolly Varden, and most sport harvest for these 2 species occurs at the mouths of the Agulowak and Agulukpak rivers.

A stock assessment project conducted in 1993 found the abundance of Arctic char at the mouth of the Agulowak River had declined from 12,000 to 5,000 fish over a 10-year period (Minard and Hasbrouck 1994). Sport harvests during the period of decline are thought to have been excessive. This prompted an emergency order reduction in bag limits for the 1994 season. Restrictive regulations addressing this fishery were adopted by the BOF in January 1995. The new regulations reduced the daily bag limit from 10 to 2 fish per day and in possession and required the use of single-hook artificial lures. Additionally, a single-hook artificial lure restriction was adopted for the portion of Lake Aleknagik within a half-mile radius of the outlet of the Agulowak River. These restrictions have been in place since the 1994 season (by emergency order in 1994, and by regulation since 1995). Public acceptance and compliance have been good. Overall, the Arctic char stocks at the Agulowak River appear to have recovered, suggesting that the regulatory changes have allowed recovery to previous levels. High effort at the outlet of the Agulowak River continues and may require ongoing attention.

Since the BOF action, harvests of Dolly Varden and Arctic char for the Wood River Lake system (Wood River Lakes, Agulowak River, and Agulukpak River) have stayed less than 1,000 fish per year since 2005 (Table 25). Most of the harvest comes from the Agulowak River stock; the fishery at the Agulukpak is primarily catch-and-release.

## Fishery Management and Objectives

The management objective for this fishery is to maintain the Agulukpak–Agulowak rivers stocks at the abundance and sizes previously documented in the 1980s. Sport fishery effort, catch, and harvest are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Subsistence harvests are not well monitored and are managed by the Division of Commercial Fisheries. Onsite surveys yield detailed estimates of angler use and success. Biological information and demographic information are also collected. Significant stock assessment and creel survey results have been reported by Minard (1989b), and Minard and Hasbrouck (1994).

## 2018 Season

Estimates of sport fishery effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for Dolly Varden and Arctic char was excellent throughout the 2018 season.

Table 25.–Sport harvest of Dolly Varden and Arctic char from the waters of the BBMA by fishery, 2004–2017, with 1977–2003 average.

| Section and drainage | Average 1977–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Ugashik | 198 | 148 | 27 | 14 | 29 | 0 | 0 | 15 | 434 | 0 | 44 | 0 | 20 | 0 | 13 | 15 |
| Egegik–Becharof | 154 | 136 | 12 | 111 | 38 | 117 | 0 | 152 | 46 | 24 | 0 | 225 | 0 | 16 | 53 | 15 |
| Naknek R. | 654 | 372 | 93 | 207 | 845 | 93 | 66 | 244 | 269 | 122 | 49 | 86 | 521 | 32 | 162 | 55 |
| Naknek L. | 67 | 0 | 24 | 14 | 26 | 0 | 0 | 92 | 0 | 32 | 0 | 30 | 0 | 0 | 12 | 0 |
| Bay of Islands | 107 | 13 | 0 | 70 | 0 | 45 | 16 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 291 |
| Brooks R. | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 195 | 0 | 16 | 0 | 0 | 0 | 0 | 3 | 40 |
| Brooks L. | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 76 | 316 | 81 | 28 | 215 | 0 | 152 | 304 | 123 | 88 | 0 | 107 | 28 | 0 | 45 | 80 |
| King Salmon R. (U) | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kvichak R. | 79 | 40 | 0 | 53 | 18 | 0 | 42 | 15 | 48 | 16 | 16 | 17 | 34 | 23 | 21 | 0 |
| Copper R. | 20 | 30 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 389 | 0 | 0 | 78 | 0 |
| Alagnak R. | 97 | 0 | 13 | 26 | 71 | 0 | 22 | 84 | 0 | 27 | 99 | 81 | 78 | 106 | 78 | 0 |
| Newhalen R. | 210 | 0 | 37 | 37 | 69 | 137 | 22 | 70 | 44 | 0 | 0 | 0 | 20 | 68 | 18 | 0 |
| L Talarik Cr. | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 125 | 53 | 0 | 0 | 0 | 0 | 0 | 29 | 58 | 11 | 0 | 49 | 70 | 66 | 39 | 17 |
| Lake Iliamna | 111 | 205 | 212 | 83 | 201 | 131 | 0 | 0 | 455 | 0 | 0 | 0 | 0 | 16 | 3 | 0 |
| Kulik R. | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Moraine Cr. | 2 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 17 | 20 | 12 | 10 | 0 |
| Other | 447 | 154 | 224 | 109 | 30 | 44 | 34 | 14 | 0 | 0 | 87 | 15 | 895 | 157 | 231 | 0 |
| Subtotal [a] | 2,243 | 1,467 | 723 | 752 | 1,542 | 630 | 376 | 1,226 | 1,477 | 336 | 295 | 1,016 | 1,686 | 496 | 766 | 513 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 226 | 842 | 161 | 228 | 254 | 63 | 308 | 211 | 235 | 163 | 197 | 61 | 239 | 237 | 179 | 23 |
| Mulchatna R. | 166 | 273 | 120 | 124 | 180 | 121 | 162 | 81 | 83 | 32 | 53 | 135 | 236 | 374 | 166 | 65 |
| Agulowak R. | 207 | 296 | 74 | 433 | 153 | 222 | 103 | 166 | 112 | 53 | 88 | 132 | 156 | 137 | 113 | 0 |
| Agulukpak R. | 84 | 53 | 81 | 0 | 9 | 0 | 30 | 308 | 48 | 11 | 16 | 0 | 0 | 0 | 5 | 0 |
| Wood River L. [b] | 1,191 | 2,539 | 790 | 468 | 664 | 476 | 770 | 542 | 319 | 279 | 154 | 381 | 226 | 100 | 228 | 95 |
| Tikchik–Nuyakuk L. | 194 | 341 | 120 | 0 | 18 | 15 | 166 | 29 | 0 | 0 | 0 | 68 | 230 | 0 | 60 | 268 |
| Koktuli R. | 43 | 0 | 24 | 41 | 30 | 0 | 62 | 0 | 0 | 159 | 0 | 61 | 0 | 0 | 44 | 15 |
| Other | 216 | 53 | 118 | 0 | 0 | 11 | 163 | 244 | 97 | 391 | 47 | 61 | 0 | 0 | 100 | 0 |
| Subtotal [a] | 2,055 | 4,397 | 1,488 | 1,294 | 1,308 | 908 | 1,764 | 1,581 | 894 | 1,088 | 555 | 899 | 1,087 | 848 | 895 | 466 |

-continued-

Table 25.–Page 2 of 2.

| Section and drainage | Average 1977–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Western | | | | | | | | | | | | | | | | |
| Togiak | 357 | 501 | 190 | 167 | 256 | 375 | 287 | 90 | 196 | 33 | 153 | 122 | 724 | 401 | 287 | 274 |
| Other | 5 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 27 | 13 | 37 | 0 | 0 | 0 | 10 | 0 |
| Subtotal [a] | 564 | 501 | 190 | 167 | 256 | 392 | 287 | 90 | 223 | 46 | 190 | 122 | 724 | 401 | 297 | 274 |
| Total | 4,862 | 6,365 | 2,401 | 2,213 | 3,106 | 1,930 | 2,427 | 2,897 | 2,594 | 1,470 | 1,040 | 2,037 | 3,497 | 1,745 | 1,958 | 1,253 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

## UGASHIK LAKES ARCTIC GRAYLING

The Ugashik lakes are located on the Alaska Peninsula, 560 km southwest of Anchorage, and are within the Alaska Peninsula National Wildlife Refuge. Two popular sport fishery areas are the Ugashik Narrows, which connect the Upper and Lower Ugashik lakes, and the Outlet, which includes the upper 2 km of the Ugashik River between Lower Ugashik Lake and a large lagoon. The Ugashik Narrows is approximately 0.5 km long and consists of 2 main channels with moderately fast water. The Outlet consists of shallow, braided channels with moderately fast water. The Ugashik lakes area is accessible only by float plane or by boat from the village of Ugashik and Pilot Point, 40 km downstream from the Outlet.

### Fishery Description

Angler effort in the Ugashik lakes area is concentrated at the Narrows and Outlet, with limited effort expended in other parts of the drainage. Due to the inclement weather of the Alaska Peninsula and the remote nature of the Ugashik Narrows, fishing pressure is moderate. Three active and 1 inactive sport fishing lodges are located in the Ugashik lakes area. In addition, several lodges in the King Salmon area fly guests to the Ugashik lakes for day fishing trips.

Species of interest in the sport fishery include Arctic grayling, coho and sockeye salmon, Arctic char and Dolly Varden, and lake trout. Annual sport fishery harvest and catch are estimated for the drainage through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Rainbow trout have never been officially documented in the drainage but reports of catches and harvests of this species routinely appear in the SWHS.

The primary attraction in the drainage has been the Ugashik Narrows, which harbors a population of very large Arctic grayling. Studies indicate that the Arctic grayling at this site are an accumulation of old large fish (Meyer 1991). From 1967 through 1998, 66 trophy fish certificates or honorary catch-and-release certificates were issued for Arctic grayling in the Ugashik River drainage (Havens, ADF&G, Division of Sport Fish, Juneau, personal communication). From 2012 through 2016, the Ugashik drainage fisheries for all species have an average annual effort of 1,260 angler-days and an average catch of 409 grayling (Appendix A6). Harvest statistics are given in Table 26.

### Fishery Management and Objectives

Annual sport fishery harvest and effort are estimated through the SWHS (Alaska sport fishing survey database http://www.adfg.alaska.gov/sf/sportfishingsurvey/).

Sport fishing regulations are intended to assure the sport fishery does no harm to Arctic grayling populations and gives the populations sufficient opportunity to reproduce and possibly increase in abundance.

Management of the sport fishery for Arctic grayling in the Ugashik River drainage has been conservative since 1969, when the bag limit was reduced to 2 fish per day. The entire drainage was closed to the taking of Arctic grayling during 1990 through 1994 after studies found declining and very low grayling populations with old fish and poor recruitment (Meyer 1991; Villegas 1993). In 1995, the BOF allowed a sport harvest in portions of the drainage again, with a 5 fish per day daily bag limit in the Ugashik River drainage, excluding the Ugashik Narrows and Ugashik River, for the period of 1995 through 1997. The Ugashik Narrows has been

designated as a catch-and-release Arctic grayling fishery since 1995. The Ugashik River has been closed to Arctic grayling fishing since 1990. During their 1997 winter meeting, the BOF reduced the daily harvest limit to 2 fish per day, with no size restrictions in areas where harvest is allowed[12].

During much of the early and mid-1990s, the Ugashik Narrows was a site controversy over public access easements for this popular angling site. The state sought to preserve a site easement on Lower Ugashik Lake and a trail easement running north along the west side of the Narrows to public lands along Upper Ugashik Lake. Fly-in anglers had a tradition of getting dropped off on the shores of one lake, angling along the shores of the Narrows, and then getting picked up at the other lake at the end of the day. Frequent and rapid weather changes often made the different drop-off and pick-up sites a necessity for safe air travel. A Native corporation sought to obtain control of the lands along the Narrows and objected to the establishment of easements. From 1992 through 1997, there were extensive legal discussions. The state accumulated extensive documentation establishing historical use of the site and trail, and showed its determination to secure these easements through litigation or a negotiated agreement. In August 1997, the Native corporation chose to relinquish its selection of these lands, thereby allowing the lands to remain as public lands under the management of the Alaska Peninsula–Becharof National Wildlife Refuge. The Narrows and landing sites at both lakes continue to be accessible to the public. However, a portion of land on the southeast side of the outlet has been conveyed to a private, Native allotment applicant.

## 2018 Season

Estimates of sport fishing effort, catch, and harvest will not be available until 2019; however, anglers reported that sport fishing for Arctic grayling was average in 2018.

[12] Southwest Alaska sport fishing regulations summary, 2018 (effective until the 2019 summary is issued) Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

Table 26.–Sport harvest of Arctic grayling from the waters of BBMA by fishery, 2004–2017, with 1977–2003 average.

| Section and drainage | Average 1977–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Naknek R. | 110 | 27 | 76 | 80 | 526 | 33 | 35 | 14 | 0 | 0 | 0 | 10 | 264 | 16 | 58 | 14 |
| Brooks R. | 5 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kvichak R. | 246 | 0 | 48 | 137 | 220 | 464 | 130 | 295 | 49 | 0 | 0 | 21 | 33 | 23 | 15 | 24 |
| Copper R. | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 69 | 33 | 119 | 33 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 124 | 106 | 48 | 0 |
| Newhalen R. | 232 | 405 | 64 | 96 | 15 | 107 | 17 | 65 | 97 | 14 | 67 | 24 | 45 | 68 | 44 | 154 |
| Lake Clark | 294 | 198 | 110 | 58 | 82 | 180 | 241 | 205 | 96 | 70 | 42 | 41 | 121 | 66 | 68 | 299 |
| Other | 311 | 193 | 0 | 93 | 85 | 81 | 74 | 161 | 99 | 0 | 72 | 465 | 84 | 28 | 130 | 40 |
| Subtotal [a] | 1,264 | 856 | 417 | 497 | 993 | 891 | 497 | 763 | 341 | 84 | 181 | 571 | 671 | 307 | 363 | 531 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 662 | 1,507 | 210 | 100 | 339 | 243 | 122 | 176 | 261 | 380 | 37 | 98 | 38 | 0 | 111 | 68 |
| Mulchatna R. | 271 | 154 | 39 | 216 | 103 | 256 | 205 | 191 | 139 | 251 | 22 | 60 | 46 | 54 | 87 | 112 |
| Agulowak R. | 3 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Agulukpak R. | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 3 | 0 |
| Wood River L. [b] | 75 | 296 | 119 | 0 | 27 | 31 | 10 | 0 | 215 | 66 | 254 | 19 | 0 | 0 | 68 | 23 |
| Tikchik–Nuyakuk | 176 | 114 | 22 | 69 | 236 | 320 | 262 | 267 | 0 | 0 | 56 | 21 | 204 | 0 | 56 | 12 |
| Other | 300 | 34 | 32 | 77 | 121 | 0 | 0 | 14 | 0 | 0 | 45 | 20 | 0 | 0 | 13 | 0 |
| Subtotal [a] | 1,494 | 2,105 | 422 | 462 | 845 | 850 | 599 | 648 | 629 | 697 | 431 | 218 | 288 | 54 | 338 | 215 |
| Western | | | | | | | | | | | | | | | | |
| Togiak R. | 32 | 49 | 0 | 0 | 25 | 67 | 33 | 0 | 0 | 0 | 9 | 10 | 118 | 0 | 27 | 44 |
| Other | 5 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 29 | 28 | 0 | 0 | 0 | 0 | 6 | 0 |
| Subtotal [a] | 38 | 49 | 0 | 0 | 25 | 95 | 33 | 0 | 29 | 28 | 9 | 10 | 118 | 0 | 33 | 44 |
| Total | 2,796 | 3,010 | 839 | 959 | 1,863 | 1,836 | 1,129 | 1,411 | 999 | 809 | 621 | 799 | 1,077 | 361 | 733 | 790 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Prior data can be found in Mills (1979–1980, 1981a, 1981b, 1982–1994) and Howe et al. (1995, 1996).

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

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# APPENDIX A: CATCH TABLES

Appendix A1.–Sport catch of Chinook salmon from the BBMA by fishery, 2004–2017, with 1994–2003 average.

| Section and drainage | Avg. 1994–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Ugashik | 471 | 113 | 31 | 408 | 86 | 26 | 151 | 0 | 0 | 69 | 74 | 109 | 0 | 48 | 60 | 524 |
| Egegik–Becharof | 328 | 790 | 147 | 638 | 16 | 69 | 26 | 78 | 277 | 65 | 148 | 564 | 218 | 238 | 247 | 99 |
| Naknek R. | 7,742 | 10,495 | 5,664 | 6,548 | 3,746 | 3,067 | 5,294 | 4,374 | 5,667 | 5,731 | 2,846 | 3,482 | 3,716 | 8,758 | 4,907 | 4,421 |
| Naknek L. | 36 | 0 [a] | 0 [a] | 0 | 0 [a] | 0 | 0 | 39 | 0 | 0 | 29 | 0 | 18 | 0 | 9 | 0 |
| Bay of Islands | 8 | 0 [a] | 42 [a] | 313 [a] | 0 [a] | 13 | 0 | 0 | 17 | 0 | 0 | 216 | 36 | 0 | 50 | 0 |
| Brooks R. | 14 | 0 | 0 | 0 | 47 | 0 | 10 | 116 | 45 | 0 | 0 | 264 | 0 | 158 | 84 | 142 |
| Brooks L. | 6 | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | 556 | 160 [a] | 125 [a] | 66 [a] | 34 [a] | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kvichak R. | 394 | 90 | 452 | 384 | 612 | 900 | 680 | 365 | 246 | 70 | 372 | 79 | 0 | 527 | 210 | 733 |
| Copper R. | 11 | 27 | 15 | 0 | 0 | 104 | 0 | 0 | 0 | 755 | 15 | 0 | 0 | 0 | 154 | 0 |
| Alagnak R. | 3,184 | 6,600 | 6,526 | 8,383 | 4,772 | 1,898 | 2,609 | 2,842 | 4,416 | 1,249 | 3,502 | 4,265 | 4,299 | 5,613 | 3,786 | 3,673 |
| Newhalen R. | 6 | 67 | 0 | 0 | 0 | 207 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 0 | 9 | 0 |
| Lake Clark | 11 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 75 | 0 | 154 | 0 | 154 | 13 | 0 | 59 | 0 | 0 | 0 | 109 | 0 | 18 | 25 | 0 |
| Kulik R. | 33 | 0 | 0 | 143 | 0 | 0 | 10 | 830 | 0 | 0 | 0 | 0 | 20 | 0 | 4 | 0 |
| Tazimina R. | 6 | 0 [a] | 0 [a] | 48 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 16 | 6 | 0 |
| Other | 942 | 212 | 416 | 579 | 169 | 299 | 72 | 268 | 170 | 340 | 0 | 47 | 0 | 0 | 77 | 18 |
| Subtotal | 13,822 | 18,554 | 13,572 | 17,510 | 9,636 | 6,651 | 8,852 | 9,003 | 10,838 | 8,279 | 7,001 | 9,135 | 8,350 | 15,376 | 9,628 | 9,610 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 36,368 | 67,341 | 62,433 | 49,268 | 49,999 | 44,471 | 32,038 | 18,199 | 37,959 | 33,974 | 30,807 | 24,465 | 31,993 | 45,893 | 33,426 | 24,345 |
| Mulchatna R. | 3,233 | 1,070 | 1,959 | 1,408 | 1,193 | 438 | 391 | 118 | 1,477 | 1,254 | 997 | 1,034 | 716 | 253 | 851 | 231 |
| Agulowak R. | 36 | 27 | 0 | 115 | 0 | 13 | 26 | 0 | 0 | 0 | 0 | 31 | 0 | 34 | 13 | 125 |
| Agulukpak R. | 17 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 245 | 0 | 0 | 0 | 0 | 0 | 0 | 42 |
| Wood River L. | 560 | 756 | 483 | 1,016 | 1,045 | 158 | 235 | 159 | 42 | 56 | 184 | 357 | 688 | 51 | 267 | 118 |
| Tikchik–Nuyakuk. | 554 | 801 | 647 | 32 | 1,758 | 272 | 308 | 255 | 703 | 2,097 | 350 | 659 | 108 | 0 | 643 | 224 |
| Koktuli R. | 476 | 66 [a] | 50 [a] | 48 [a] | 683 [a] | 0 | 365 | 0 | 0 | 151 | 0 | 0 | 138 | 187 | 95 | 73 |
| Other | 1,059 | 770 | 1,707 | 746 | 291 | 103 | 691 | 29 | 1,253 | 0 | 0 | 20 | 215 | 52 | 57 | 636 |
| Subtotal | 42,304 | 70,831 | 67,294 | 52,633 | 55,174 | 45,455 | 34,054 | 18,760 | 41,679 | 37,532 | 32,338 | 26,566 | 33,858 | 46,470 | 35,353 | 25,794 |

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Appendix A1.–Page 2 of 2.

| Section and drainage | Avg. 1994–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Western | | | | | | | | | | | | | | | | |
| Togiak | 4,177 | 10,043 | 10,084 | 13,766 | 8,319 | 2,453 | 4,765 | 5,213 | 9,096 | 6,719 | 6,392 | 10,671 | 5,620 | 5,405 | 6,961 | 5,320 |
| Other | 98 | 0 | 0 | 0 | 205 | 0 | 88 | 0 | 545 | 0 | 106 | 69 | 258 | 254 | 137 | 456 |
| Subtotal | 4,275 | 10,043 | 10,084 | 13,766 | 8,319 | 2,453 | 4,853 | 5,213 | 9,641 | 6,719 | 6,498 | 10,740 | 5,878 | 5,659 | 7,099 | 5,776 |
| Total | 60,400 | 99,428 | 90,950 | 83,909 | 73,129 | 54,559 | 47,759 | 32,976 | 62,158 | 52,530 | 45,837 | 46,441 | 48,086 | 67,505 | 52,080 | 41,180 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Data from prior years can be found in Howe et al. (1995, 1996).

[a] Unpublished estimates from SWHS for sites with less than 12 responses.

Appendix A2.–Sport catch of coho salmon from the BBMA by fishery, 2004–2017, with 1994–2003 average.

| Section and drainage | Avg. 1994–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Ugashik | 2,016 | 4,086 | 4,486 | 2,285 | 2,178 | 258 | 2,205 | 1,062 | 688 | 893 | 1,187 | 2,426 | 4,759 | 559 | 1,965 | 358 |
| Egegik–Becharof | 1,139 | 1,929 | 4,203 | 3,033 | 3,040 | 2,414 | 1,976 | 4,962 | 3,693 | 4,281 | 2,309 | 4,797 | 3,932 | 6,706 | 4,405 | 10,993 |
| Naknek R. | 6,609 | 12,985 | 5,824 | 9,182 | 7,278 | 9,723 | 9,065 | 10,863 | 6,416 | 6,391 | 3,359 | 10,130 | 6,892 | 5,113 | 6,377 | 11,176 |
| Naknek L. | 88 | 54 [a] | 877 [a] | 133 | 194 | 157 | 25 | 34 [a] | 0 | 39 | 114 | 28 | 506 | 148 | 167 | 58 |
| Bay of Islands | 30 | 0 [a] | 0 [a] | 0 | 128 | 59 | 0 | 0 [a] | 0 | 0 | 31 | 120 | 33 | 16 | 40 | 947 |
| Brooks R. | 457 | 466 | 29 | 296 | 189 | 388 | 460 | 132 | 18 | 29 | 61 | 293 | 17 | 202 | 120 | 195 |
| Brooks L. | 37 | 0 [a] | 0 [a] | 136 | 266 | 0 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 171 | 34 | 0 |
| American Cr. | 33 | 0 | 132 | 62 | 67 | 303 | 0 | 0 | 0 | 0 | 240 | 0 | 0 | 0 | 48 | 0 |
| King Salmon R. | 480 | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 [a] | 27 | 0 | 11 | 386 | 1,147 | 34 | 316 | 869 |
| Kvichak R. | 1,327 | 2,237 | 3,334 | 4,455 | 1,648 | 3,959 | 2,443 | 2,496 | 3,797 | 2,734 | 2,828 | 1,493 | 1,287 | 968 | 1,862 | 1,551 |
| Copper R. | 234 | 0 | 0 | 27 | 631 | 115 | 247 | 82 | 181 | 14 | 101 | 521 | 535 | 69 | 248 | 104 |
| Alagnak R. | 3,616 | 3,699 | 4,885 | 13,128 | 3,780 | 4,582 | 3,914 | 2,287 | 3,551 | 2,958 | 5,446 | 10,663 | 3,368 | 1,438 | 4,775 | 6,219 |
| Newhalen R. | 457 | 1,005 | 15 | 30 | 48 | 93 | 40 | 47 | 60 | 0 | 144 | 52 | 722 | 127 | 209 | 220 |
| L Talarik Cr. | 119 | 167 | 44 | 18 | 27 | 19 | 0 | 0 [a] | 0 | 0 | 172 | 10 | 118 | 0 | 60 | 550 |
| Lake Clark | 135 | 196 | 0 | 0 | 288 | 192 | 15 | 22 | 27 | 0 | 15 | 179 | 225 | 776 | 239 | 139 |
| Lake Iliamna | 249 | 91 | 292 | 429 | 192 | 48 | 507 | 310 | 202 | 27 | 0 | 31 | 1,013 | 137 | 242 | 64 |
| Kulik R. | 63 | 39 | 0 | 62 | 48 | 106 | 128 | 286 | 27 | 127 | 229 | 112 | 71 | 0 | 108 | 58 |
| Tazimina R. | 0 | 11 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Moraine Cr. | 52 | 0 | 0 | 0 | 0 | 19 | 61 | 17 | 27 | 0 | 0 | 153 | 118 | 0 | 54 | 0 |
| Other | 2,149 | 1,387 | 292 | 142 | 412 | 1,461 | 450 | 1,540 | 678 | 647 | 486 | 20 | 0 | 582 | 347 | 233 |
| Subtotal | 19,291 | 28,352 | 24,413 | 33,418 | 20,414 | 23,896 | 21,356 | 24,140 | 19,257 | 18,140 | 16,733 | 31,414 | 24,743 | 17,046 | 21,615 | 33,734 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 4,690 | 11,721 | 7,251 | 7,566 | 4,521 | 19,761 | 15,619 | 7,518 | 5,981 | 10,220 | 9,811 | 14,124 | 8,181 | 6,716 | 9,810 | 2,355 |
| Mulchatna R. | 1,290 | 1,260 | 1,445 | 2,639 | 2,075 | 1,171 | 520 | 411 | 563 | 389 | 1,717 | 1,900 | 3,004 | 560 | 1,514 | 2,193 |
| Agulowak R. | 209 | 225 | 0 | 639 | 238 | 484 | 879 | 42 | 237 | 156 | 106 | 198 | 84 | 137 | 136 | 209 |
| Agulukpak R. | 136 | 131 | 27 | 158 | 306 | 29 | 61 | 0 | 36 | 0 | 275 | 593 | 12 | 0 | 176 | 324 |
| Wood River L. | 1,508 | 5,673 | 2,538 | 2,723 | 2,050 | 630 | 989 | 1,965 | 1,350 | 627 | 2,864 | 2,036 | 2,349 | 1,354 | 1,846 | 3,543 |
| Tikchik–Nuyakuk. | 601 | 2,207 | 88 | 471 | 67 | 1,717 | 122 | 1,426 | 846 | 0 | 122 | 204 | 556 | 297 | 236 | 2,012 |
| Other | 1,431 | 2,365 | 1,881 | 4,125 | 1,273 | 3,708 | 881 | 979 | 369 | 97 | 92 | 254 | 574 | 0 | 203 | 131 |
| Subtotal | 9,891 | 23,582 | 13,230 | 18,321 | 10,530 | 27,500 | 19,071 | 12,341 | 9,382 | 11,489 | 14,987 | 19,309 | 14,760 | 9,064 | 13,922 | 10,767 |

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Appendix A2.–Page 2 of 2.

| Section and drainage | Avg. 1994–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Western | | | | | | | | | | | | | | | | |
| Togiak | 6,243 | 21,279 | 15,072 | 16,359 | 11,712 | 22,234 | 5,422 | 6,471 | 5,007 | 17,424 | 4,258 | 10,051 | 14,672 | 15,017 | 12,284 | 16,541 |
| Other | 220 | 0 | 0 | 0 | 0 | 163 | 0 | 0 | 2,860 | 764 | 984 | 778 | 3,195 | 1,884 | 1,521 | 2,726 |
| Subtotal | 6,463 | 21,279 | 15,072 | 16,359 | 11,712 | 22,397 | 5,422 | 6,471 | 7,867 | 18,188 | 5,242 | 10,829 | 17,867 | 16,901 | 13,805 | 19,267 |
| Total | 35,645 | 73,213 | 52,715 | 68,098 | 42,656 | 73,793 | 45,849 | 42,952 | 36,506 | 47,817 | 36,962 | 61,552 | 57,370 | 43,011 | 49,342 | 63,768 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Data from prior years can be found in Howe et al. (1995, 1996).

[a] Unpublished estimates from SWHS for sites with less than 12 responses.

Appendix A3.–Sport catch of sockeye salmon from the BBMA by fishery, 2004–2017, with 1994–2003 average.

| Section and drainage | Avg. 1994–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Ugashik | 2,290 | 1,884 | 133 | 321 | 1,472 | 70 | 349 | 1,025 | 932 | 1,824 | 1,022 | 504 | 1,325 | 180 | 971 | 265 |
| Egegik–Becharof | 945 | 840 | 109 | 430 | 973 | 13 | 214 | 128 | 641 | 397 | 178 | 2,116 | 444 | 227 | 672 | 442 |
| Naknek R. | 2,183 | 4,050 | 3,054 | 11,518 | 9,456 | 12,356 | 14,134 | 8,681 | 7,739 | 8,610 | 6,977 | 8,521 | 9,095 | 11,103 | 8,861 | 8,439 |
| Naknek L. | 626 | 0 [a] | 0 [a] | 96 | 189 [a] | 363 | 694 | 0 | 158 | 138 | 445 | 1,065 | 1,182 | 1,901 | 946 | 342 |
| Bay of Islands | 130 | 451 [a] | 46 [a] | 940 [a] | 46 [a] | 168 [a] | 0 [a] | 0 [a] | 153 [a] | 0 | 114 | 0 | 63 | 175 | 70 | 80 |
| Brooks R. | 3,877 | 2,884 | 2,027 | 3,341 | 1,736 | 3,729 | 2,350 | 2,819 | 1,725 | 2,119 | 2,103 | 5,032 | 1,788 | 2,638 | 2,736 | 2,299 |
| Brooks L. | 308 | 124 [a] | 61 [a] | 220 [a] | 305 [a] | 342 [a] | 101 [a] | 149 [a] | 47 [a] | 261 | 303 | 890 | 353 | 157 | 393 | 0 |
| American Cr. | 868 | 0 | 291 | 664 | 89 | 479 | 1,357 | 276 | 572 | 240 | 719 | 2,089 | 319 | 164 | 706 | 2,979 |
| King Salmon R. | 179 | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 | 19 | 0 | 0 | 35 | 11 | 0 |
| Kvichak R. | 6,199 | 4,245 | 4,064 | 6,063 | 4,244 | 11,003 | 7,165 | 7,621 | 8,911 | 4,478 | 3,367 | 7,076 | 3,288 | 9,242 | 5,490 | 8,930 |
| Copper R. | 2,822 | 625 | 1,113 | 2,372 | 1,235 | 1,085 | 1,590 | 2,355 | 2,296 | 1,864 | 2,145 | 3,118 | 2,034 | 990 | 2,030 | 812 |
| Alagnak R. | 11,333 | 7,876 | 15,260 | 8,612 | 10,971 | 12,446 | 10,973 | 7,235 | 5,900 | 8,730 | 5,107 | 2,280 | 12,163 | 5,890 | 6,834 | 9,156 |
| Newhalen R. | 11,895 | 4,714 | 3,533 | 4,566 | 3,270 | 3,409 | 3,920 | 1,675 | 1,406 | 2,553 | 3,913 | 1,295 | 6,270 | 1,648 | 3,136 | 6,604 |
| L Talarik Cr. | 458 | 248 | 0 | 353 [a] | 0 [a] | 0 | 0 | 73 [a] | 67 [a] | 68 | 256 | 427 | 133 | 0 | 177 | 121 |
| Lake Clark | 1,008 | 1,388 | 503 | 350 | 141 | 864 | 0 [a] | 238 | 429 | 471 | 1,024 | 734 | 811 | 919 | 792 | 1,425 |
| Lake Iliamna | 2,505 | 1,915 | 1,333 | 3,398 | 986 | 2,407 | 1,375 | 2,260 | 1,171 | 811 | 0 | 4,828 | 2,559 | 1,042 | 1,848 | 40 |
| Kulik R. | 485 | 1,335 | 463 | 1,090 | 561 | 563 | 1,072 | 505 | 799 | 1,405 | 264 | 1,227 | 80 | 0 | 595 | 1,406 |
| Tazimina R. | 200 | 45 [a] | 0 [a] | 651 [a] | 0 [a] | 0 [a] | 124 [a] | 0 [a] | 0 [a] | 0 | 530 | 0 | 197 | 0 | 145 | 0 |
| Moraine Cr. | 384 | 1,306 | 897 | 574 | 893 | 884 | 662 | 1,022 | 945 | 1,765 | 1,958 | 704 | 455 | 401 | 1,057 | 891 |
| Other | 5,380 | 2,649 | 4,009 | 1,752 | 3,351 | 4,192 | 5,033 | 3,119 | 67 | 1,186 | 2,157 | 1,070 | 41 | 2,731 | 1,437 | 612 |
| Subtotal | 54,075 | 36,579 | 36,896 | 47,311 | 39,918 | 54,373 | 51,113 | 39,181 | 21,991 | 36,920 | 32,601 | 42,976 | 42,600 | 39,443 | 32,423 | 44,843 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 2,281 | 1,103 | 2,054 | 1,956 | 1,492 | 1,543 | 555 | 2,144 | 576 | 954 | 786 | 753 | 1,671 | 1,097 | 1,052 | 3,716 |
| Mulchatna R. | 1,593 | 564 | 1,794 | 1,038 | 205 | 221 | 668 | 140 | 1,164 | 686 | 720 | 464 | 1,284 | 361 | 703 | 753 |
| Agulowak R. | | 241 | 1,539 | 3,943 | 2,025 | 1,466 | 2,374 | 3,355 | 784 | 1,276 | 600 | 2,063 | 676 | 437 | 1,010 | 1,743 |
| Agulukpak R. | | 1,465 | 351 | 2,571 | 1,006 | 629 | 1,316 | 312 | 2,323 | 310 | 203 | 347 | 540 | 178 | 316 | 916 |
| Wood River L. | 4,718 | 2,536 | 1,680 | 7,506 | 5,513 | 2,923 | 2,868 | 2,653 | 3,222 | 982 | 3,423 | 6,575 | 2,638 | 444 | 2,812 | 3,223 |
| Tikchik–Nuyakuk. | 514 | 169 | 0 | 11 | 91 | 765 | 254 | 65 | 277 | 614 | 204 | 583 | 250 | 175 | 365 | 508 |
| Koktuli | 967 | 260 [a] | 0 [a] | 184 [a] | 513 [a] | 61 [a] | 101 [a] | 0 [a] | 0 [a] | 27 | 0 | 0 | 199 | 105 | 66 | 0 |
| Other | 1,076 | 181 | 412 | 303 | 50 | 1,408 | 77 | 0 | 1,165 | 112 | 132 | 348 | 60 | 638 | 258 | 0 |
| Subtotal | 11,149 | 6,519 | 7,830 | 17,512 | 10,895 | 9,016 | 8,213 | 8,669 | 9,511 | 4,961 | 6,068 | 11,133 | 7,318 | 3,435 | 5,486 | 10,859 |

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| Section and drainage | Avg. 1994–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Western | | | | | | | | | | | | | | | | |
| Togiak | 1,144 | 3,690 | 2,452 | 835 | 2,424 | 653 | 920 | 290 | 654 | 2,110 | 191 | 636 | 1,146 | 2,838 | 1,384 | 1,575 |
| Other | 30 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 50 | 360 | 435 | 299 | 160 | 261 | 80 |
| Subtotal | 1,174 | 3,690 | 2,452 | 835 | 2,424 | 681 | 920 | 290 | 654 | 2,160 | 551 | 1,071 | 1,445 | 2,998 | 1,645 | 1,655 |
| Total | 66,398 | 46,788 | 47,178 | 65,658 | 53,237 | 64,070 | 60,246 | 48,140 | 32,156 | 44,041 | 39,220 | 55,180 | 51,363 | 45,876 | 39,554 | 57,357 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Data from prior years can be found in Howe et al. (1995, 1996).

[a] Unpublished estimates from SWHS for sites with less than 12 responses.

Appendix A4.–Sport catch of rainbow trout from the BBMA by fishery, 2004–2017, with 1991–2003 average.

| Section and drainage | Avg. 1991–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Naknek R. | 25,609 | 20,497 | 16,431 | 15,555 | 25,692 | 19,886 | 31,097 | 22,555 | 21,869 | 15,794 | 15,779 | 19,876 | 21,311 | 36,277 | 21,807 | 20,823 |
| Brooks R. | 15,793 | 9,728 | 8,804 | 13,399 | 14,284 | 15,891 | 14,648 | 13,127 | 16,144 | 14,896 | 15,513 | 12,243 | 7,954 | 8,500 | 11,821 | 17,100 |
| Kvichak R. | 18,104 | 25,564 | 13,435 | 31,293 | 30,912 | 24,545 | 23,644 | 18,739 | 13,753 | 11,429 | 16,827 | 19,837 | 21,906 | 13,259 | 16,652 | 15,825 |
| Copper R. | 23,179 | 15,164 | 8,273 | 13,571 | 14,548 | 14,644 | 18,751 | 25,418 | 18,247 | 29,479 | 30,317 | 30,138 | 27,942 | 23,328 | 28,241 | 20,923 |
| Alagnak R. | 34,518 | 19,371 | 37,195 | 40,008 | 39,564 | 22,194 | 19,153 | 6,711 | 12,536 | 6,735 | 9,411 | 8,483 | 30,038 | 15,266 | 13,987 | 21,851 |
| Newhalen | 4,702 | 2,720 | 2,600 | 2,654 | 1,615 | 1,696 | 357 | 1,209 | 1,317 | 31 | 1,317 | 603 | 1,358 | 3,017 | 1,265 | 4,671 |
| Lake Clark | 690 | 2,043 | 415 | 47 | 2,309 | 13 | 1,233 | 151 | 20 | 177 | 383 | 178 | 1,147 | 418 | 461 | 857 |
| Other | 57,544 | 48,673 | 36,884 | 63,275 | 59,502 | 72,946 | 76,422 | 89,016 | 48,267 | 36,002 | 49,384 | 70,949 | 47,585 | 68,482 | 54,480 | 60,769 |
| Subtotal [a,b] | 180,139 | | | | | | | | | | | | | 168,547 | 148,714 | 162,819 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak | 15,323 | 11,956 | 6,638 | 5,609 | 6,616 | 5,478 | 11,785 | 2,926 | 3,937 | 5,256 | 3,497 | 3,302 | 4,003 | 4,727 | 4,157 | 2,592 |
| Mulchatna | 6,559 | 5,201 | 2,001 | 4,046 | 4,429 | 2,365 | 1,954 | 901 | 795 | 735 | 419 | 735 | 2,499 | 2,395 | 1,357 | 2,045 |
| Agulowak | 10,734 | 5,230 | 6,885 | 7,465 | 10,760 | 8,026 | 5,281 | 2,517 | 2,567 | 1,726 | 2,292 | 5,079 | 2,918 | 6,259 | 3,655 | 8,069 |
| Agulukpak | 13,799 | 8,335 | 4,966 | 6,130 | 5,965 | 4,767 | 5,374 | 3,413 | 5,744 | 1,803 | 1,902 | 4,526 | 6,840 | 6,145 | 4,243 | 7,344 |
| Wood R. [c] | 10,532 | 4,575 | 7,270 | 6,773 | 5,784 | 4,058 | 2,221 | 3,293 | 5,403 | 578 | 3,344 | 3,015 | 7,791 | 728 | 3,091 | 2,205 |
| Tikchik–Nuyakuk | 2,901 | 5,167 | 1,038 | 588 | 1,426 | 1,016 | 695 | 720 | 1,083 | 813 | 1,116 | 1,135 | 2,611 | 1,026 | 1,340 | 2,056 |
| Other | 4,583 | 5,018 | 2,538 | 3,331 | 1,329 | 1,014 | 460 | 277 | 841 | 352 | 211 | 685 | 1,053 | 522 | 565 | 993 |
| Subtotal [a] | 64,431 | 45,482 | 31,336 | 33,942 | 36,309 | 26,724 | 27,770 | 14,047 | 20,370 | 11,263 | 12,781 | 18,477 | 27,715 | 21,802 | 18,408 | 25,304 |
| Western | | | | | | | | | | | | | | | | |
| Togiak R. | 2,339 | 5,716 | 3,475 | 2,261 | 2,282 | 3,977 | 3,638 | 2,256 | 3,242 | 2,741 | 1,318 | 1,889 | 2,605 | 2,086 | 2,128 | 4,113 |
| Other | 151 | 445 | 0 | 0 | 0 | 121 | 0 | 0 | 0 | 27 | 58 | 64 | 176 | 0 | 65 | 865 |
| Subtotal [a] | 2,490 | 6,161 | 3,475 | 2,261 | 2,282 | 4,098 | 3,638 | 2,256 | 3,242 | 2,768 | 1,376 | 1,953 | 2,781 | 2,086 | 2,193 | 4,978 |
| Total [d] | 247,060 | | | | | | | | | | | | | 192,435 | 169,314 | 193,101 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: https://intra.sf.adfg.state.ak.us/swhs_est/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Data from prior years can be found in Mills (1992, 1993) and Howe et al. (1994, 1995).

[a] Subtotals of averages may not be the sum of the drainages because information for some drainages is not available for some years.

[b] Subtotals for the Eastern Section for 2004–2015 follow respectively: 143,760; 124,037; 179,802; 188,426; 171,815; 185,305; 176,926; 132,153; 114,543; 138,931; 162,307; and 159,241.

[c] Wood River Lakes includes Lake Nunavaugaluk. Prior to 1998, Agulowak and Agulukpak rivers were included in Wood River Lakes.

[d] Totals for all sections for 2004–2015 follow, respectively: 195,403; 158,848; 216,005; 227,017; 202,637; 216,713; 193,229; 155,765; 128,574; 153,088; 182,737; and 189,737.

Appendix A5.–Sport catch of Dolly Varden and Arctic char from the BBMA by fishery, 2004–2017, with 1991–2003 average.

| Section and drainage | Avg. 1991–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Ugashik R. | 3,229 | 8,393 | 1,838 | 338 | 3,150 | 5,097 | 5,923 | 7,327 | 3,846 | 2,277 | 3,153 | 11,013 | 4,588 | 2,648 | 4,736 | 7,259 |
| Egegik–Becharof | 3,416 | 5,353 | 2,125 | 1,194 | 3,388 | 975 | 2,245 | 4,268 | 4,402 | 8,180 | 3,698 | 12,144 | 5,357 | 7,634 | 7,403 | 4,695 |
| Naknek R. | 2,994 | 8,661 | 6,361 | 4,439 | 4,640 | 3,817 | 10,259 | 7,729 | 5,665 | 5,465 | 5,837 | 5,673 | 7,034 | 6,815 | 6,165 | 3,468 |
| Naknek L. | 431 | 227 | 0 | 14 | 281 | 332 | 646 | 445 | 128 | 1,151 | 1,522 | 1,969 | 626 | 771 | 1,208 | 43 |
| Bay of Isl. | 250 | 797 | 177 | 70 | 106 | 258 | 204 | 66 | 400 | 0 | 56 | 0 | 71 | 0 | 25 | 608 |
| Brooks R. | 584 | 296 | 219 | 1,333 | 1,763 | 431 | 1,632 | 917 | 1,112 | 1,892 | 2,131 | 1,094 | 924 | 1,215 | 1,451 | 731 |
| Brooks L. | 93 | 0 | 0 | 0 | 150 | 0 | 163 | 74 | 62 | 182 | 0 | 0 | 97 | 0 | 56 | 0 |
| American Cr. | 5,292 | 7,795 | 4,917 | 5,164 | 5,063 | 10,465 | 9,664 | 14,725 | 9,651 | 5,584 | 9,848 | 8,260 | 9,140 | 2,723 | 7,111 | 10,622 |
| King Salmon R. | 478 | 0 | 0 | 0 | 264 | 0 | 0 | 44 | 0 | 0 | 70 | 0 | 0 | 754 | 165 | 363 |
| Kvichak R. | 1,457 | 2,657 | 599 | 2,276 | 1,156 | 744 | 2,973 | 2,040 | 1,130 | 1,205 | 1,232 | 1,511 | 1,877 | 1,069 | 1,379 | 1,169 |
| Copper R. | 1,232 | 642 | 645 | 665 | 406 | 956 | 162 | 413 | 1,326 | 5,873 | 2,055 | 7,131 | 3,132 | 3,059 | 4,250 | 933 |
| Alagnak R. | 1,792 | 1,312 | 2,864 | 1,602 | 2,817 | 2,877 | 2,694 | 723 | 1,118 | 1,137 | 1,919 | 2,248 | 6,555 | 1,909 | 2,754 | 1,556 |
| Newhalen R. | 1,152 | 203 | 463 | 866 | 653 | 169 | 22 | 212 | 180 | 0 | 431 | 17 | 295 | 850 | 319 | 659 |
| L Talarik Cr. | 114 | 61 | 108 | 0 | 0 | 73 | 0 | 83 | 21 | 0 | 0 | 67 | 0 | 481 | 110 | 44 |
| Lake Clark | 642 | 810 | 208 | 76 | 232 | 278 | 517 | 29 | 409 | 1,207 | 133 | 717 | 1,329 | 340 | 745 | 569 |
| Lake Iliamna | 685 | 800 | 1,539 | 1,248 | 175 | 940 | 1,092 | 1,393 | 749 | 2,854 | 347 | 4,145 | 6,005 | 11,216 | 4,913 | 8,806 |
| Kulik R. | 143 | 531 | 768 | 903 | 386 | 1,191 | 896 | 1,234 | 207 | 689 | 678 | 745 | 465 | 530 | 621 | 1,213 |
| Tazimina R. | 236 | 13 | 0 | 66 | 0 | 0 | 0 | 0 | 0 | 0 | 106 | 0 | 78 | 0 | 37 | 201 |
| Moraine Cr. | 133 | 24 | 269 | 79 | 62 | 1,685 | 875 | 571 | 435 | 806 | 750 | 1,724 | 2,694 | 519 | 1,299 | 143 |
| Other | 8,727 | 406 | 2,627 | 0 | 1,243 | 1,286 | 3,023 | 878 | 2,882 | 410 | 9,742 | 4,602 | 2,874 | 2,238 | 3,973 | 946 |
| Subtotal | 33,003 | 38,981 | 25,727 | 20,333 | 25,935 | 31,574 | 42,990 | 43,171 | 33,723 | 38,912 | 43,708 | 63,060 | 53,141 | 44,771 | 48,718 | 44,028 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 6,785 | 12,353 | 8,358 | 3,791 | 5,385 | 5,997 | 9,753 | 3,804 | 4,329 | 7,170 | 9,724 | 11,001 | 15,224 | 12,263 | 11,076 | 1,147 |
| Mulchatna R. | 1,439 | 3,588 | 1,584 | 935 | 2,458 | 2,099 | 1,072 | 844 | 1,439 | 121 | 504 | 338 | 3,608 | 2,896 | 1,493 | 580 |
| Agulowak R. | 4,777 | 3,776 | 5,133 | 3,743 | 5,198 | 7,037 | 3,298 | 4,243 | 2,241 | 861 | 2,551 | 4,129 | 4,602 | 6,397 | 3,708 | 5,909 |
| Agulukpak R. | 2,884 | 6,074 | 2,128 | 3,088 | 3,802 | 3,279 | 3,416 | 7,124 | 4,486 | 1,612 | 2,395 | 1,560 | 1,297 | 1,460 | 1,665 | 1,176 |
| Wood River L | 13,133 | 22,536 | 14,528 | 10,971 | 8,215 | 13,148 | 7,812 | 9,602 | 6,793 | 4,710 | 14,260 | 5,479 | 9,351 | 5,481 | 7,856 | 5,879 |
| Tikchik–Nuyakuk | 2,742 | 6,712 | 1,723 | 2,158 | 1,217 | 1,567 | 2,152 | 4,079 | 1,662 | 310 | 828 | 2,178 | 4,733 | 181 | 1,646 | 3,236 |
| Koktuli R. | 534 | 327 | 657 | 148 | 74 | 24 | 410 | 0 | 41 | 558 | 0 | 1,218 | 1,072 | 2,422 | 1,054 | 165 |
| Other | 1,517 | 4,043 | 824 | 2,034 | 447 | 2,003 | 511 | 737 | 263 | 2,043 | 346 | 307 | 1,350 | 521 | 913 | 527 |
| Subtotal | 30,233 | 59,409 | 34,935 | 26,868 | 26,796 | 35,154 | 28,424 | 30,433 | 21,254 | 17,385 | 30,608 | 26,210 | 41,237 | 31,621 | 29,412 | 18,619 |

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Appendix A5.–Page 2 of 2.

| Section and drainage | Avg. 1991–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Western | | | | | | | | | | | | | | | | |
| Togiak | 3,439 | 11,432 | 8,450 | 5,586 | 4,127 | 8,667 | 6,568 | 2,512 | 9,087 | 4,165 | 2,085 | 7,528 | 12,486 | 3,479 | 5,949 | 4,728 |
| Other | 125 | 0 | 235 | 0 | 0 | 335 | 132 | 0 | 213 | 308 | 322 | 322 | 169 | 642 | 353 | 581 |
| Subtotal | 3,564 | 11,432 | 8,685 | 5,586 | 4,127 | 9,002 | 6,700 | 2,512 | 9,300 | 4,473 | 2,407 | 7,850 | 12,655 | 4,121 | 6,301 | 5,309 |
| Total | 66,800 | 109,822 | 69,347 | 52,787 | 56,858 | 75,730 | 78,114 | 76,116 | 64,277 | 60,770 | 76,723 | 97,120 | 107,033 | 80,513 | 84,432 | 67,956 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: https://intra.sf.adfg.state.ak.us/swhs_est/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Data from prior years can be found in Mills (1992, 1993) and Howe et al. (1994, 1995).

Appendix A6.–Sport catch of Arctic grayling from the waters of the BBMA by fishery, 2004–2017, with 1991–2003 average.

| Section and drainage | Avg. 1991–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | | | | | | |
| Ugashik R. | 1,698 | 1,317 | 3,139 | 459 | 884 | 559 | 946 | 763 | 766 | 207 | 561 | 708 | 251 | 319 | 409 | 180 |
| Egegik–Becharof | 1,491 | 1,920 | 716 | 652 | 1,193 | 296 | 541 | 2,683 | 2,021 | 857 | 2,847 | 1,107 | 1,130 | 1,015 | 1,391 | 457 |
| Naknek R. | 2,566 | 1,054 | 1,803 | 419 | 2,345 | 1,261 | 3,985 | 2,171 | 1,369 | 1,886 | 2,100 | 1,811 | 3,606 | 2,054 | 2,291 | 1,137 |
| Naknek L. | 110 | 488 | 0 | 63 | 15 | 0 | 50 | 92 | 0 | 81 | 144 | 89 | 0 | 21 | 67 | 0 |
| Bay of Islands | 41 | 0 | 0 | 39 | 58 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 5 | 0 |
| Brooks R. | 812 | 325 | 132 | 0 | 248 | 360 | 465 | 237 | 89 | 315 | 1,429 | 204 | 368 | 308 | 525 | 860 |
| Brooks L. | 16 | 0 | 0 | 0 | 47 | 0 | 0 | 14 | 118 | 0 | 0 | 89 | 166 | 0 | 51 | 0 |
| American Cr. | 214 | 373 | 119 | 256 | 344 | 1,048 | 210 | 189 | 261 | 31 | 423 | 110 | 1,664 | 31 | 452 | 2,265 |
| King Salmon R. (Ugashik) | 313 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kvichak R. | 5,351 | 4,028 | 3,241 | 3,499 | 7,362 | 8,483 | 6,816 | 6,276 | 3,876 | 7,873 | 6,091 | 6,746 | 12,383 | 2,939 | 7,206 | 2,133 |
| Copper R. | 382 | 195 | 0 | 174 | 295 | 27 | 112 | 1,089 | 49 | 151 | 515 | 955 | 83 | 77 | 356 | 206 |
| Alagnak R. | 4,736 | 2,429 | 5,580 | 5,252 | 5,856 | 6,176 | 5,525 | 732 | 3,333 | 4,274 | 7,114 | 1,588 | 6,557 | 716 | 4,050 | 1,502 |
| Newhalen R. | 4,932 | 1,648 | 1,855 | 2,108 | 2,096 | 1,466 | 138 | 171 | 274 | 211 | 1,888 | 706 | 6,277 | 1,450 | 2,106 | 7,490 |
| L Talarik Cr. | 469 | 0 | 70 | 790 | 76 | 98 | 301 | 99 | 245 | 0 | 36 | 203 | 0 | 95 | 67 | 153 |
| Lake Clark | 4,716 | 7,400 | 3,438 | 1,385 | 3,929 | 4,873 | 4,172 | 2,821 | 3,647 | 1,501 | 3,799 | 2,496 | 3,319 | 3,649 | 2,953 | 4,415 |
| Lake Iliamna | 633 | 16 | 22 | 24 | 314 | 67 | 229 | 30 | 196 | 637 | | 4,266 | 674 | 2,547 | 2,031 | 293 |
| Kulik R. | 55 | 49 | 206 | 496 | 175 | 14 | 429 | 59 | 0 | 172 | 1,489 | 48 | 705 | 157 | 514 | 168 |
| Tazimina R. | 1,593 | 68 | 2,015 | 750 | 0 | 352 | 220 | 166 | 49 | 344 | 1,606 | 91 | 0 | 111 | 430 | 681 |
| Moraine Cr. | 425 | 290 | 303 | 109 | 241 | 648 | 284 | 1,309 | 396 | 1,204 | 969 | 1,143 | 2,400 | 251 | 1,193 | 550 |
| Other | 5,647 | 5,092 | 937 | 1,235 | 2,452 | 1,784 | 2,238 | 4,816 | 2,172 | 632 | 969 | 4,499 | 336 | 219 | 1,331 | 1,104 |
| Subtotal | 36,017 | 26,692 | 23,576 | 17,710 | 27,930 | 27,512 | 26,661 | 23,717 | 18,861 | 20,376 | 32,003 | 23,144 | 34,932 | 12,550 | 24,601 | 21,820 |
| Central | | | | | | | | | | | | | | | | |
| Nushagak R. | 14,178 | 22,537 | 11,400 | 7,659 | 7,395 | 6,399 | 10,965 | 3,840 | 3,423 | 7,034 | 7,801 | 4,926 | 10,038 | 2,988 | 6,557 | 3,608 |
| Mulchatna R. | 3,965 | 2,402 | 1,485 | 3,434 | 1,056 | 2,273 | 855 | 2,008 | 1,771 | 1,360 | 504 | 292 | 2,808 | 1,106 | 1,214 | 2,651 |
| Agulowak R. | 2,315 | 1,458 | 2,450 | 1,520 | 4,800 | 1,322 | 2,001 | 991 | 1,157 | 275 | 1,065 | 1,563 | 1,187 | 1,378 | 1,094 | 3,480 |
| Agulukpak R. | 2,135 | 4,042 | 1,916 | 1,748 | 1,192 | 1,235 | 960 | 1,008 | 1,191 | 1,206 | 1,453 | 872 | 1,616 | 817 | 1,193 | 3,044 |

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Appendix A6.–Page 2 of 2.

| Section and drainage | Avg. 1991–2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Avg. 2012–2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wood River L. | 4,836 | 6,143 | 5,119 | 1,133 | 7,235 | 4,025 | 2,142 | 2,405 | 3,446 | 2,052 | 6,873 | 1,732 | 5,586 | 285 | 3,306 | 809 |
| Tikchik–Nuyakuk L. | 7,128 | 11,271 | 3,721 | 1,303 | 6,442 | 7,861 | 3,698 | 8,098 | 1,904 | 2,688 | 4,174 | 2,840 | 7,809 | 812 | 3,665 | 2,711 |
| Koktuli R. | 1,335 | 91 | 603 | 743 | 341 | 0 | 328 | 0 | 29 | 0 | 22 | 426 | 615 | 556 | 324 | 1,156 |
| Other | 4,155 | 5,840 | 1,598 | 2,564 | 2,440 | 2,250 | 2,394 | 103 | 1,628 | 1,370 | 23 | 290 | 490 | 115 | 458 | 355 |
| Subtotal | 37,891 | 53,784 | 28,292 | 20,104 | 30,901 | 25,365 | 23,343 | 18,453 | 14,549 | 15,985 | 21,915 | 12,941 | 30,149 | 8,057 | 17,809 | 17,814 |
| Western | | | | | | | | | | | | | | | | |
| Togiak | 1,456 | 1,772 | 1,101 | 454 | 1,130 | 7,482 | 955 | 301 | 2,503 | 208 | 1,256 | 2,005 | 4,672 | 276 | 1,683 | 3,019 |
| Other | 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 | 0 | 20 | 10 | 43 | 0 |
| Subtotal | 1,501 | 1,772 | 1,101 | 454 | 1,130 | 7,482 | 955 | 301 | 2,503 | 208 | 1,443 | 2,005 | 4,692 | 286 | 1,727 | 3,019 |
| Total | 75,409 | 82,248 | 52,969 | 38,268 | 59,961 | 60,359 | 50,959 | 42,471 | 35,913 | 36,569 | 55,361 | 38,090 | 69,773 | 20,893 | 44,137 | 42,653 |

*Source:* Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2018). Available from: https://intra.sf.adfg.state.ak.us/swhs_est/ (custom query details available upon request from ADF&G, Division of Sport Fish, Research and Technical Services). Data from prior years can be found in Mills (1992, 1993) and Howe et al. (1994, 1995).