**Fishery Management Report No. 98-3**

# Area Management Report for the Recreational Fisheries of the Southwest Alaska Sport Fish Management Area, 1997

**by**

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**and**

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**August 1998**

**Alaska Department of Fish and Game** **Division of Sport Fish**

## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

**Weights and measures (metric)**

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

**Weights and measures (English)**

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

Spell out acre and ton.

**Time and temperature**

| | |
|---|---|
| day | d |
| degrees Celsius | °C |
| degrees Fahrenheit | °F |
| hour (spell out for 24-hour clock) | h |
| minute | min |
| second | s |

Spell out year, month, and week.

**Physics and chemistry**

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

**General**

| | |
|---|---|
| All commonly accepted abbreviations. | e.g., Mr., Mrs., a.m., p.m., etc. |
| All commonly accepted professional titles. | e.g., Dr., Ph.D., R.N., etc. |
| And | & |
| At | @ |
| Compass directions: | |
| east | E |
| north | N |
| south | S |
| west | W |
| Copyright | © |
| Corporate suffixes: | |
| Company | Co. |
| Corporation | Corp. |
| Incorporated | Inc. |
| Limited | Ltd. |
| et alii (and other people) | et al. |
| et cetera (and so forth) | etc. |
| Exempli gratia (for example) | e.g., |
| 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 |
| Number (before a number) | # (e.g., #10) |
| Pounds (after a number) | # (e.g., 10#) |
| Registered trademark | ® |
| Trademark | ™ |
| United States (adjective) | U.S. |
| United States of America (noun) | USA |
| U.S. state and District of Columbia abbreviations | use two-letter abbreviations (e.g., AK, DC) |

**Mathematics, statistics, fisheries**

| | |
|---|---|
| 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 | C.I. |
| correlation coefficient | R (multiple) |
| correlation coefficient | r (simple) |
| covariance | cov |
| degree (angular or temperature) | ° |
| degrees of freedom | df |
| divided by | ÷ or / (in equations) |
| equals | = |
| expected value | E |
| fork length | FL |
| 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. |
| mideye-to-fork | MEF |
| minute (angular) | ' |
| multiplied by | x |
| not significant | NS |
| null hypothesis | $H_O$ |
| percent | % |
| probability | P |
| probability of a type I error (rejection of the null hypothesis when true) | $\alpha$ |
| probability of a type II error (acceptance of the null hypothesis when false) | $\beta$ |
| second (angular) | " |
| standard deviation | SD |
| standard error | SE |
| standard length | SL |
| total length | TL |
| variance | Var |

*FISHERY MANAGEMENT REPORT NO. 98-03*

# AREA MANAGEMENT REPORT FOR THE RECREATIONAL FISHERIES OF THE SOUTHWEST ALASKA SPORT FISHERIES MANAGEMENT AREA, 1997

by

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August 1998

The Fishery Management Reports series was established in 1989 for the publication of an overview of Division of Sport Fish management activities and goals in a specific geographic area. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Distribution is to state and local publication distribution centers, libraries and individuals and, on request, to other libraries, agencies, and individuals. This publication has undergone regional peer review.

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# PREFACE

Data contained in this report represent the Division's most recent efforts to upgrade and update fishery statistics useful in describing Southwestern Alaska's sport fisheries. Data contained in this document were extracted from *Statewide Harvest Summaries*, *Survey and Inventory Reports*, and the *Fishery Data and Manuscript Series*. We consider this report to be the most comprehensive information source concerning effort and harvest statistics for the major Southwestern Alaska sport fisheries. Fisheries data in this report supersede information in previous reports and are intended for interdepartmental use only.

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# SECTION I: MANAGEMENT AREA OVERVIEW

## MANAGEMENT AREA DESCRIPTION

The Southwest Sport Fish Management Area (SWMA) is comprised of the Bristol Bay Sport Fishing Regulatory Area and the southwestern portion of the Arctic-Yukon-Kuskokwim (AYK) Sport Fishing Regulatory Area. Included in the area are all waters and drainages flowing into Bristol Bay north of Cape Menshikof, the eastern shores of Kuskokwim Bay, and the Kuskokwim River from Aniak River downstream to Kuskokwim Bay (Figure 1). Roughly the size of Washington state, the 54,700 square mile management area contains some of the most productive salmon, rainbow trout, Arctic grayling, Arctic char, and Dolly Varden waters in the world.

The sport fisheries of this large region are more easily discussed by dividing the management area into four geographic sections: Eastern, Central, Western, and Northwestern (Figure 1). The four sections are based on general habitat types and are somewhat arbitrary. However, for some species such as rainbow trout, the sections represent distinct differences in the character of the fisheries or biology of local stocks.

The Eastern section includes all drainages from the Kvichak River to the area's southern boundary at Cape Menshikof. 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 boundaries.

The Western section reaches from the drainage of the Kanektok River south to Cape Constantine on the Nushagak Peninsula and contains the Togiak National Wildlife Refuge.

The Northwestern section is formed by the northern boundary of the management area and includes the drainages flowing into the south side of Kuskokwim River from the Aniak River downstream to Kuskokwim Bay. Portions of the Aniak, Kisaralik and Kwethluk rivers of the Northwestern section fall within the confines of the Yukon-Delta National Wildlife Refuge.

Major communities located within the region include Naknek, King Salmon, Dillingham, Togiak, Iliamna, Quinhagak, Aniak, and Bethel. The management area is not linked to the state's highway system although local roads do provide sport fishermen with limited access near the major communities. Float-equipped aircraft are commonly used to access the area's many remote fisheries.

The Southwest Sport Fish Management Area includes portions of four areas for the purposes of effort and harvest reporting in the mail survey of Howe et al. (1997). These are: the Kuskokwim area (Area V), the Nushagak area (Area T), the Kvichak area (Area S), and that portion of the Naknek River Drainage-Alaska Peninsula Area (Area R) excluding the saltwater fisheries and freshwater fisheries of Cold Bay and the Aleutian Islands.

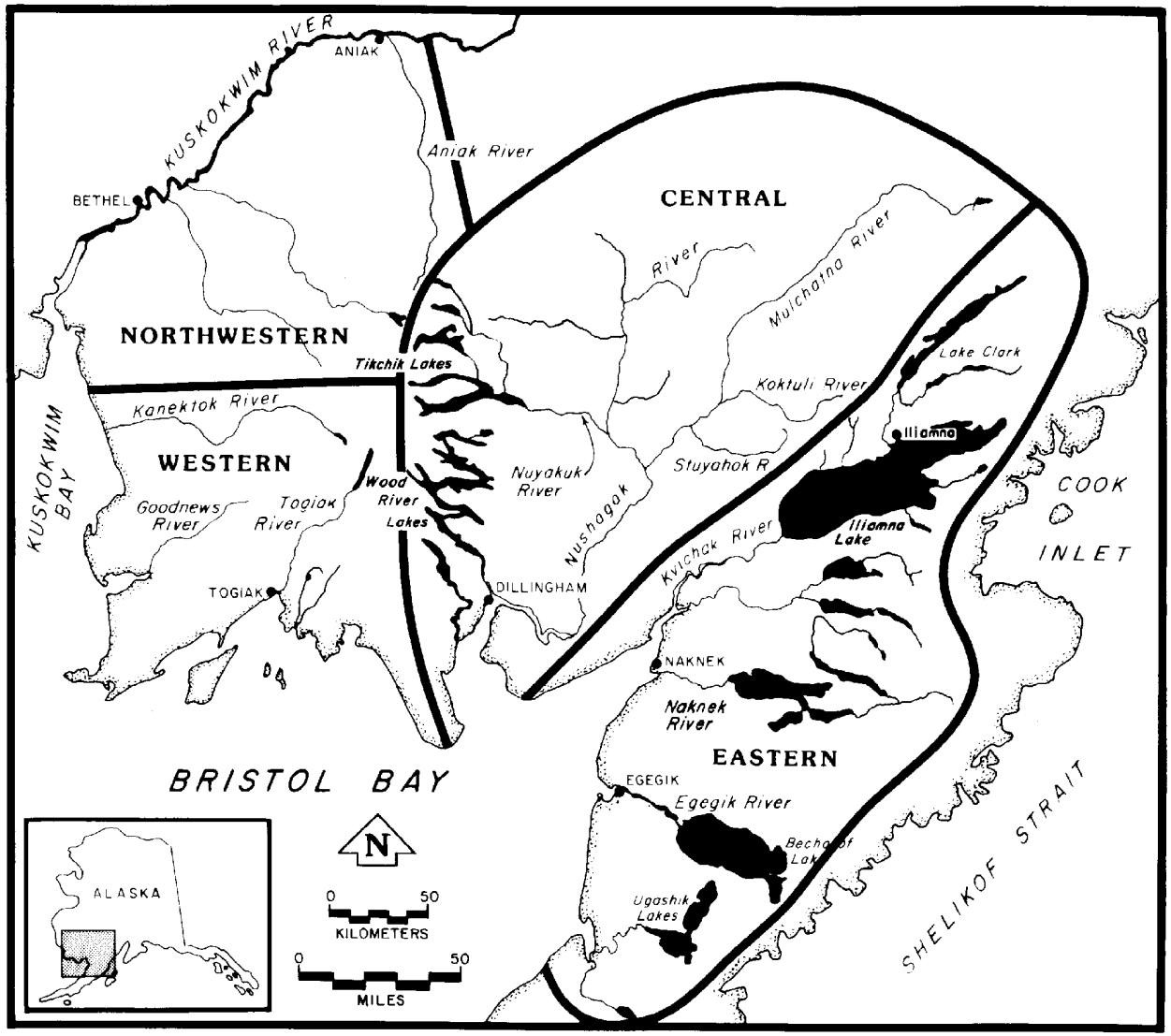



**Figure 1.-Southwestern Alaska sport fish management area, showing the Eastern, Central, Western, and Northwestern sections.**

## REGULATORY PROCESS

The process of developing fishing regulations appropriate for fisheries in the SWMA occurs within the established Alaska Board of Fisheries process. Public input concerning regulation changes and allocation issues is provided for in this process through various means including direct testimony to the Board of Fisheries and through participation in fish and game advisory committees. These advisory committees have been established throughout Alaska to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes in areas that might be affected. Most active committees meet at least once each year, usually in the fall prior to the Board meetings. Staff from the Division of Sport Fish and other divisions often attend the committee meetings. In this way, advisory committee meetings allow for direct public interaction with staff involved with resource issues of local concern. Within the SWMA there are eight Fish and Game Advisory Committees: Lower Bristol Bay, Iliamna, Naknek/Kvichak, Togiak, Nushagak, Lower Kuskokwim, Central Bering Sea, and Central Kuskokwim.

Under the current operating schedule, the Board of Fisheries meets on a 3-year cycle. Proposals regarding the AYK portion of the SWMA were last heard November 8-18, 1994 in Anchorage. The Alaska Board of Fisheries last met to consider sport fish regulations for the Bristol Bay portion during a meeting held in Dillingham during January 17-28, 1995.

The Board of Fisheries is next scheduled to review regulation proposals for Bristol Bay in Naknek November 4-14, 1997 and proposals for AYK in Fairbanks December 2-9, 1997.

## RECREATIONAL ANGLER EFFORT

Beginning in 1977, recreational angler effort has been estimated statewide using a mail survey (Appendix A) (Mills 1979-1994, Howe et al. 1995-1997). This survey estimates the number of angler-days of sport fishing effort expended by recreational anglers fishing Alaskan waters, as well as the harvest of important sport species. The survey is designed to provide estimates of effort and harvest on a site-by-site basis and, unfortunately, 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) on a site-by-site basis (Appendix B). Additionally, creel surveys have been selectively used to ground truth the mail survey for fisheries of interest or for fisheries that require more detailed information or inseason management. The following summary of recreational angler effort in the SWMA is based on the mail survey data.

Recreational angler effort in the SWMA rose gradually from 1977 to 1982, increasing from 25,500 angler-days per year in 1977 to 41,300 angler-days per year in 1982 (Table 1, Figure 2). In 1983, recreational angler effort rose significantly to 66,500 angler-days, an increase of over 50% from 1982. A period of relative stability followed, from 1983 to 1989, with recreational angler effort averaging 71,900 angler-days per year. Recreational angler effort again jumped in 1990 rising to over 104,500 angler-days. Since 1990, recreational fishing effort has averaged 118,600 angler-days per year. In 1995, the most recent year for which statewide data are available, SWMA effort of 128,500 angler-days was 6.5% of the Southcentral region effort and 4.6% of the total angling effort in Alaska (Howe et al. 1996). Recreational angler effort is expected to continue to increase at a modest rate for the foreseeable future.

**Table 1.-Sport Fishing effort for the Southwest Sport Fish Management Area by section, 1977-1996.**

| Year | SWMA Days[a] | Eastern Days | Eastern Percent | Central Days | Central Percent | Western Days | Western Percent | Northwestern Days | Northwestern Percent |
|---|---|---|---|---|---|---|---|---|---|
| 1977 | 25,512 | 17,653 | 69 | 7,184 | 28 | 675 | 3 | | 0 |
| 1978 | 26,451 | 18,912 | 71 | 7,000 | 26 | 539 | 2 | | 0 |
| 1979 | 27,022 | 19,177 | 71 | 6,179 | 23 | 1,666 | 6 | | 0 |
| 1980 | 35,358 | 24,948 | 71 | 8,897 | 25 | 1,513 | 4 | | 0 |
| 1981 | 33,715 | 24,964 | 74 | 7,819 | 23 | 932 | 3 | | 0 |
| 1982 | 41,318 | 30,385 | 74 | 9,773 | 24 | 1,160 | 3 | | 0 |
| 1983 | 66,492 | 43,364 | 65 | 16,942 | 25 | 3,251 | 5 | 2,935 | 4 |
| 1984 | 63,818 | 39,394 | 62 | 11,160 | 17 | 11,732 | 18 | 1,532 | 2 |
| 1985 | 70,108 | 47,138 | 67 | 11,812 | 17 | 10,377 | 15 | 781 | 1 |
| 1986 | 74,801 | 50,724 | 68 | 12,026 | 16 | 10,232 | 14 | 1,819 | 2 |
| 1987 | 72,730 | 43,262 | 59 | 14,132 | 19 | 12,909 | 18 | 2,427 | 3 |
| 1988 | 82,408 | 40,987 | 50 | 19,840 | 24 | 18,767 | 23 | 2,814 | 3 |
| 1989 | 73,041 | 38,460 | 53 | 19,677 | 27 | 7,638 | 10 | 7,266 | 10 |
| 1990 | 104,699 | 60,371 | 58 | 28,714 | 27 | 10,807 | 10 | 4,807 | 5 |
| 1991 | 107,584 | 56,695 | 53 | 38,690 | 36 | 6,155 | 6 | 6,044 | 6 |
| 1992 | 110,517 | 69,310 | 63 | 26,621 | 24 | 7,842 | 7 | 6,744 | 6 |
| 1993 | 114,300 | 69,799 | 61 | 30,497 | 27 | 7,774 | 7 | 6,230 | 5 |
| 1994 | 125,603 | 67,836 | 54 | 40,769 | 32 | 10,904 | 9 | 6,094 | 5 |
| 1995 | 128,466 | 73,779 | 57 | 37,531 | 29 | 9,926 | 8 | 7,230 | 6 |
| 1996[b] | 138,934 | 68,912 | 50 | 44,849 | 32 | 14,740 | 11 | 10,433 | 8 |
| Avg(77-82) | 31,563 | 22,673 | 72 | 7,809 | 25 | 1,081 | 3 | | 0 |
| Avg(83-89) | 71,914 | 43,333 | 60 | 15,084 | 21 | 10,701 | 15 | 2,796 | 4 |
| Avg(90-96) | 118,586 | 66,672 | 56 | 35,382 | 30 | 9,735 | 8 | 6,797 | 6 |

[a] Days = Angler-day; any portion of a day in which one angler fished.

[b] Preliminary data.

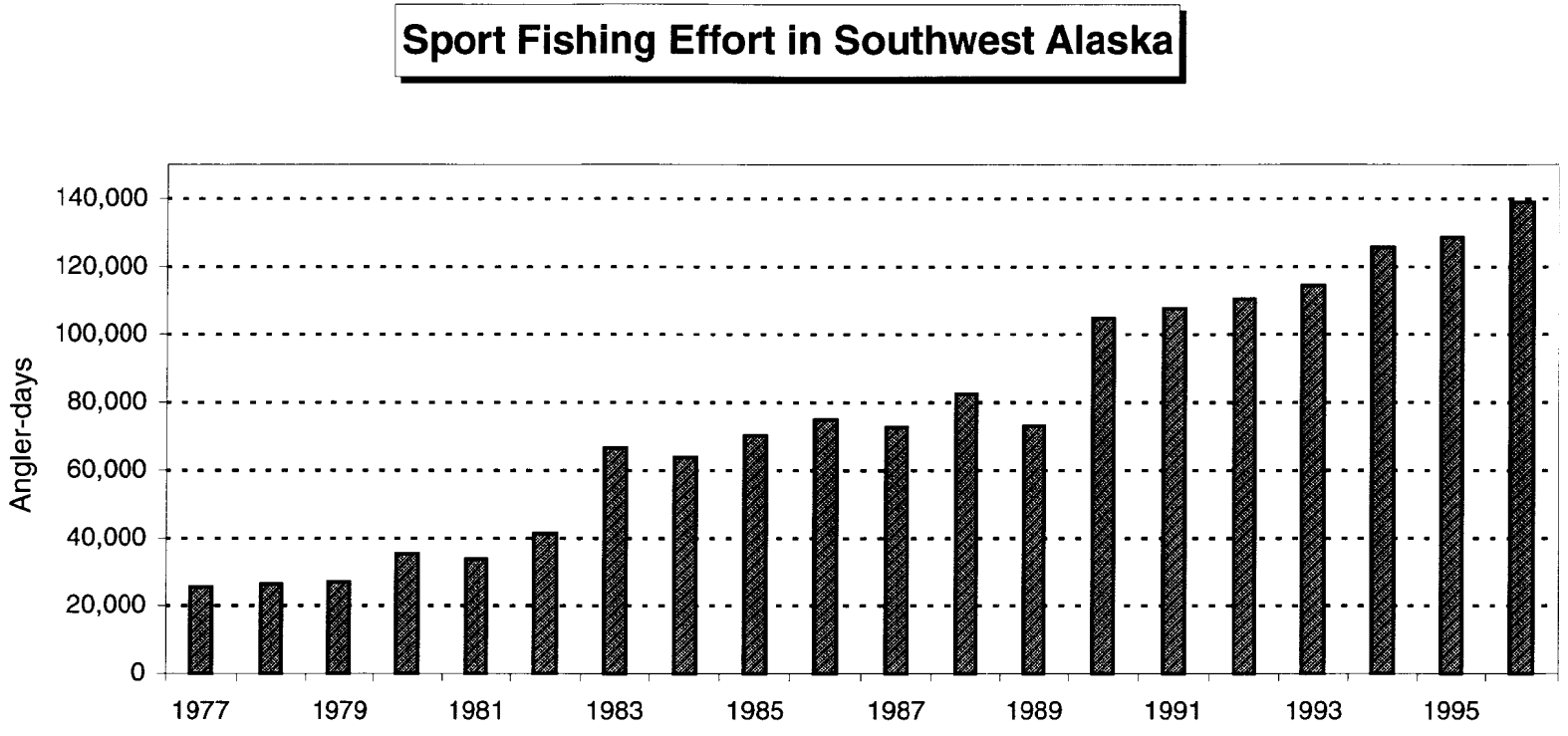



**Figure 2.-Sport fishing effort in angler-days for the Southwest Alaska sport fish management area, 1977 to 1996.**

Historically, most of the effort has occurred in the waters of the Eastern section of the SWMA (Figure 3). This area accounted for 57% of the total effort from 1991-1995. The Central section has accounted for the second largest proportion of effort, about 30% of the total effort from 1991 through 1995. The Western and Northwestern sections have accounted for about 7% and 6% of the total effort from 1991 through 1995, respectively. Distribution of effort among sections during 1996 resembled the historic effort distribution (Figure 3).

## SPORT HARVEST

Recreational harvests of all species in the SWMA rose gradually at a rate of approximately 16% per year from 24,400 fish in 1977 to peak at nearly 98,000 fish in 1994 (Table 2).

In terms of numbers of fish harvested, smelt, which are not a highly sought-after species in Southwest Alaska, have nevertheless dominated the historic recreational harvest (Table 2). The 1994 harvest of over 23,800 smelt is more likely a reflection of their abundance rather than their desirability as a sport species. Excluding smelt, sockeye, chinook and coho salmon are clearly the most frequently harvested species, with lesser numbers of Dolly Varden/Arctic char, rainbow trout, and Arctic grayling being taken annually (Figure 4). The remaining species: pink salmon, lake trout, chum salmon, northern pike, whitefish, and burbot, are all harvested at relatively low levels.

Harvests for 1996 were on par with the recent 5-year averages; two exceptions were the coho salmon harvest, which was twice the 5-year average (Figure 4), and the chinook salmon harvest which was down substantially from previous years (Figure 4).

## ECONOMIC VALUE OF THE SPORT FISHERY

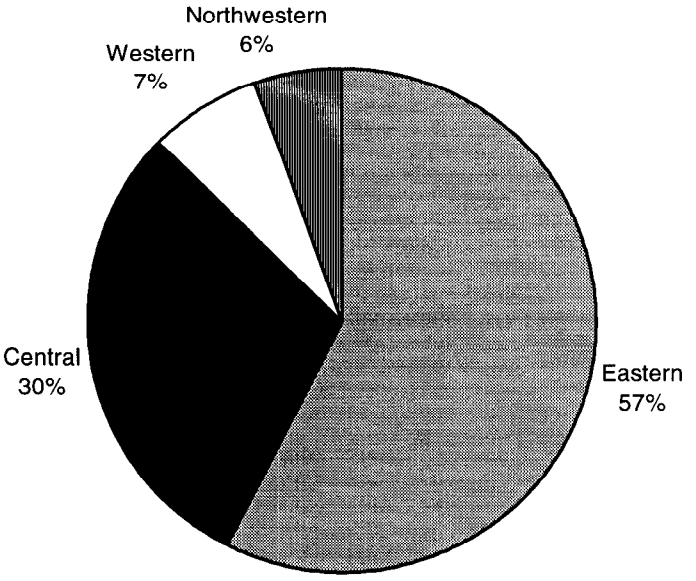
Recreational fisheries in Southwest Alaska provide the angler with a unique combination of high quality salmon and rainbow trout fishing in a pristine wilderness setting. Although this area accounts for a relatively minor portion of the total statewide sport fishing effort, and even less of the statewide harvest, it is the combination of scenery and diverse fishing opportunities that allows this region of Alaska to compete with other world-class sport fisheries. Studies by the University of Alaska placed the 1988 value of the area's recreational fishery at $50 million (Ackley 1988).

The annual Sport Fish Division budget to manage the $50 million fishery in the SWMA in fiscal year 1997 was $516,300 (ADF&G 1997c). Sport fishing effort within the area for the same period was 128,500 angler-days, which translates to a cost of $4.02 per angler-day. Put another way, for every dollar the Division spends on research and management of sport fisheries in Southwest Alaska, almost $100 are potentially added to the economy of the state.

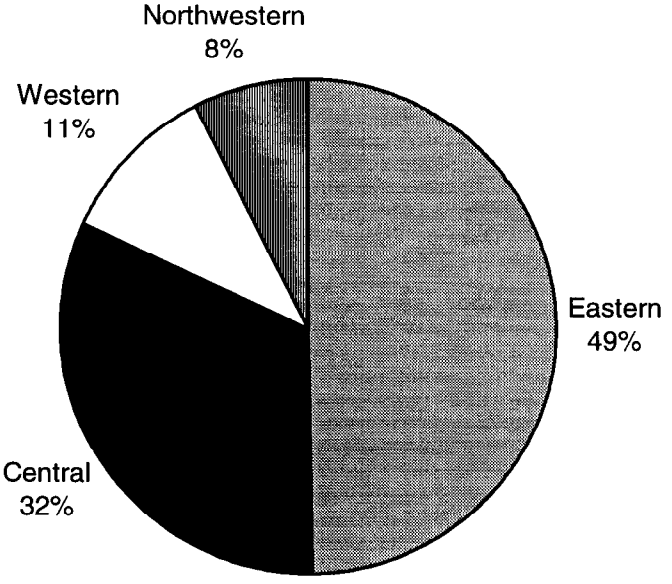
## MANAGEMENT PLANS AFFECTING FISHERIES

### Nushagak Chinook Salmon Management Plan

Management of the Nushagak chinook salmon fisheries is governed by the Nushagak-Mulchatna Chinook Salmon Management Plan (5 AAC 06.361) which was adopted by the Alaska Board of Fisheries in January of 1992, and amended in January of 1995. The purpose of this management plan is to ensure an adequate spawning escapement of chinook salmon into the Nushagak-Mulchatna River system. The plan directs the department to manage for an inriver return goal




Mean 1991-1995




1996

**Figure 3.-Percentage of sport fishing effort for the Eastern, Central, Western, and Northwestern sections of the Southwest Alaska Management Area, mean during 1991-1995 and 1996.**

**Table 2.-Numbers of fish harvested, by species, by recreational anglers fishing within the Southwest Alaska Management Area waters, 1977-1996.**

| Species | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Smelt | 12,064 | 1,834 | 65,238 | 30,764 | 5,778 | 14,547 | 3,902 | 7,859 | 18,095 | 1,284 | 88 |
| Sockeye Salmon | 3,204 | 4,345 | 4,403 | 3,126 | 3,479 | 6,417 | 7,909 | 7,367 | 8,445 | 5,047 | 10,443 |
| Chinook Salmon | 2,003 | 3,093 | 3,411 | 3,649 | 3,962 | 5,812 | 9,272 | 9,119 | 9,891 | 14,599 | 18,622 |
| Coho Salmon | 975 | 1,476 | 1,112 | 2,100 | 2,303 | 3,543 | 5,191 | 9,005 | 4,459 | 13,083 | 10,424 |
| Dolly Varden/ Arctic Char | 1,421 | 2,731 | 2,465 | 4,374 | 4,481 | 4,745 | 10,309 | 10,666 | 8,622 | 5,993 | 7,979 |
| Rainbow Trout | 2,286 | 2,585 | 3,318 | 4,794 | 5,546 | 5,085 | 10,785 | 7,608 | 6,607 | 6,198 | 6,344 |
| Arctic Grayling | 1,963 | 2,938 | 3,017 | 3,952 | 3,467 | 5,043 | 9,029 | 6,266 | 5,720 | 5,493 | 7,242 |
| Pink Salmon | 0 | 3,286 | 0 | 1,299 | 0 | 1,142 | 388 | 3,253 | 67 | 3,629 | 150 |
| Lake Trout | 232 | 244 | 635 | 603 | 821 | 576 | 2,023 | 1,863 | 1,072 | 3,649 | 2,056 |
| Chum Salmon | 148 | 732 | 182 | 147 | 379 | 775 | 1,215 | 2,051 | 1,082 | 1,495 | 1,252 |
| Northern Pike | 123 | 379 | 362 | 276 | 433 | 807 | 2,758 | 2,848 | 980 | 835 | 2,431 |
| Whitefish | 8 | 25 | 0 | 17 | 183 | 168 | 376 | 287 | 1,330 | 958 | 247 |
| Burbot | 0 | 0 | 227 | 0 | 0 | 0 | 189 | 124 | 840 | 355 | 84 |
| Other | | | | | | | | | | | |
| Total | 24,427 | 23,668 | 84,370 | 55,101 | 30,832 | 48,660 | 63,346 | 68,316 | 67,210 | 62,618 | 67,362 |

| Species | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996[a] | 5-YR Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Smelt | 30,600 | 57,611 | 5,640 | 21,165 | 22,078 | 7,458 | 23,815 | 8,145 | 525 | 12,404 |
| Sockeye Salmon | 8,171 | 32,962 | 15,996 | 17,613 | 15,912 | 24,889 | 20,413 | 20,250 | 16,153 | 19,523 |
| Chinook Salmon | 13,235 | 13,216 | 8,875 | 11,300 | 10,428 | 12,651 | 19,333 | 12,687 | 7,678 | 12,555 |
| Coho Salmon | 12,529 | 18,535 | 8,284 | 9,382 | 6,676 | 5,461 | 10,608 | 8,229 | 20,220 | 10,239 |
| Dolly Varden/ Arctic Char | 6,228 | 7,482 | 5,964 | 7,635 | 5,717 | 5,934 | 5,970 | 5,065 | 6,335 | 5,804 |
| Rainbow Trout | 5,240 | 4,500 | 3,779 | 5,233 | 3,421 | 3,161 | 3,122 | 2,702 | 2,956 | 3,072 |
| Arctic Grayling | 4,212 | 4,225 | 3,905 | 6,750 | 4,042 | 4,858 | 5,971 | 3,775 | 3,721 | 4,473 |
| Pink Salmon | 5,224 | 827 | 1,351 | 625 | 1,198 | 251 | 669 | 310 | 1,077 | 701 |
| Lake Trout | 1,507 | 3,094 | 1,617 | 952 | 1,355 | 1,380 | 2,075 | 936 | 1,102 | 1,370 |
| Chum Salmon | 2,539 | 4,452 | 1,734 | 1,999 | 2,175 | 1,802 | 2,934 | 1,227 | 2,172 | 2,062 |
| Northern Pike | 561 | 2,133 | 904 | 2,500 | 1,960 | 1,639 | 2,427 | 1,803 | 1,758 | 1,917 |
| Whitefish | 217 | 231 | 1,538 | 734 | 635 | 557 | 506 | 385 | 78 | 432 |
| Burbot | 109 | 0 | 1,242 | 93 | 169 | 214 | 20 | 0 | 18 | 84 |
| Other | | | | | | | | | | |
| Total | 90,372 | 149,268 | 60,829 | 85,981 | 75,766 | 70,255 | 97,863 | 65,514 | 63,793 | 74,638 |

[a] Preliminary data.

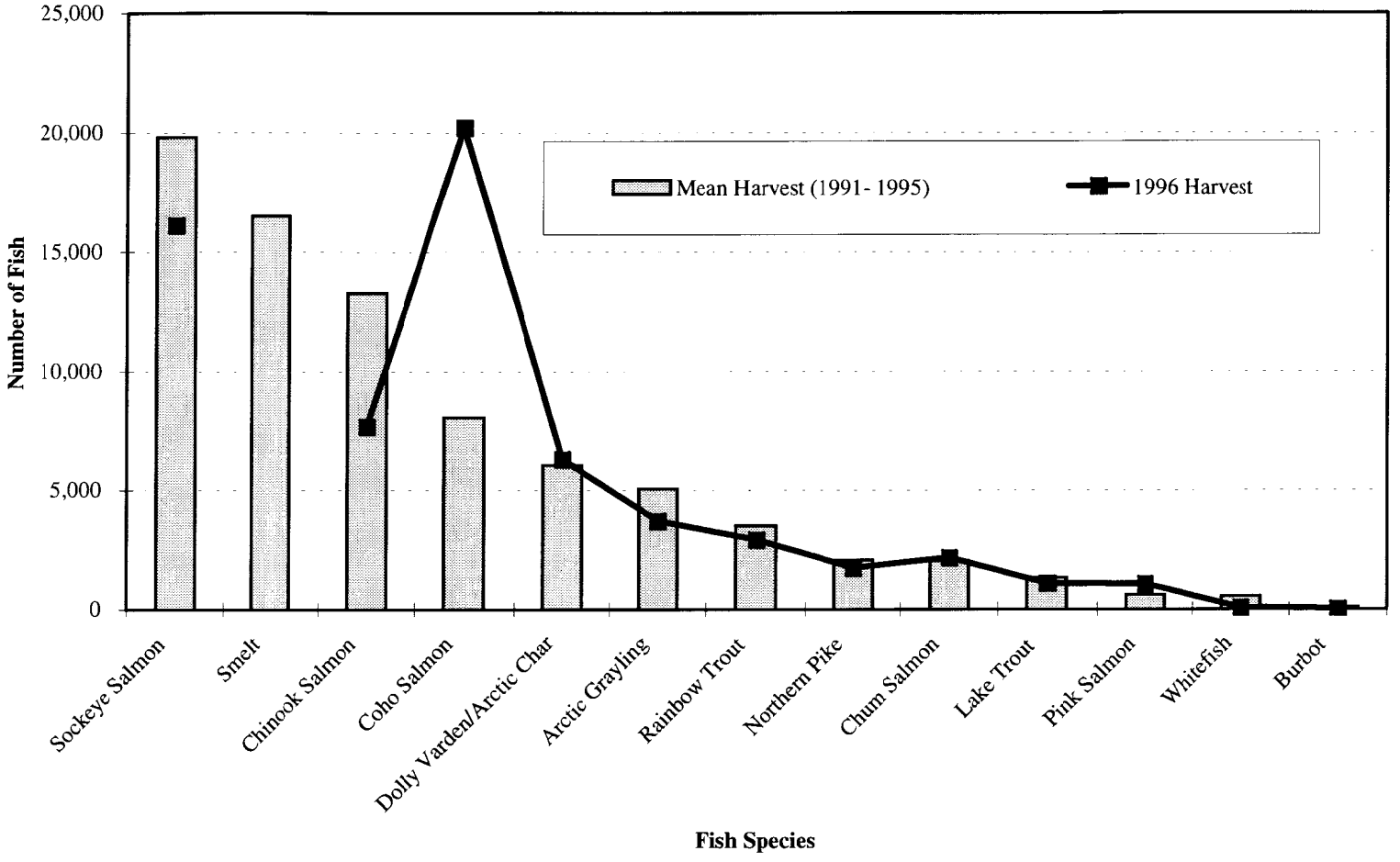



**Figure 4.-Harvest by species of sport-caught fishes in Southwest Alaska, 1991-1996.**

of 75,000 chinook salmon past the sonar site at Portage Creek. The inriver goal provides for: (1) 65,000 spawning fish, (2) a reasonable opportunity for subsistence harvest, and (3) a sport guideline harvest of 5,000 fish. If the inriver chinook salmon return is greater than 75,000, then the sport guideline harvest does not apply.

The plan also addresses poor return scenarios by specifying management actions to be taken in subsistence, commercial, and sport fisheries depending on the severity of the conservation concern. If the inriver return of chinook salmon is projected to be less than 65,000 but more than 40,000, restrictions in the sport fishery are mandated, and if the inriver return is projected to be less than 40,000 fish, the sport fishery is to be closed.

The 1997 season was the fifth year the department has managed under some form of this plan. Management is heavily dependent upon the daily estimates of escapement generated from the Portage Creek sonar site on the Nushagak River.

### Southwest Alaska Rainbow Trout Management Plan

In February of 1990, the Alaska Board of Fisheries adopted a comprehensive management plan for rainbow trout in Southwest Alaska. The overriding philosophy of the Southwest Alaska Rainbow Trout Management Plan is one of conservative wild stock management (ADF&G 1990). Conservative wild stock management does not necessarily preclude limited harvest of rainbow trout for food or trophies. However, maximum yield principles, which 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.

The plan established three policies by which rainbow stocks are to be managed and provides guidance for the Board in developing future regulations.

Policy I: states that native rainbow trout populations will be managed to maintain historic size and age compositions and at stock levels sufficient such that stocking is not needed to enhance or supplement the wild population.

Policy II: states 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 11 criteria adopted by the Board of Fisheries. The 11 criteria include: stock status, abundance and size of rainbow trout, history of special management, proximity to local community, legal public access, overlap with freshwater net fisheries, water characteristics, clear geographic boundaries, importance to the sport fishing industry, geographical distribution of special management areas, and unique considerations such as education or research.

Policy III: states management strategies should be consistent with the prudent economic development of the state's recreational sport fishing industry while at the same time acknowledging the intrinsic value of this fishery resource to the people of Alaska.

### Nushagak River Coho Salmon Management Plan

Management of Nushagak coho salmon stocks is guided by the Nushagak River Coho Salmon Management Plan (5 AAC 06.368), adopted by the Alaska Board of Fisheries in 1996. Under this plan the Nushagak coho salmon commercial fishery is to be managed for an inriver goal of 100,000 coho salmon, which provides for a spawning escapement of 90,000; a guideline harvest

level of 2,000 in the sport fishery; and a reasonable opportunity in the inriver subsistence fishery. When the projected inriver return falls between 100,000 and 60,000 coho salmon, the sport harvest is not to exceed 2,000 fish. If the inriver return falls between 60,000 and 50,000 fish, the sport fishery is to be closed, and the subsistence fishery restricted. Below 50,000, all coho fisheries close. The department has managed coho returns to the Nushagak under this plan for two seasons. While the direction is clear, the erratic returns of recent years and problems of accurately assessing run size and timing have made it difficult for the staff to implement the plan.

### U.S. Fish and Wildlife Service Fisheries Management Plans

There is a Fisheries Management Plan (FMP) for each of the four National Wildlife Refuges (Togiak, Becharof, Alaska Peninsula, and Yukon Delta) that are within the SWMA. These plans generally acknowledge the state's authority for management of the sport fisheries and have little direct effect on the day-to-day management of the area's fisheries. Department staff have worked with U.S. Fish and Wildlife Service (USFWS) personnel to develop these plans, which are essentially a list of fishery-related issues and concerns and a list of projects to address those concerns. Each plan covers a 5-year period, after which the plan is to be reviewed. The individual plans, along with their effective dates, are listed below:

| Refuge | Status | Effective Dates |
|---|---|---|
| Togiak | Adopted | 5/90 - 5/94 |
| Yukon Delta | Adopted | 1/92 - 1/96 |
| Alaska Peninsula/Becharof | Draft | 3/94 - 3/98 |

Department and Service staff have discussed potential changes to the Togiak National Wildlife Refuge FMP but an actual review has not been scheduled.

Adopted in 1992, the Yukon Delta Refuge FMP was implemented gradually over subsequent years. The plan has been adequate and there are currently no plans for revision (John Morgart, USFWS, Bethel, personal communication).

### U.S. Fish and Wildlife Service Public Use Management Plans

The U.S. Fish and Wildlife Service (USFWS) has adopted or drafted Public Use Management Plans (PUMP) for the refuges which address allowable activities. Of significance are the portions of these plans which address commercial sport fishing services. Since most of the sport fishing effort that occurs within refuge boundaries is guided, plans that affect guided access and activities directly affect opportunity to participate in recreational fishing. Generally, these plans establish levels of allowable commercial use on a river-by-river basis. Unguided use levels are not presently limited. The Togiak PUMP is the most complex of the group, requiring operators to submit prospectus applications and essentially bid for the privilege to provide services on these waters.

| Plan | Status |
|---|---|
| Togiak PUMP | Adopted 2/91 |
| Alaska Peninsula/Becharof PUMP | Adopted 2/94 |

The Togiak Refuge PUMP was adopted in 1991. Since adoption, four minor amendments were made. In 1995 review and revision of the plan commenced according to the plan schedule and consistent with the directive to review the plan when unguided visitor use equaled guided visitor use. A Draft Public Use Management Plan Revision is being prepared and is expected to be available for public review by spring of 1998. Department staff have participated with Refuge staff throughout the revision process. Currently, differences remain between the state and USFWS regarding management authority as well as the format and wording of some proposed alternatives.

### Nushagak & Mulchatna Rivers Recreation Management Plan

The Nushagak & Mulchatna Recreation Management Plan was adopted in August of 1990. The plan is the result of a joint effort between Department of Natural Resources (DNR), Bristol Bay Coastal Resource Service Area staff, and the Department of Fish and Game. The plan identifies goals and management intent and public use sites for 25 management units in the planning area. Additionally, management policies for long-term uses are identified, as are guidelines for specific management direction for the 25 management units, which constitute the planning area.

Limits on use levels and number of camps were not addressed in the plan. However, much of the policy contained in the plan directly affects commercial operators who provide sport fishing services within the area. Therefore, this plan affects sport fishing opportunity in an indirect but measurable way.

This plan is not scheduled for review or revision at this time. Implementation continues through the DNR process. Compliance with the permit stipulations required by the plan is considered good to excellent for the sport fishing industry.

## MAJOR ISSUES

Issues affecting management of the sport fisheries in Southwest Alaska can be both biological and social in nature. With the growth of any resource-based activity comes concern for resource conservation and problems related to the competition for those resources between user groups. Significant conservation concerns exist for the following fisheries:

### Alagnak River Rainbow Trout

The Alagnak River is located in the eastern portion of the management area and flows into the Kvichak River approximately 20 miles north of King Salmon. Since 1992, sport effort has averaged 12,350 angler-days per year, accounting for 10% of the total effort within the SWMA (Figure 5). The Alagnak River is the second most popular fishing destination in southwest Alaska after the Naknek River.

In the lower portion of the drainage anglers pursue chinook, coho and sockeye salmon. In the upper reaches rainbow trout are a popular species. From 1991 to 1995 the average catch (includes fish released and kept) has averaged over 20,000 rainbow trout per year (Figure 5). At

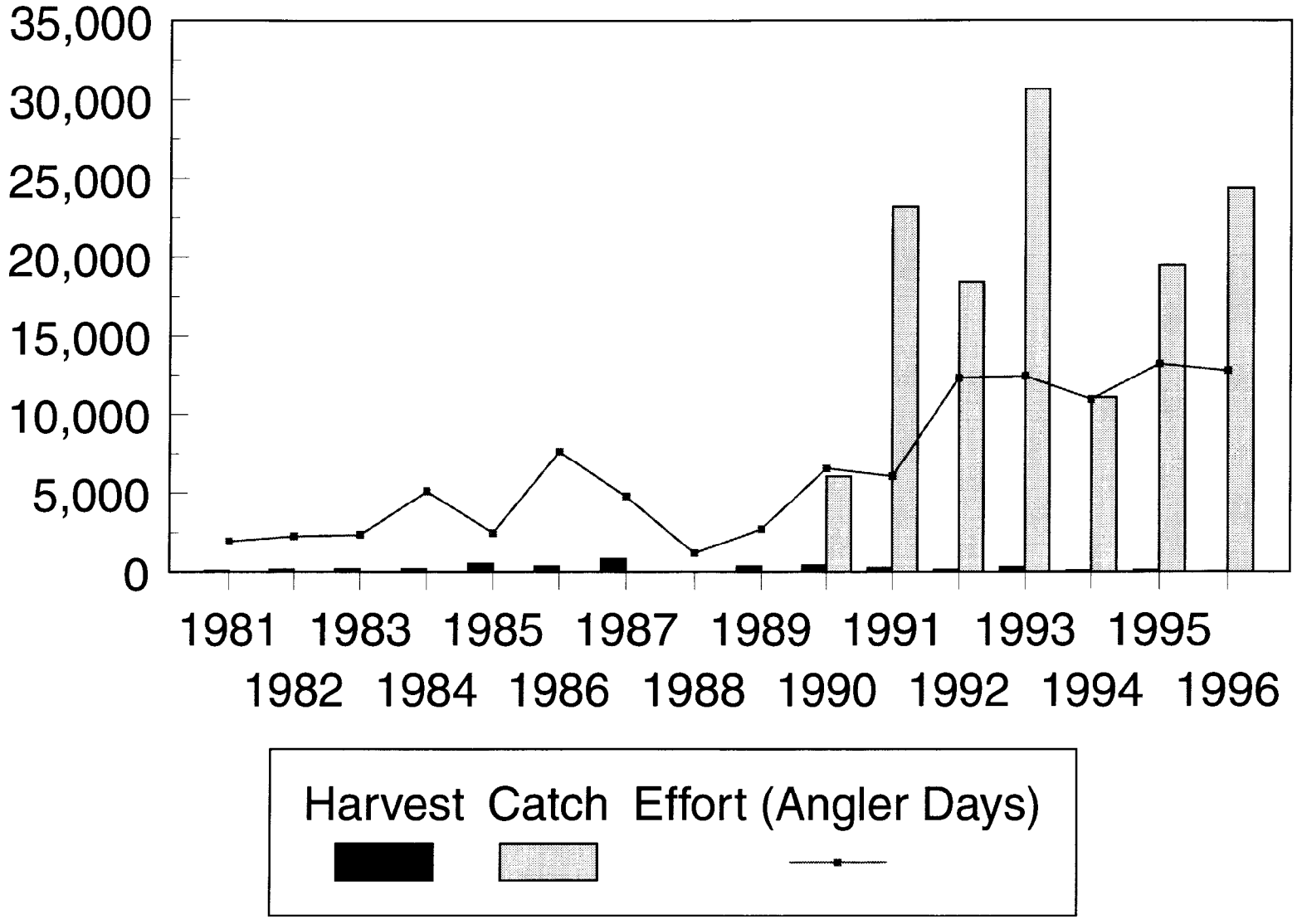



**Figure 5.-Sport harvest and catch of rainbow trout and total angler effort from the Alagnak River, 1981-1996.**

this level, the Alagnak River is the most popular rainbow trout fishery in Southwest Alaska. During the open water season, current regulations allow the retention of 1 rainbow trout per day, no size limit. Average harvest of rainbow trout is estimated to be 126 per year (Figure 5), but is likely selective for large fish.

Starting in about 1993, coincident with increased fishing effort, department staff began receiving complaints that the rainbow trout stocks in the Alagnak were declining. Data for the Alagnak River rainbow trout fishery prior to 1996 is sparse; however, results from a sampling trip in 1989 suggested that the size composition and age structure were depressed. In 1996 a joint ADF&G and National Park Service (NPS) creel survey was conducted at the outlet of Nonvianuk Lake in the upper Alagnak River drainage (Jaenicke 1998). Thirty-four anglers were asked to compare their experience in 1996 to experiences in the past with regard to catch rate and average size of the catchable population (Table 3). Many anglers felt both catch rate and size composition had diminished (Jaenicke *Unpublished*). In addition to the survey, NPS staff also collected size and age samples from the catchable population. Results showed the size distribution to be skewed to small fish, and age composition to be primarily age-4 and -5 fish.

As a result of the 1996 work, an emergency order closing the Alagnak and Nonvianuk rivers to the sport harvest of rainbow trout was issued effective July 1, 1996, and was reissued prior to the June 8 opening in 1997.

Additional sampling was conducted in 1997 (Jaenicke *In prep b,* and *Unpublished*). The size composition information collected throughout the drainage did not suggest the depressed condition indicated in 1996. Study results are not final but the following points remain:

1. Effort has increased substantially in the last 5 years.
2. The Alagnak River is the most popular rainbow trout fishery in southwest Alaska with over 20,000 trout being landed per year.
3. Harvests of rainbow trout are estimated to be small, but are likely selective for large fish.
4. Many anglers feel the catch rate and size composition have diminished over time.

There are a number of Board of Fisheries proposals to restrict harvest opportunity in the Alagnak River. The department favors more conservative regulations for resident species. The department sees two options for addressing the depressed stock condition for Alagnak rainbow trout: (1) restrict sport harvest by establishing a maximum size limit, or (2) establish a catch-and-release fishery during the open water season. Either action will accomplish the goal of improving the size and age compositions of this fishery.

### Naknek River Rainbow Trout

Since the early 1970s rainbow trout in the Naknek River have undergone a decline and subsequent recovery in the abundance of larger, older fish in the catchable population. Research in the late 1980s confirmed comments from the angling public that the average size of the catchable population and the number of spawning-sized fish had declined (Minard 1990). Regulation changes intended to protect larger, older fish through bag and size limit manipulations were recommended by the department and adopted by the Board of Fisheries in 1990. Studies conducted in 1993 and 1995 indicate the rainbow trout population has responded favorably to those actions.

**Table 3.-Results from an angler opinion survey concerning the current status of rainbow trout fisheries in the Alagnak River drainage, 1996 and 1997.**

Question 1: Have you ever fished here before?

| | 1996 Nonvianuk R. headwaters | | 1997 Alagnak R. headwaters | |
|---|---|---|---|---|
| Response | Number | Percent | Number | Percent |
| Yes | 34 | 21.9 | 17 | 11.9 |
| No | 120 | 77.4 | 126 | 88.1 |
| Response not recorded | 1 | 0.6 | 0 | 0.0 |
| Total | 155 | 100.0 | 143 | 100.0 |

Question 2: If you have fished here before, how does the current abundance of rainbow trout compare with your previous trip (less abundant than previous trip, same, or more abundant than previous trip).

| | 1996 Nonvianuk R. headwaters | | 1997 Alagnak R. headwaters | |
|---|---|---|---|---|
| Response | Number | Percent | Number | Percent |
| Less abundant | 6 | 17.6 | 4 | 23.5 |
| Same | 28 | 82.4 | 8 | 47.1 |
| More abundant | 0 | 0.0 | 5 | 29.4 |
| Total | 34 | 100.0 | 17 | 100.0 |

Question 3: If you have fished here before, how does the current average size of rainbow trout compare with your previous trip (smaller average size than previous trip, same, or larger average size than previous trip)?

| | 1996 Nonvianuk R. headwaters | | 1997Alagnak R. headwaters | |
|---|---|---|---|---|
| Response | Number | Percent | Number | Percent |
| Smaller average size | 12 | 35.3 | 5 | 29.4 |
| Same | 22 | 64.7 | 9 | 52.9 |
| Larger average size | 0 | 0.0 | 3 | 17.6 |
| Total | 34 | 100.0 | 17 | 100.0 |

From: Jaenicke *Unpublished.*

Currently the angling public expresses mixed opinions on how to transition from a period of recovery to a management strategy that would maintain an apparently recovered rainbow trout stock. A variety of regulation proposals addressing the future of this fishery has been submitted for the November 1997 Board of Fisheries meeting.

### Nushagak Coho Salmon

Including the 1997 season, six of the last seven Nushagak River coho salmon returns were considered poor. The 1998 season is likely to be poor as well. Although sport harvests are considered negligible in most years, the Nushagak River drainage was closed for much of the normal sport season in 1997 to protect a very weak return. Management of Nushagak coho salmon is guided by the Nushagak River coho salmon management plan, in which recommended actions are linked to sonar estimates of inriver abundance. While the direction is clear, the erratic returns of recent years and problems of accurately assessing run size and timing have made it difficult for the staff to implement the plan. During the last 10 years, run sizes have been so erratic that sport fishing opportunities have been very unpredictable.

### Agulowak Arctic Char

A study 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. More restrictive regulations addressing this fishery were adopted by the Alaska Board of Fisheries in January of 1995. The new regulations included a reduced bag limit from 10 per day and in possession to 2 per day and in possession, and required the use of single-hook artificial lures. These restrictions have been in place since 1994 season (by emergency order in 1994, and then by regulation since 1995). Public acceptance appears good, as is compliance. There are anecdotal indications that the char stocks at the Agulowak are recovering, suggesting that the regulatory changes are sufficient to allow recovery to previous levels. Additional studies are planned for the fall of 1997 as part of an assessment project to determine if the stock can support an egg take planned for 1998.

### Iliamna River Arctic Char

Arctic char stocks in the Iliamna River appear to have suffered a significant decline in abundance and a loss of the larger, older age classes. Records from area lodges that have a history fishing the Iliamna River show a significant decline in both the number of Arctic char landed and the size of those fish. Visual counts of char in the lower Iliamna River in 1996 and 1997 indicate a char population in the low thousands to mid hundreds (Jaenicke *In prep a*). Emergency order restrictions were issued in 1996 and 1997 dropping bag and possession limits from 10 per day to catch-and-release. Compliance appeared excellent. The Alaska Board of Fisheries will be asked to adopt a similar restriction for this fishery during the November 1997 meeting.

### Nushagak Chinook Salmon

There are four issues of concern to management staff regarding Nushagak chinook salmon:

- The accuracy and precision of sonar estimated inriver abundance. In 1997 sonar estimated inriver abundance differed significantly from escapement estimated by aerial survey. Sonar estimates totaled 40,300 fish, while aerial estimates were between 80,000 and 85,000 fish. The number of fish counted in the aerial survey exceeded the sonar count. The apparent underestimate by the sonar may have been caused by the record low water conditions causing

chinook salmon to migrate further from shore than normal. Chinook salmon were observed migrating offshore. Management actions tied to the sonar counts resulted in significant restrictions in the sport fishery (catch-and-release on June 30, 1997) that in the end were unnecessary. To address this issue, department staff have begun to develop a program that will measure the extent and variability of offshore chinook salmon distribution and have committed to continue to assess escapement by aerial survey.

- The ability to keep the sport fishery within the 5,000 fish allocation. Sport fishing effort in the Nushagak has increased approximately 9% per year during the last 5 years. Through inseason management efforts the sport harvest of chinook salmon has averaged 5,675 during the same period (Figure 6). A challenge in the future will be to continue to keep the sport harvest within the guideline harvest level of 5,000 fish in the face of increasing participation. A number of proposals are before the Board to address this issue; including seasonal limits, reduced bag limits, elimination of bait, restrictions on the activities of guides, and reducing areas open to sport harvest of chinook salmon. Department staff believe the harvest potential of the Nushagak chinook salmon sport fishery is approximately 10,000 fish under the current levels of effort and regulations, and given an inriver abundance of 75,000. Assuming increasing effort and harvest potential are related, in 3 years (one more Board cycle) the harvest potential under current regulations is expected to be approximately 13,000 chinook salmon. If the Board decides to leave the sport allocation at 5,000, and desires to make the regulations stable for a 3-year period, then the current harvest potential will need to be reduced by approximately 60%.

- The precision of commercial fish management and the effect on sport fishing opportunity. Under the current management plan the commercial fishery is to be managed for an inriver return of 75,000 chinook salmon. Fish surplus to the 75,000 are to be taken in the commercial fishery. Decisions to open and close the commercial fishery in an effort to harvest chinook salmon surplus to the 75,000 are based on the preseason forecast, commercial fishery performance, subsistence catch strength, and sonar-estimated inriver abundance. As with all management tools, there is a level of error associated with each of the indicators of run strength. In addition, there is no precise formula for determining the length and frequency of commercial periods.

  The sonar estimate of chinook salmon passage has ranged from 39% over the inriver goal to 30% under the goal since 1990. From 1990 through 1994, management of the commercial fishery was conservative in an effort to rebuild the stock. During the most recent 3 years, management of the commercial fishery has been more aggressive in an effort to comply with the plan by harvesting all fish surplus to the 75,000 inriver goal. Since 1995 the inriver return has ranged from 28% above the goal to 46% below. Given the current technology and financial resources, management precision within the commercial fishery (measured by the difference between the inriver goal and the actual return) is roughly plus or minus 30% or about 22,500 fish. In some cases this equates to one commercial fishing period.

  Comparison of recent escapement levels to resulting returns found the 30% annual variation has little biological consequence to future production. However, the consequence of this wide variation can be highly significant to the user groups. In a case where the inriver goal is undershot by as little as 13%, the management plan requires that the sport fishery be

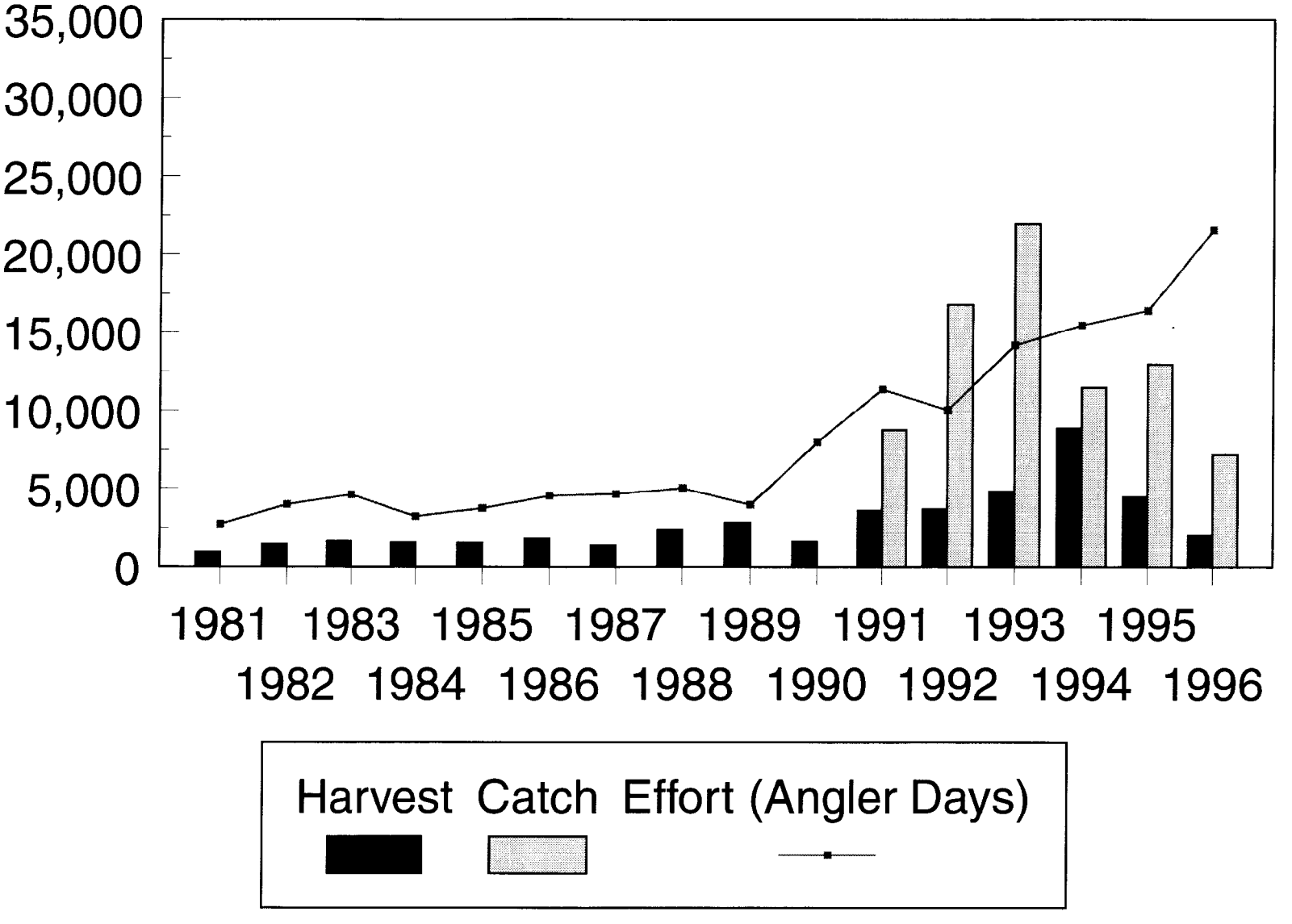



**Figure 6.-Sport harvest and catch of chinook salmon and total angler effort from the Nushagak River, 1981-1996.**

restricted. At current levels of participation and harvest potential, it has been necessary to restrict the sport fishery to catch-and-release only in the 1996 and 1997 seasons. This action has proven to be very disruptive to recreational anglers and the sport fishing industry. If the Board chooses to address this concern, the inriver goal could be increased, or the plan could be "desensitized" by reducing the biological escapement goal of 65,000 fish.

- The quality of escapement. Chinook salmon vary significantly in both age and size, much more so than other salmon species. The spawning potential for a chinook salmon run depends to a large extent on the sex, age, and size structure of the fish on the spawning grounds (i.e., the spawning escapement). While it is not specifically stated, the 65,000 fish biological escapement goal (BEG) for Nushagak chinook salmon carries with it the assumption of adequate levels of egg-bearing females in the escapement to maintain productivity.

  Inriver users expressed significant concern regarding the unusually high proportion of jacks (small males) and a scarcity of females they observed in the 1995 and 1996 returns. The department examined size and age composition of chinook salmon captured at the sonar site and in the subsistence fishery below the sonar site. Two areas of concern were found with respect to escapement quality: (1) The proportion of female spawners was less than desired for adequate egg deposition, and (2) a pattern has developed where age composition of early season escapement differs substantially from age composition later in the run. These problems appear linked to department management of the commercial fishery, and if left unresolved, could result in decreased future yields of Nushagak River chinook salmon.

  To avoid low proportions of females in the 1997 escapement, the department only allowed commercial fishing after a pulse of chinook salmon had entered the river. The intent was to allow untouched portions of the run with "natural" size and age compositions to pass through the commercial district and, ultimately, onto the spawning grounds. This strategy appears to have worked in that a greater number of productive females appear to have escaped in 1997 than in the previous 2 years.

  Two proposals that seek to redefine the BEG in terms of large chinook salmon are before the Board for consideration. Although management staff recognize the importance of putting large fish into the escapement, we do not generally favor a more complex management plan. We prefer to continue to monitor escapement performance as prescribed in the Escapement Goal Policy, and to avoid a more complex management scenario.

  There has been little resolution concerning how to address the mid-season shift of age and size composition in the escapement.

## OTHER ISSUES

Significant social issues concerning sport fisheries in the SWMA include:

1. Preservation of quality sport fishing opportunities in the face of greater competition between user groups for limited resources. Sport fishing effort is increasing throughout the management area at approximately 7% to 11% per year (Figure 2). Maintenance of high quality sport fishing opportunity within the area is becoming an increasing challenge that is generally being addressed thorough management plans and coordination with other federal and state agencies. Management objectives that stipulate desired catch rates, population

attributes, and address diversity of opportunities are being continually developed and presented in the public process. During the upcoming fiscal year, for example, management objectives for all rainbow trout fisheries will be reviewed and published. Additionally, an areawide management plan for Arctic grayling is to be drafted. There remains the issue of limited access fisheries to preserve quality. As of yet, there are no such fisheries within the area, however, demand for such fisheries is growing and the Board of Fisheries will have the opportunity to address that topic for the Naknek River spring rainbow trout fishery during the November 1997 meeting in King Salmon.

2. Increasingly complex land ownership patterns. Of particular concern has been securing access to public lands and waters through negotiated easements across private lands. Limited Department of Natural Resources staff time available for working on these issues necessitates Sport Fish staff remain deeply involved if a desirable outcome is to be achieved. Approximately 20% of the area management biologist's time is spent on land and access issues.

3. Coordination with other federal and state agencies. Ever-increasing staff time is devoted to coordination with other agencies with a management interest in the area fisheries. Efforts have been made to improve communication between agencies and to work cooperatively on projects. However, due primarily to the expansive area and diverse fisheries, inadequate time is available for close communication.

4. Potential effects of federal management of subsistence fisheries on sport fishing opportunity. In the near future the federal government may take over management of all subsistence fisheries within the state. Under federal management, priority will be given to rural subsistence uses. Uses, such as sport fisheries, that compete for resources and space may be restricted in times of shortage. There is a very real possibility that sport fishing opportunity in a number of popular waters may be restricted under such management. Department staff are working to closely follow the developments; however there is little area-level staff can do to affect this issue.

## ONGOING RESEARCH AND MANAGEMENT ACTIVITIES

There were four main programs conducted in 1997; three major research projects and the routine management activities.

1. Bristol Bay Rainbow Trout Studies.

This project provided funding for the following three projects:

   a. Continued monitoring of overwintering rainbow trout stocks of the Kvichak River, and sampling of the spawning population of Lower Talarik Creek. Program objectives include estimation of survival, abundance and recruitment as well as age and size compositions. Results to date indicate the stock is stable or slightly increasing. Estimates of recruitment and survival appear sound. Results of this 11-year project will be reported this winter in a Fishery Data Series report and consideration will be given to publishing results of this project in the professional literature.

   b. Volunteer creel survey program at Lower Talarik Creek. Objectives include the census of sport fishing effort and catch, estimation of size and age compositions of

catchable trout and angler demographics. Results show a generally stable level of effort as well as desirable catch rates and size compositions. Results of the Lower Talarik Creek surveys are reported in the Fishery Management Report series.

c. Biological sampling of the catchable population of rainbow trout in the Kvichak River. Project objectives included the estimation of size and age composition of rainbow trout available for capture in the sport fishery in the Kvichak River. Data concerning frequency of hook scars and conditions were also collected. Results will be reported in a Fishery Data Series report.

2. Southwest Alaska Salmon Studies.

This project provided funding for monitoring the chinook salmon sport fishery on the lower Nushagak and Mulchatna rivers. Fishery timing and location, angler demographics and effectiveness of current management strategies will be reported in a Fishery Data Series report for publication in 1998.

3. Resident Species Studies.

This project provided funding for the second year of the Iliamna River Arctic char stock assessment project. Project objectives included estimation of size and age composition of the catchable population, estimation and frequency of subsistence use of Arctic char by residents of Pedro Bay, and indexing the abundance of Arctic char in the Iliamna River. These data will be used to benchmark what is considered to be a depressed population and develop management recommendations for this stock. Project results will be presented in a Fishery Data Series report and in the Subsistence Division report series.

4. Management Activities.

Management activities in 1997 included participation with local advisory committees in the Board of Fisheries process, public contacts, dissemination of information, fisheries monitoring, coordination with staff from other resource management agencies, and habitat monitoring and permit review. Working toward resolution of easements at Ugashik Narrows and participation in the revision of the Togiak Public Use Management Plan consumed significant staff time. Additional management staff time was dedicated to a special assignment on the Subsistence Policy group, a group charged by the commissioner with developing ways for the department to be more effective with the increasing role of the Federal Government in subsistence management.

## ACCESS PROGRAM

Management of the sport fisheries in Southwest Alaska includes the development of projects that promote access for the angling public to common property resources. About 12% of the annual Sport Fish Division budget is dedicated to the acquisition, development and maintenance of public boating facilities and additional nonboating projects are funded at the discretion of the division. Access projects that benefit sport fishermen may be as simple as a dumpster for collection of refuse or as complex as the development of a boat launch with parking and picnic facilities.

The Division has a fairly well-defined process for the selection and prioritization of projects that are being considered for funding (ADF&G *Unpublished*). There are essentially seven steps in the

process: (1) proposed by Area Management Biologist, (2) Regional Access Coordinator Review, (3) Statewide Access Coordinator Review, (4) Acquisition, (5) Development, (6) Maintenance and (7) Management. All proposed projects must go through the same review process and be assigned a priority based on their individual merit. The following is a list of projects presently being considered in Southwest Alaska.

### Aleknagik Lake

This project is located in the central portion of the management area on the south shore of Lake Aleknagik. This site is the most common launching point for traffic heading into or returning from the Wood/Tikchik State Park. Popular sport fishing waters accessed from this point include the Wood, Agulowak and Agulukpak rivers, and the many bays and tributary streams to the Wood River lake system. The project entails the acquisition of property sufficient for the construction of a boat launch, parking for up to 60 vehicles with trailers, an outhouse facility, and garbage service. Total project cost is estimated to be $300,000.

As of December 1996, steps 1 through 4 had been completed. Development of the site is scheduled for July of 1998.

### Lake Camp

The outlet of Naknek Lake, commonly referred to as Lake Camp, is frequently used by sport fishermen as an access point for the upper Naknek River and Naknek Lake. The upper reach of the Naknek River supports the largest rainbow trout fishery in Bristol Bay. Over 20,000 angler-days are expended by recreational fishermen on the Naknek River each year. Presently, access to the upper river is limited to an undeveloped launch site on private land. Technically, any use of this site constitutes trespass.

This project would entail the acquisition and development of a site for a public launch. Facilities should include a launch ramp, outhouse, picnic area and refuse containers. To date, the Access Project Data Sheet (step 1) has been filled out (February 1992) and the project is now on hold pending review by the regional access coordinator (step 2). Complicated land ownership and unwilling sellers confound resolution of this project.

### Newhalen River

This project is located at a trailhead near the transient parking ramp at the Iliamna airport, which leads to the Newhalen River falls. Sport fishermen utilize this location heavily in late June and July while fishing sockeye salmon, and to a lesser extent during the months of August and September while fishing rainbow trout. The installation of an outhouse and refuse containers, as well as a garbage collection and maintenance contract, were completed in the spring of 1993. Additional outhouses were installed at the trail terminus in the spring of 1995. Overall reaction on the part of local residents and the angling public has been highly favorable. The next phase includes the development of a boardwalk across sensitive habitat to avoid additional erosion and improve the ease of access.

### Kvichak River at Igiugig

This project will develop a walkway from the community road system to the banks of the Kvichak River. While anglers visit the Kvichak River throughout the open water season, this project has been conceived to accommodate the numerous shorebased anglers during the late June to mid July sockeye salmon fishery. Steps 1 through 3 have been completed and step 4 is in

process. The project has strong support of the local community. It is expected to address trespass issues, enhance angling opportunities, encourage orderly conduct and development of the fishery, and to minimize stream bank damage from foot traffic.

### Agulukpak River Camp Sites

The Agulukpak River, within the Wood Tikchik State Park, is designated as a special management water under the Southwest Alaska Rainbow Trout Management Plan. It is a popular destination for fly fishermen seeking abundant rainbow trout. At the head of this short river, the Alaska Department of Natural Resources, Division of Parks has created several hardened sites to accommodate overnight camping parties. The river is a major spawning area for sockeye salmon and attracts numerous brown bears during the fall; the same period when trout angling is at its peak. In 1997 two food storage caches were provided by the ADF&G Access program and erected by the Division of Parks as a measure to reduce potential human-bear conflicts at the camp site.

## OUTREACH PROGRAM

An important aspect of successful resource management includes public outreach. Over the years a number of methods including presentations, special publications, and signs have been used to inform the public about Southwest Alaska fishery resources and management activities.

### Presentations

The Southwest Alaska staff have conducted various presentations including fishing and fly tying seminars, classroom and school visits, guide information meetings, and talks and slide shows to assorted groups (Table 4). In 1997 a fly tying and fishing seminar was conducted in the community of Naknek/King Salmon. Slide shows were presented to two lodge groups and one to a meeting of the Alaska Fly Fishers group in Anchorage. Guide meetings were conducted in Portage Creek, Igiugig, and King Salmon during early June of 1997.

Including three staff participating as science fair judges, the Dillingham schools were visited four times during 1997.

### Publications

A long list of written materials has been, and continues to be, developed for the public. In addition to the occasional magazine article and routine news releases announcing special regulations or management actions, the following brochures are available (Table 4): commercial services list, float trip guide, Southwest Alaska angling guide, Dillingham day trip guide, Naknek River regulation brochure, Newhalen River access and regulation brochure, Togiak Refuge Waters fishing regulation brochure, Southwest Alaska Rainbow Trout Plan, and an airport tear sheet jointly-produced with DNR, USFWS, and Bristol Bay Coastal Resource Service Area, on department activities in Southwest Alaska. The Dillingham office also distributes department-produced brochures on catch-and-release fishing, fish handling, fish life histories, and bear safety as well as brochures from other agencies such as the Togiak National Wildlife Refuge and Forest Service. Each spring a Southwest Alaska sport fisheries Outlook is written to address many of the most popular fisheries for the coming season.

This written material is mailed out to anyone requesting it. Through September 1997, the Dillingham office has mailed 153 information packets to people around the world. Since records

**Table 4.-Summary of outreach activities in 1997.**

| | | |
|---|---|---|
| **Presentations** | | |
| | Fishing classes/seminars | 1 |
| | School visits | 4 |
| | Guide meetings | 3 |
| | Talks and slide shows | 3 |
| **Publications** | | |
| | Magazine articles | 0 |
| | News releases | 12 |
| | Current brochures available | 14 |
| | Information packet mailings | 153 |
| **Signs** | | |
| | new this year | 2 |
| **Other** | | |
| | hotlines installed | 2 |

have been kept in 1993, annual Dillingham mailings have ranged from 136 to 172 and average 153 per year.

From late May through early September, a weekly fishing forecast is written and released to news media outlets and recorded on the department's recorded information system in Anchorage.

## Other Information Outlets

Signs: The Southwest Area office continues to explore and develop additional means to get information to the angling public. Over the last several years, signs have been installed in strategic locations such as airport terminals, boat launches, and trailheads. Topics of the signs may include fishing regulations, easement and directions, angling techniques, and bear safety. Signs are currently installed in Iliamna, Igiugig, King Salmon, and Aleknagik. In 1997, two large catch-and-release instruction signs were installed: one at Lake Camp on the upper Naknek River and another in the King Salmon visitor center.

Regulation Hotline: It is difficult to inform the public about inseason regulation changes (emergency orders) for Southwest Alaskan fisheries, but these changes are becoming increasingly common. In early 1997 the department installed a Southwest Alaska sport fishing regulation "Hot Line" recording at 907-842-REGS (907-842-7347). The recording is updated whenever emergency orders are issued for Southwest Alaska sport fisheries and is available to callers 24 hours a day.

King Salmon Hotline: The community of King Salmon, Alaska is a major transportation hub for Southwest Alaska. Many of the anglers passing through the town visit the local department office. However, much of the year, no Sport Fish Division personnel are available to staff this office. A free telephone connected directly to the Dillingham Sport Fish office was installed in May 1997 to improve service for anglers and to relieve public demands on staff from other Divisions.

# SECTION II: SPORT FISHING EFFORT

Comprehensive estimates of sport fishing effort for the SWMA were first made in 1977 and published in the Statewide Harvest Report (Mills 1979). Since that time, substantial increases in sport fishing effort have taken place in the SWMA, with the increases being best described as stair-stepped (Figure 2).

From 1977 to 1982, effort averaged 31,563 angler-days in Southwest Alaska (Table 1). During this period, sport fishing effort was increasing at a rate of 3,161 angler-days per year, and the SWMA was accounting for an average of 2.3% of the statewide total. Growth during this period was about 10% per year; about half the rate observed statewide.

A significant increase in effort was estimated for the period 1983 to 1989 when sport fishing effort more than doubled to an average 71,927 angler-days per year. During this period, effort grew at approximately 936 angler-days per year, contributing an average of 3.5% to the total sport fishing effort statewide.

More recently, a third leap occurred when the effort surpassed the 100,000 angler-day level in 1990, with an estimated 104,699 angler-days. Rather than stabilizing since 1990, there has been a steady increase in effort each year, averaging 5% annually since 1990. In 1996, the effort reached the highest level on record, at 138,934 angler-days. During the period 1990-1995, the SWMA has provided an average of 4.4% of the total effort statewide.

Why effort has demonstrated the tendency for stair-stepped growth is not understood. Some of the growth may be a response to the increased publicity associated with the creation of several National Wildlife refuges in the early 1980s. It is apparent that interest in sport fishing in Southwest Alaska has grown considerably, and the area is accounting for an increasing portion of the total sport fishing effort statewide. Sport fishing effort in the SWMA is expected to continue to increase during the next few years.

Sport fishing effort for some of the more popular locations is summarized in the following section of this report. To warrant special recognition in this chapter, a fishery had to sustain an average 2,500 angler-days during the last 5 years, or demonstrate a radical departure from historic performance (Figure 7).

### ALAGNAK RIVER

The Alagnak River, known locally as the Branch River, is located approximately 40 miles north of King Salmon in the Kvichak River drainage (Figure 1). Effort estimates for this fishery were first made in 1981 (Table 5). Since 1981, recreational fishing effort has demonstrated an erratic pattern, peaking in 1986 at 7,628 angler-days, and bottoming out in 1988 at 1,182 angler-days. Effort during 1992 through 1996 climbed steadily to a level with an average of 12,346 angler-days (Figure 7), and has ranged between 10,949 angler-days in 1994 to 13,232 angler-days in 1995. The large effort occurring in the Alagnak River makes it the third most popular fishing destination in Southwest Alaska, ranking only behind the Nushagak/Mulchatna and Naknek rivers (Figure 7). Guided anglers utilizing several river-based lodges or daily fly-in services account for over three-quarters of the sport effort on the Alagnak River (Dunaway 1994). The Alagnak River enjoys Wild and Scenic River status and hosts significant recreational fisheries for chinook, chum, and coho salmon as well as for rainbow trout, Dolly Varden/Arctic char,

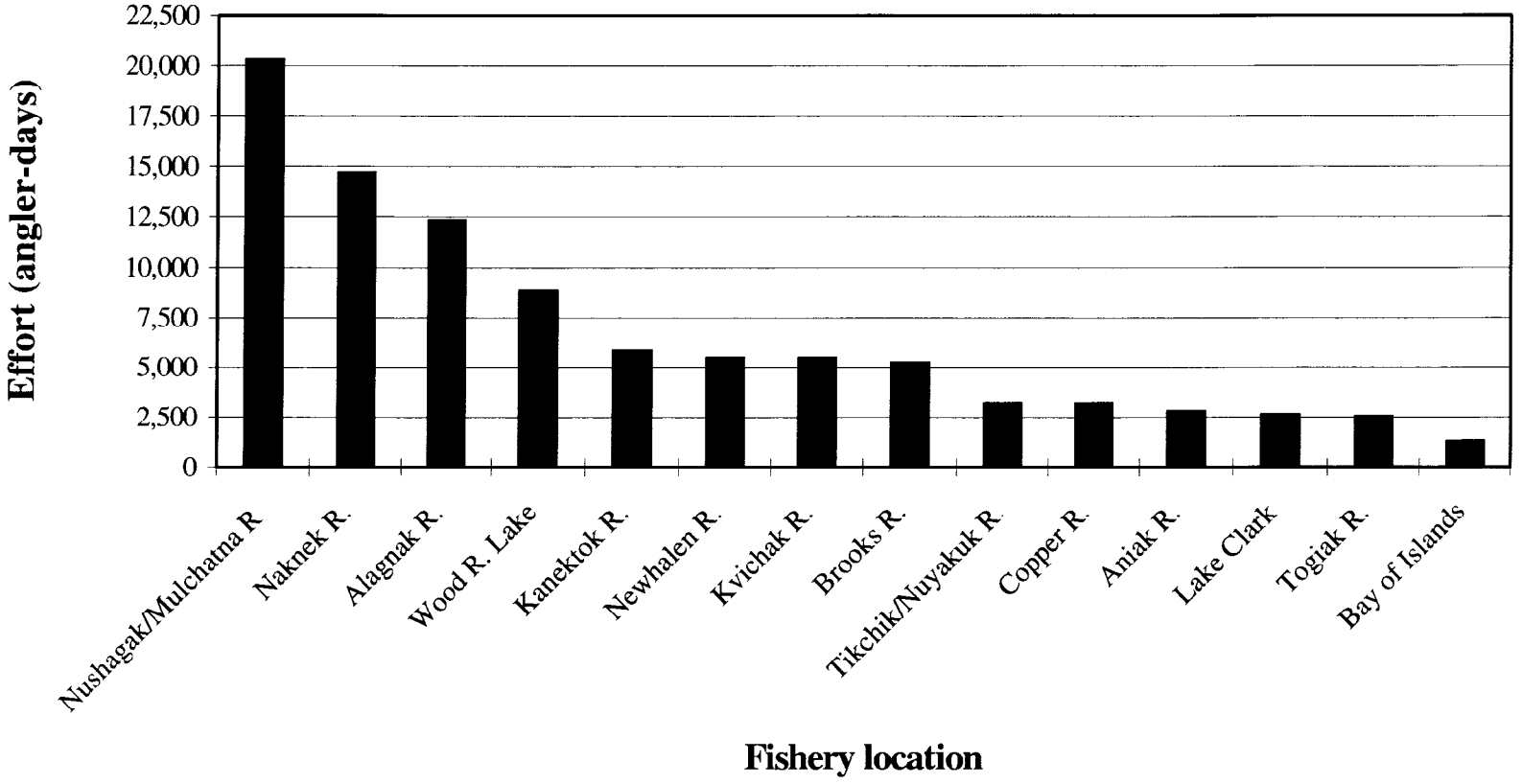



**Figure 7.-Five-year average (1992-1996) of the sport fishing effort (angler-days) at the major sport fisheries in Southwest Alaska.**

**Table 5.-Sport fishing effort in angler-days in the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 707 | 2,477 | 1,399 | 472 | 671 | 870 | 769 | 1,609 | 954 [a] | 627 [a] | 1,682 |
| Egegik/Becharof | 403 | 883 | 314 | 386 | 360 | 239 | 405 | 1,147 [a] | 954 [a] | 367 [a] | 335 [a] |
| Naknek R. | 4,675 | 5,600 | 5,691 | 9,967 | 10,863 | 11,393 | 14,786 | 14,914 | 15,311 | 18,057 | 17,152 |
| Naknek L. | 872 | 646 | 770 | 1,542 | 1,472 | 1,777 | 1,052 | 574 | 121 [a] | 1,590 | 762 |
| Bay of Islands | | | | | | | 1,012 | 1,197 | 971 | 1,131 [a] | 1,005 |
| Brooks R. | 1,195 | 1,464 | 1,163 | 1,971 | 1,391 | 2,423 | 2,976 | 1,821 | 1,474 | 2,752 | 2,784 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 61 [a] | 175 [a] | 364 [a] | 122 [a] | 335 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 1,509 | 948 | 2,044 | 2,056 | 1,865 | 1,877 | 2,206 | 2,576 | 2,533 | 2,379 | 2,544 |
| Copper R. | 1,686 | 1,120 | 723 | 1,200 | 916 | 2,491 | 2,429 | 251 [a] | 222 [a] | 1,699 [a] | 1,012 [a] |
| Alagnak R. | | | | | 1,947 | 2,252 | 2,348 | 5,119 | 2,473 | 7,628 | 4,786 |
| Newhalen R. | 1,686 | 1,572 | 2,672 | 4,013 | 1,832 | 3,054 | 2,834 | 3,664 | 8,871 | 4,475 | 5,087 |
| L Talarik Cr. | 749 | 646 | 927 | 585 | 458 | 972 | 688 | 1,288 [a] | 666 | 623 [a] | 137 [a] |
| Lake Clark | 3,748 | 2,910 | 3,128 | 2,342 | 2,519 | 2,286 | 4,777 | 1,322 | 1,511 | 4,248 | 824 |
| Lake Iliamna | | | | | | | 142 [a] | 485 [a] | 548 [a] | 3,700 | 1,641 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | 423 | 646 | 346 | 414 | 670 | 751 | 6,879 | 3,252 | 10,165 | 1,326 | 3,176 |
| Subtotal | 17,653 | 18,912 | 19,177 | 24,948 | 24,964 | 30,385 | 43,364 | 39,394 | 47,138 | 50,724 | 43,262 |

-continued-

**Table 5.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 528 [a] | 998 | 1,383 | 1,627 | 2,001 | 1,918 | 2,315 | 905 | 2,918 | 2,011 |
| Egegik/Becharof | 1,037 [a] | 779 | 1,193 | 1,033 | 1,634 | 888 | 1,771 | 1,083 | 881 | 1,251 |
| Naknek R. | 18,372 | 14,120 | 12,572 | 15,918 | 14,436 | 13,674 | 12,005 | 16,738 | 16,647 | 14,700 |
| Naknek L. | 1,710 [a] | 914 | 2,148 | 981 | 2,411 | 844 | 700 | 931 | 1,107 | 1,199 |
| Bay of Islands | 564 [a] | 1,527 | 2,620 | 2,259 | 2,838 | 1,160 | 747 | 857 | 798 | 1,280 |
| Brooks R. | 4,602 | 1,839 | 8,162 | 3,305 | 6,605 | 5,565 | 4,566 | 4,047 | 5,335 | 5,224 |
| Brooks L. | | | 680 | 813 | 2,262 | 900 | 642 | 1,289 | 404 | 1,099 |
| American Cr. | 31 [a] | 343 | 1,550 | 491 [a] | 939 | 1,659 | 1,833 | 609 | 750 | 1,158 |
| King Salmon R. | | | | | 918 | 190 | 605 | 1546 [a] | 863 [a] | 824 |
| Kvichak R. | 1,346 | 2,616 | 6,107 | 3,047 | 4,716 | 5,475 | 5,796 | 5,411 | 5,792 | 5,438 |
| Copper R. | 146 [a] | 384 | 1,036 | 1,791 | 2,518 | 4,088 | 4,324 | 2,820 | 2,065 | 3,163 |
| Alagnak R. | 1,182 [a] | 2,717 | 6,571 | 6,079 | 12,323 | 12,440 | 10,949 | 13,232 | 12,784 | 12,346 |
| Newhalen R. | 3,365 | 5,646 | 4,370 | 7,567 | 4,225 | 6,428 | 5,790 | 6,392 | 4,399 | 5,447 |
| L Talarik Cr. | 1,619 [a] | 172 [a] | 1,975 | 549 | 1,184 | 491 | 705 | 955 | 821 | 831 |
| Lake Clark | 255 [a] | 2,697 | 3,377 | 3,292 | 1,803 | 2,596 | 3,084 | 4,148 | 1,373 | 2,601 |
| Lake Iliamna | 891 | 1,151 | 1,220 | 1,097 | 1,291 | 2,184 | 1,625 | 2,700 | 1,469 | 1,854 |
| Kulik R. | | | | | 886 | 1,555 | 851 | 621 | 2,321 | 1,247 |
| Tazimina R. | | | | | 437 | 343 | 627 | 800 [a] | 275 [a] | 496 |
| Moraine Cr. | | | | | 405 | 689 | 591 | 739 | 762 | 637 |
| Other | 5,339 | 2,557 | 5,407 | 6,846 | 5,478 | 6,712 | 8,310 | 7,956 | 7,148 | 7,121 |
| Subtotal | 40,987 | 38,460 | 60,371 | 56,695 | 69,310 | 69,799 | 67,836 | 73,779 | 68,912 | 69,927 |

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**Table 5.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 1,380 | 1,206 | 2,421 | 1,885 | 2,732 | 3,992 | 4,615 | 3,212 | 3,750 | 4,557 | 4,677 |
| Mulchatna | 1,296 | 1,486 | 1,431 | 1,057 | 1,145 | 1,228 | 2,672 | 2,175 | 3,266 | 2,920 | 2,735 |
| Wood River L. | 3,549 | 2,843 | 1,745 | 3,884 | 1,701 | 3,139 | 5,040 | 3,497 | 2,460 | 3,012 | 2,325 |
| Tikchik/Nuyakuk | 959 | 1,465 | 582 | 2,071 | 2,241 | 1,058 | 1,579 | 1,171 | 1,693 | 292 [a] | 684 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 356 | 3,036 | 1,105 | 643 | 1,245 | 3,711 |
| Subtotal | 7,184 | 7,000 | 6,179 | 8,897 | 7,819 | 9,773 | 16,942 | 11,160 | 11,812 | 12,026 | 14,132 |
| Western | | | | | | | | | | | |
| Togiak | 675 | 539 | 1,666 | 1,513 | 932 | 1,160 | 972 | 3,497 | 1,290 [a] | 1,208 | 848 [a] |
| Goodnews | | | | | | | 742 | 1,010 [a] | 4,214 | 229 [a] | 2,372 [a] |
| Kanektok | | | | | | | 1,517 | 6,881 | 4,630 | 8,825 | 9,689 |
| Other | | | | | | | 20 | 344 | 243 | 61 | |
| Subtotal | 675 | 539 | 1,666 | 1,513 | 932 | 1,160 | 3,251 | 11,732 | 10,377 | 10,323 | 12,909 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 253 [a] | 383 [a] | 87 [a] | 1,116 [a] | 507 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 2,682 | 1,149 | 694 | 703 | 1,920 |
| Subtotal | | | | | | | 2,935 | 1,532 | 781 | 1,819 | 2,427 |
| Eastern | 17,653 | 18,912 | 19,177 | 24,948 | 24,964 | 30,385 | 43,364 | 39,394 | 47,138 | 50,724 | 43,262 |
| Central | 7,184 | 7,000 | 6,179 | 8,897 | 7,819 | 9,773 | 16,942 | 11,160 | 11,812 | 12,026 | 14,132 |
| Western | 675 | 539 | 1,666 | 1,513 | 932 | 1,160 | 3,251 | 11,732 | 10,377 | 10,323 | 12,909 |
| Northwestern | | | | | | | 2,935 | 1,532 | 781 | 1,819 | 2,427 |
| Total | 25,512 | 26,451 | 27,022 | 35,358 | 33,715 | 41,318 | 66,492 | 63,818 | 70,108 | 74,892 | 72,730 |

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**Table 5.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 5,039 | 3,980 | 7,978 | 11,351 | 10,031 | 14,168 | 15,460 | 16,410 | 21,589 | 15,532 |
| Mulchatna | 4,711 | 1,974 | 6,070 | 7,449 | 4,705 | 4,729 | 4,708 | 4,484 | 5,243 | 4,774 |
| Wood River L. | 4,457 | 10,272 | 7,618 | 10,853 | 6,647 | 6,482 | 12,144 | 9,022 | 9,715 | 8,802 |
| Tikchik/Nuyakuk | 4,147 | 1,569 | 2,424 | 4,996 | 3,051 | 3,678 | 3,306 | 2,804 | 3,091 | 3,186 |
| Koktuli R. | | | | | 1,323 | 342 | 1,522 | 576 [a] | 1,532 | 1,059 |
| Other | 1,486 | 1,882 | 4,624 | 4,041 | 864 | 1,098 | 3,629 | 4,235 | 3,679 | 2,701 |
| Subtotal | 19,840 | 19,677 | 28,714 | 38,690 | 26,621 | 30,497 | 40,769 | 37,531 | 44,849 | 36,053 |
| Western | | | | | | | | | | |
| Togiak | 1,055 [a] | 1,174 | 1,638 | 1,729 | 1,419 | 1,647 | 2,361 | 3,384 | 3,926 | 2,547 |
| Goodnews | 1,219 [a] | 1,315 | 4,578 [a] | 1,328 | 1,387 | 2,276 | 2,038 | 1,030 | 2,322 | 1,811 |
| Kanektok | 12,697 | 4,382 | 4,525 | 3,078 | 4,972 | 3,791 | 6,505 | 5,512 | 8,305 | 5,817 |
| Other | 3,796 | 767 | 66 | 20 | 64 | 60 | 0 | 0 | 187 | 62 |
| Subtotal | 18,767 | 7,638 | 10,807 | 6,155 | 7,842 | 7,774 | 10,904 | 9,926 | 14,740 | 10,237 |
| Northwestern | | | | | | | | | | |
| Aniak | 2,437 [a] | 4,035 | 1,964 | 3,078 | 2,604 | 2,056 | 1,815 | 3,569 | 3,964 | 2,802 |
| Kisaralik | | | | | | | 1,463 | 369 [a] | 1,525 [a] | 1,119 |
| Kwethluk | | | | | 640 | 554 | 466 [a] | 387 [a] | 1,511 [a] | 712 |
| Other | 377 | 3,231 | 2,843 | 2,966 | 3,500 | 3,620 | 2,350 | 2,905 | 3,433 | 3,162 |
| Subtotal | 2,814 | 7,266 | 4,807 | 6,044 | 6,744 | 6,230 | 6,094 | 7,230 | 10,433 | 7,346 |
| Eastern | 40,987 | 38,460 | 60,371 | 56,695 | 69,310 | 69,799 | 67,836 | 73,779 | 68,912 | 69,927 |
| Central | 19,840 | 19,677 | 28,714 | 38,690 | 26,621 | 30,497 | 40,769 | 37,531 | 44,849 | 36,053 |
| Western | 18,767 | 7,638 | 10,807 | 6,155 | 7,842 | 7,774 | 10,904 | 9,926 | 14,740 | 10,237 |
| Northwestern | 2,814 | 7,266 | 4,807 | 6,044 | 6,744 | 6,230 | 6,094 | 7,230 | 10,433 | 7,346 |
| Total | 82,408 | 73,041 | 104,699 | 107,584 | 110,517 | 114,300 | 125,603 | 128,466 | 138,934 | 123,564 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the statewide harvest survey. 1996 data are preliminary.

[a] Unpublished estimates from statewide harvest survey for sites with less than 12 responses.

Arctic grayling, and northern pike. For the near term, sport fishing effort on the Alagnak River is expected to remain above 12,400 angler-days per year.

## BROOKS RIVER

The Brooks River, located in the heart of Katmai National Park and Preserve, had been a popular destination for sport fishermen long before estimates of sport fishing effort were first made in 1977. The Brooks River has shallow, clear water with a moderate current, and flows northeast from Lake Brooks down to Naknek Lake (Figure 1). The Brooks River has long been recognized for its rainbow trout, sockeye and coho salmon, and Arctic grayling fisheries. During the recent 5-year period (1992-1996), Brooks River has supported an average of 5,224 angler-days of effort, making it the eighth most popular fishery in Southwest Alaska (Figure 7). At only 1.25 miles in length, the Brooks River supports more fishing pressure per mile than any other water in Southwest Alaska. Effort in 1996 (5,335 angler-days), although not a record, was the fourth highest observed since 1977.

Although effort is growing on the Brooks River, recent management actions on the part of the National Park Service have likely reduced growth in the fishery from what would have occurred if left unchecked. Effort levels can be expected to remain between 4,000 and 7,000 angler-days per year. Several bear-angler incidents in recent years, where bears obtained fish from careless anglers, have resulted in restrictions on fishing area and bag limits, and led to the rule that anglers must leave fishing areas or at least stop fishing activity when bears are present. All these restrictions have a negative effect on the angling effort.

## BAY OF ISLANDS

The Bay of Islands, located in Naknek Lake, has gone through an initial surge in angler effort in the early 1990s, followed by a steady decline. Estimates of effort for this location first appeared in the statewide harvest survey in 1983 and remained relatively low through 1989 (Table 5). In 1990, effort for this fishery jumped to 2,620 angler-days, and in 1992 was estimated to be 2,838 angler-days. Recreational fishing effort in 1993 dropped to 1,160 angler-days, and decreased even further during 1994 to 1996, with effort ranging from 747 to 857 angler-days. The average effort during 1992-1996 was 1,280 angler-days (Figure 7).

Anglers fishing the Bay of Islands are reportedly targeting large rainbow trout, lake trout, pike and Dolly Varden. Previous studies indicate Naknek River rainbow trout stocks migrate to the Bay of Islands in June and July where they summer (Berger and Gwartney 1986). The fishery is reported to be a deepwater troll fishery.

The decline in this fishery may be due to access difficulty. Frequent high winds on Naknek Lake can limit both accessibility and ability to fish in the Bay of Islands. Fishing opportunity may also be reduced because the National Park Service does not allow boat storage along the shoreline of Naknek Lake. Additionally, the popular salmon and rainbow trout fisheries on the Naknek River are more easily accessed than the Bay of Islands area.

## KVICHAK RIVER

The Kvichak River drains an extensive portion of the Bristol Bay watershed, most notably Lake Iliamna (Figure 1). Known primarily as the world's largest producer of sockeye salmon, the Kvichak drainage also supports significant recreational fisheries for rainbow trout, Dolly

Varden/Arctic char, and Arctic grayling. Minor fisheries for coho salmon and lake trout also occur.

Annual effort jumped to a high level beginning in 1990, when 6,107 angler-days of effort occurred at the Kvichak River (Table 5). Effort dropped slightly in 1991 (3,047 angler-days), but the effort during 1993 to 1996 remained stable at between 5,411 and 5,796 angler-days. The average effort during 1992 to 1996 was 5,438 angler-days (Table 5, Figure 7).

Expansion of the village airfield at Igiugig was completed in 1994. Improved aircraft access and parking will likely result in increased demand for fishing opportunity. Sport fishing effort is expected to remain stable or to slowly increase in the near future. Some recent evidence indicates that the rainbow trout fishery in August and September is increasing in popularity. An additional sport fishing lodge was built near Igiugig in 1997. Staff are in discussions with village leaders and access program personnel to find ways to accommodate expected growth in a planned manner-including walkways and boat launching areas.

## LAKE CLARK

Lake Clark is located in the eastern section of the management area and forms a major watershed for the Iliamna drainage. Waters from Lake Clark flow generally south into Sixmile Lake which is drained by the Newhalen River (Figure 1). Lake Clark is within the confines of the Lake Clark National Park and preserve. Fjord-like bays and glacial-colored waters are the signature of this area.

Sport fishing effort in Lake Clark has been estimated since 1977 (Table 5). Effort has generally remained approximately in the 2,000 to 4,000 angler-day range since 1977, although there have been notable exceptions of low effort in 1987 (824 angler-days), 1988 (255 angler-days), and 1996 (1,373 angler-days). The drop in effort in 1996, following a steadily increasing trend from 1992 to 1995, is difficult to explain. The average effort during 1992 to 1996 was 2,601 angler-days (Figure 7).

Most effort targets northern pike, grayling, lake trout and sockeye salmon. Rainbow trout are found very infrequently, if at all in the glacial waters of Lake Clark. Because of its proximity to Anchorage, it is likely that Lake Clark will continue to grow as a fishing destination.

## COPPER RIVER

Copper River, a 32-mile river flowing west from a series of small lakes and eventually into Intricate Bay on the southeastern shore of Iliamna Lake, is located in the Eastern section of the management area (Figure 1). The high quality rainbow trout fishery in this river was included in the Bristol Bay Trophy Fish area beginning in 1971, and in 1991 was designated a fly fishing only, catch-and-release special management area. The Copper River has a relatively abundant population of large, brightly-colored resident rainbow trout, as well as the more transient lake population of rainbow trout which enter the river in late August and September. Additional sport fish species present at least part of the year in Copper River include Dolly Varden, northern pike, and sockeye salmon. The scenic beauty of the area provides anglers either on float-trips or fishing from shore with a quality fly fishing experience.

The sport fishing effort has been estimated since 1977 (Table 5) and was generally below 2,000 angler-days up until 1992. Peak effort prior to 1992 occurred in 1982 and 1983, with approximately 2,400 angler-days per year. Unfortunately, the effort estimates from 1984 to 1988 are

based on less than 12 responses to the statewide harvest surveys, making these estimates extremely imprecise. The angling effort during 1992 to 1996 has ranged between 2,065 angler-days in 1996 to 4,324 angler-days in 1994, and the average effort during this period has been 3,163 angler-days (Figure 7). The level of sport fishing effort is expected to remain steady or slightly increase over the next several years.

### NAKNEK RIVER

The Naknek River, located on the east side of Bristol Bay (Figure 1), supports the second most popular sport fishery within the SWMA, accounting for approximately one-tenth of the total recreational angler effort expended in the SWMA each year. Effort is split between the upper river, where anglers target rainbow trout, Arctic grayling, and sockeye salmon, and the lower river, where they fish primarily for chinook and coho salmon.

Sport fishing effort on the Naknek River increased steadily during 1979 to 1988, from an average of approximately 5,000 angler-days annually during the late 1970s to the record 18,372 angler-days observed in 1988 (Table 5). From 1989 to 1994, effort ranged from 15,918 angler-days in 1991 to 12,005 angler-days in 1994. The reduction after 1988 was most likely due to angler response to more conservative regulations, the issuance of emergency order restrictions inseason, and a growing desire on the part of some fishermen to fish less crowded waters. During 1995 and 1996, the angler effort has rebounded back to levels of slightly over 16,000 angler-days, indicating that the fishery is expanding once again even with the more conservative regulations. During 1992 to 1996, the average angling effort was 14,700 angler-days (Figure 7). Sport fishing effort is expected to increase slowly over the next several years.

### NEWHALEN RIVER

The Newhalen River connects Six-Mile Lake to Lake Iliamna and is the third most popular fishing destination in the Eastern section of the SWMA. Estimates of sport fishing effort were first made for the Newhalen River in 1977 and have been made annually since then (Table 5). During the period 1992 to 1996, sport fishing effort averaged 5,447 angler-days per year (Figure 7), and ranged from 6,428 angler-days in 1993 to 4,225 angler-days in 1992. Record effort was estimated in 1985 at 8,871 angler-days.

The attraction for most anglers is the opportunity to fish for abundant sockeye salmon which ascend the Newhalen River each summer. The bulk of the fishery occurs during a 4-week period starting in late June and continuing until late July. The sockeye returns to the Kvichak River drainage in 1996 and 1997 were extremely poor, resulting in reduced opportunity and success in harvesting fish. In addition to sockeye, there is excellent rainbow trout fishing opportunity available in the upper reach of the Newhalen River as well as the tail water below the area known as the falls.

Sport fishing opportunity can be significantly enhanced through development of an improved camping area and trail. Staff are continuing to work with local community leaders to improve access to the Newhalen River. When that project is completed, participation in the recreational fishery on the Newhalen can be expected to significantly increase.

### NUSHAGAK AND MULCHATNA RIVERS

The Nushagak and Mulchatna rivers are located in the central portion of the SWMA (Figure 1) and together are the greatest producers of chinook, chum, coho, and pink salmon in Bristol Bay.

Primary species of interest to sport fisherman include chinook, chum, and coho salmon as well as rainbow trout, Dolly Varden/Arctic char and Arctic grayling. Sport fishing effort has increased steadily since 1977 and in 1996 accounted for 26,832 angler-days (Table 5). Most (75%) of the effort occurs in the Nushagak River, and together the two rivers account for about 16% of the total sport fishing effort in the SWMA (Figure 7).

Recreational fishing effort in the Nushagak River averaged 15,532 angler-days per year during 1992 to 1996, making it the most popular fishery in the SWMA. The 1996 estimate of 21,589 angler-days is a new record level of effort for this fishery and likely the result of the growing chinook fisheries in the lower and middle Nushagak River. The Mulchatna River has averaged approximately 5,000 angler-days per year and since 1988 has remained relatively stable.

Approximately 30 commercial guiding services use the Nushagak/Mulchatna drainage and operate spike camps or store boats within the area. Recreational activity within the drainage was the focus of a major planning effort completed in July 1990, which resulted in the Nushagak and Mulchatna Rivers Recreation Management Plan (ADNR et al. 1990). Additionally, village corporations now maintain a vigorous, and profitable, recreational land management program on corporation lands.

### WOOD RIVER LAKES

The Wood River Lakes system (Figure 1), a series of six large lakes connected by relatively swift short rivers, is located within the confines of the Wood-Tikchik State Park. Sport fishing opportunities have attracted anglers in ever-increasing numbers. Anglers target rainbow trout, Arctic char, Arctic grayling and a variety of salmon species. Because of the diverse fishery resources, sport fishing continues throughout most of the open water season. During the recent 5-year period (1992 to 1996) effort averaged 8,802 angler-days per year (Figure 7) or about 7% of the area-wide total. Two rivers, the Agulukpak and Agulowak, support most of the sport fishing activity that occurs within the drainage.

As a state park, the area receives a great deal of publicity, and unguided use of the fishery resources is on the rise. The area is also the base for several major fishing lodges which offer fly-out fishing trips, often to remote reaches of the Wood River Lakes system. Taken together, the guided and unguided components are significant in these waters and effort is expected to increase substantially in the future.

### TIKCHIK/NUYAKUK RIVER

The Tikchik/Nuyakuk river is located within the Wood/Tikchik State Park (Figure 1). The Nuyakuk River starts at the outlet of Tikchik Lake, and flows east 43 miles until it reaches the confluence with the Nushagak River. The Nuyakuk River has a moderate current, and clear and deep water, making it a popular destination for anglers seeking a quality float-trip experience. Sport fishing opportunities have been increasing in this area, just as they have in the nearby Wood River Lakes. Anglers target rainbow trout, lake trout, Arctic char, Arctic grayling, and a variety of salmon species.

Angling effort in the Tikchik/Nuyakuk River during 1977 to 1991 ranged from a low of 582 angler-days in 1979 to a high of 4,996 angler-days in 1991 (Table 5). The estimates of effort in 1986 and 1987 (292 and 684 angler-days, respectively) were based on less than 12 responses to the statewide harvest survey. During 1992 to 1996, angling effort remained relatively steady

with an average annual effort of 3,186 angler-days (Figure 7), ranging from 2,804 angler-days in 1995 to 3,678 angler-days in 1993.

## GOODNEWS RIVER

The Goodnews River (Figure 1) is located in the Western section of the management area and is within the Togiak National Wildlife Refuge. The Goodnews River consists of three river forks which drain approximately 1,000 square miles. The Goodnews River (North Fork) drains Goodnews Lake and flows approximately 25 miles before leaving the refuge, and continues another 22 miles to Goodnews Bay. The Middle Fork is a 42-mile-long tributary which parallels the North Fork, joining near the mouth. The upper 27 miles of the Middle Fork are located on the refuge. The South Fork is the smallest of the three tributaries and is approximately 25 miles in length, 10 miles of which are within the refuge. The waters of the Goodnews drainage support abundant Dolly Varden/Arctic char, rainbow trout, Arctic grayling, and all five species of Pacific salmon. Of the salmon species, coho salmon are the most popular with recreational anglers fishing these waters.

Estimates of sport fishing effort were first available in 1983. Estimates for the Goodnews River based on 12 or more responses to the statewide harvest survey were made for 1985, 1989, and 1991 through 1996. For the remaining 5 years (1984, 1986-1988, and 1990), estimates of sport effort have been made but are based on less than 12 responses, making these estimates extremely imprecise. For the period 1992 to 1996, sport fishing effort on the Goodnews River averaged 1,811 angler-days accounting for less than 2% of the total effort in Southwest Alaska. According to USFWS staff, about 66% of the effort occurs in the lower portion of the Goodnews River, below the wilderness boundary and outside the refuge.

In May of 1991, the Togiak Refuge Public Use Management Plan was adopted by the U.S. Fish and Wildlife Service for the Goodnews River (USFWS 1991). The plan addressed guided and unguided use on the Goodnews River, and allowed 10 sport fishing operators to provide commercial services within the wilderness portion of the drainage. Commercial activities below the wilderness area are not controlled by the Service under this plan. The intent of this plan was to maintain the 1990 level of guided sport fishing effort through the 1995 season. Under this plan, private recreational effort throughout the system and professional guided effort below the refuge boundary is currently unlimited.

## KANEKTOK RIVER

The Kanektok River (Figure 1), located south of Bethel and within the Togiak National Wildlife Refuge, is a 93-mile clearwater river that became popular with sport fishermen starting about 1983. Since 1983, sport fishing effort increased steadily until it peaked in 1988 at 12,697 angler-days (Table 5). Fishing effort during 1989 to 1995 declined to between 4,000 and 6,000 angler-days, and then in 1996 increased to 8,305 angler-days. During 1992 to 1996 the effort has averaged 5,817 angler-days (Figure 7), or about 4.7% of the effort within the SWMA area. Approximately 60% of the total effort occurs on the lower 20 miles of the river, where fishermen target chinook, chum, and coho salmon. The upper 73 miles support primarily rainbow trout, Arctic grayling, and Dolly Varden fisheries.

The Togiak Refuge Public Use Management Plan adopted in 1991 by the USFWS addressed guided and unguided use on the Kanektok River (USFWS 1991). That plan established maximum daily use levels for commercially guided visitors within the wilderness section of the

Refuge. This plan is not likely to result in significant changes in sport fishing effort on the Kanektok River. Under this plan, private recreational effort throughout the system and professional guided effort in the lower 20 miles of the river are currently unlimited.

## TOGIAK RIVER

The Togiak River, within the confines of the Togiak National Wildlife Refuge on the western side of Bristol Bay (Figure 1), supports significant runs of chinook and coho salmon as well as abundant Dolly Varden/Arctic char and rainbow trout stocks. The river is fished primarily by fly-in and float-trip anglers, as well as clients from two river-based lodges. Angler effort on the Togiak River during 1977 to 1992 was relatively stable at levels of approximately 500 to 1,500 angler-days, with the exception of 1984 when effort peaked at 3,497 angler-days. During 1992 to 1996, the effort has steadily increased from 1,419 angler-days in 1992 to 3,926 angler-days in 1996 (Table 5). The average effort during this period was 2,547 angler-days (Figure 7). As of 1996, effort at the Togiak River represented only 3.1% of the SWMA total recreational fishing effort. Under the Public Use Management Plan adopted in 1991 by the U.S. Fish and Wildlife Service (USFWS 1991), sport fishing effort, particularly guided effort in the wilderness section of the Refuge, was limited to moderate growth during the next several years by increasing the number of client-days allocated to each guide.

## NORTHWESTERN FISHERIES

The least developed fisheries in the SWMA are found in the Northwestern section. The waters in this section are extremely remote with few facilities catering to sport fishermen. Estimates of effort were first calculated for the waters of the Northwestern section in 1983 (Table 5). During 1992 to 1996, effort has averaged 7,346 angler-days per year or barely 6% of the effort for the whole management area. The most popular river in this section is the Aniak River which accounts for approximately 36% of the Northwestern section total. During 1992 to 1996, the angling effort on the Aniak River averaged 2,802 angler-days (Figure 7). Chinook salmon, rainbow trout, Dolly Varden/Arctic char and Arctic grayling are the most commonly harvested species in the Northwestern section sport fisheries.

# SECTION III: CHINOOK SALMON FISHERIES

The following discussions focus on six significant recreational chinook salmon fisheries found in the SWMA. A significant fishery refers to a particular drainage, river, or portion of a waterway where a large proportion of the area's total effort and/or harvest for a species occurs. Fisheries requiring particular management attention or which have been designated as special management areas are generally regarded as significant fisheries.

Chinook salmon stocks throughout the management area significantly increased in abundance from the late 1970s through the early 1980s. Then, from about 1984 to 1990, chinook salmon abundance in western Alaska returned to more normal levels. Harvests of chinook salmon have loosely followed the trends in abundance, peaking in 1987 at 18,622 fish and then declining through 1990 (Figure 8). Chinook salmon typically account for about 30% of the recreational salmon harvest in Southwest Alaska. The 1996 sport harvest for the area was 7,678, down significantly from the 1995 harvest (Table 6). Approximately 7% of all the chinook salmon killed in the SWMA are taken by sport fishermen.

The peak of the recreational chinook salmon fishery occurs from mid-June to mid-July in the lower reaches of the Alagnak, Nushagak, Naknek, Togiak, and Kanektok rivers, as well as several smaller waters (Figure 9). The chinook salmon sport fisheries of the area, like the sport fisheries for most species, are fished primarily by guided fishermen. With few exceptions, the guided to unguided ratio is about 3 to 1, and the retention rates (the number of fish kept in relation to the total caught) are usually 50% or less.

Since 1960, bag limits for chinook salmon have become increasingly conservative. The following is a chronology of regulatory changes affecting chinook salmon sport fisheries in Southwest Alaska:

| Year | Bristol Bay daily bag and possession limit, and size limit | Kuskokwim Bay area and Kuskokwim River drainage daily bag and possession limit, and size limit |
|---|---|---|
| 1965 | 10 salmon (all species combined) per day, no size limit | 15 salmon per day, no size limit |
| 1972 | 5 chinook per day, only 2 may be over 26 inches | no change |
| 1976 | 5 chinook per day, only 2 may be over 28 inches | no change |
| 1985 | no change | 5 chinook per day, no size limit |
| 1988 | 3 chinook per day, only 2 may be over 28 inches | Kuskokwim Bay area (excluding Kuskokwim River): 3 chinook per day, only 2 may be over 28 inches<br>Kuskokwim River drainage: 1 chinook per day, no size limit |
| 1995 | no change | Kuskokwim Bay area and Kuskokwim River drainage: 3 chinook per day, only 2 may be over 28 inches |

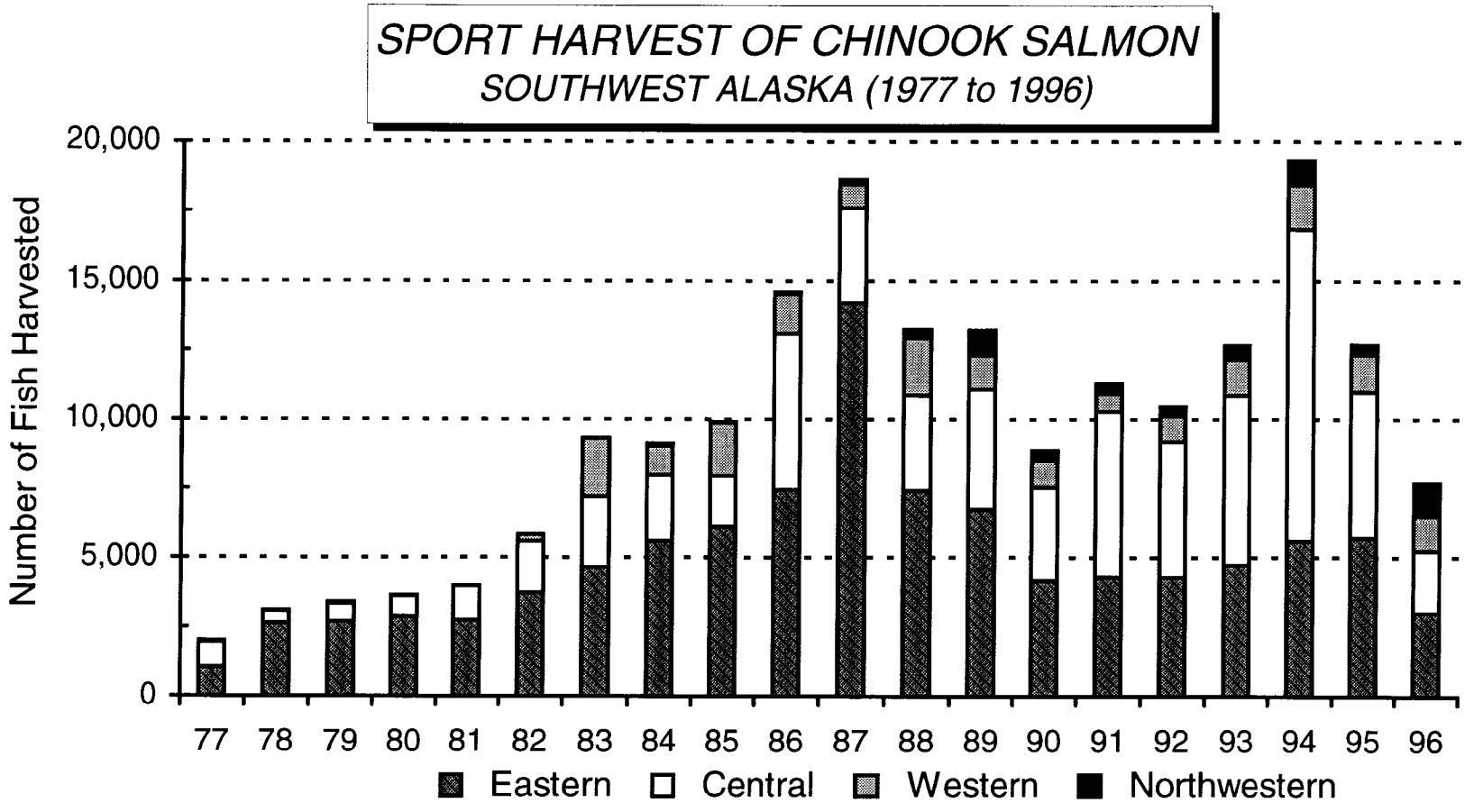


**Figure 8.-Sport harvest of chinook salmon from the Eastern, Central, Western, and Northwestern sections of the Southwest Alaska sport fish management area, 1977 to 1996.**

**Table 6.-Sport harvest of chinook salmon from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 0 [a] | 0 [a] | 322 |
| Egegik/Becharof | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 148 [a] | 0 [a] | 37 [a] | 0 [a] |
| Naknek R. | 1,005 | 2,406 [b] | 2,669 [b] | 2,729 | 2,581 | 3,264 | 3,545 | 4,524 | 5,038 | 6,462 [b] | 11,419 [b] |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 15 | 0 |
| Bay of Islands | | | | | | | 0 | 0 | 62 | 0 [a] | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 42 | 25 | 0 | 64 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 9 | 210 | 10 | 129 | 64 | 252 | 420 | 100 | 57 | 68 | 191 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 97 | 220 | 252 | 661 | 757 | 680 | 1,969 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 34 | 54 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 430 | 0 | 161 | 128 | 149 |
| Subtotal | 1,018 | 2,616 | 2,679 | 2,858 | 2,742 | 3,736 | 4,647 | 5,576 | 6,100 | 7,424 | 14,168 |

-continued-

**Table 6.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 52 | 120 | 113 | 72 | 150 | 106 | 19 | 20 | 73 |
| Egegik/Becharof | 588 [a] | 78 | 80 | 0 | 16 | 9 | 20 | 9 | 49 | 21 |
| Naknek R. | 5,380 [b] | 3,879 [b] | 3,250 [b] | 3,115 | 2,633 | 2,603 | 3,692 | 4,153 | 1,936 | 3,003 |
| Naknek L. | 62 [a] | 26 | 0 | 9 | 69 | 0 | 0 | 9 | 0 | 16 |
| Bay of Islands | 0 [a] | 0 | 0 | 18 | 25 | 18 | 67 | 45 | 29 | 37 |
| Brooks R. | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 19 | 0 | 13 |
| Brooks L. | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | | | | 182 | 19 | 219 | 124 [a] | 88 [a] | 126 |
| Kvichak R. | 0 | 681 | 143 | 44 | 16 | 250 | 90 | 175 | 98 | 126 |
| Copper R. | 0 [a] | 277 | 0 | 22 | 0 | 0 | 0 | 9 | 39 | 10 |
| Alagnak R. | 1,243 [b] | 1,333 [b] | 474 | 790 | 1,160 | 1,515 | 1,048 | 891 | 673 | 1,057 |
| Newhalen R. | 0 | 25 | 0 | 22 | 0 | 0 | 30 | 9 | 0 | 8 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 0 | 50 | 55 | 11 | 17 | 0 | 60 | 0 | 0 | 15 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 124 | 338 | 31 | 142 | 57 | 173 | 267 | 255 | 59 | 162 |
| Subtotal | 7,397 | 6,739 | 4,153 | 4,286 | 4,291 | 4,737 | 5,599 | 5,717 | 2,991 | 4,667 |

-continued-

**Table 6.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 402 | 151 | 312 | 611 | 929 | 1,436 | 1,615 | 1,534 | 1,517 | 1,780 [b] | 1,371 [b] |
| Mulchatna | 521 | 291 | 342 | 146 | 291 | 367 | 388 | 786 | 292 | 3,534 | 1,860 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 14 | 0 | 0 |
| Tikchik/Nuyakuk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 [a] | 27 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 42 | 545 | 12 | 0 | 350 | 191 |
| Subtotal | 923 | 442 | 654 | 757 | 1,220 | 1,845 | 2,548 | 2,394 | 1,852 | 5,664 | 3,449 |
| Western | | | | | | | | | | | |
| Togiak | 62 | 35 | 78 | 34 | 0 | 231 | 535 | 46 [b] | 925 [b] | 618 [b] | 338 [b] |
| Goodnews | | | | | | | 31 | 52 [a] | 323 | 0 [a] | 125 [a] |
| Kanektok | | | | | | | 1,511 | 922 | 667 [b] | 844 [b] | 375 [b] |
| Other | | | | | | | 0 | 12 | 0 | 0 | |
| Subtotal | 62 | 35 | 78 | 34 | 0 | 231 | 2,077 | 1,032 | 1,915 | 1,462 | 838 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 0 [a] | 39 [a] | 12 [a] | 49 [a] | 49 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 0 | 78 | 12 | 0 | 118 |
| Subtotal | | | | | | | 0 | 117 | 24 | 49 | 167 |
| Eastern | 1,018 | 2,616 | 2,679 | 2,858 | 2,742 | 3,736 | 4,647 | 5,576 | 6,100 | 7,424 | 14,168 |
| Central | 923 | 442 | 654 | 757 | 1,220 | 1,845 | 2,548 | 2,394 | 1,852 | 5,664 | 3,449 |
| Western | 62 | 35 | 78 | 34 | 0 | 231 | 2,077 | 1,032 | 1,915 | 1,462 | 838 |
| Northwestern | | | | | | | 0 | 117 | 24 | 49 | 167 |
| Total | 2,003 | 3,093 | 3,411 | 3,649 | 3,962 | 5,812 | 9,272 | 9,119 | 9,891 | 14,599 | 18,622 |

-continued-

**Table 6.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 2,383 | 2,807 | 1,594 | 3,586 | 3,688 | 4,815 | 8,871 | 4,476 | 2,006 | 4,771 |
| Mulchatna | 403 | 754 | 1,409 [b] | 1,894 | 813 | 965 | 1,675 | 402 | 84 | 788 |
| Wood River L. | 557 | 104 | 160 | 173 | 80 | 97 | 435 | 93 | 10 | 143 |
| Tikchik/Nuyakuk | 31 | 52 | 80 | 71 | 178 | 101 | 60 | 73 | 10 | 84 |
| Koktuli R. | | | | | 76 | 18 | 20 | 0 [a] | 44 | 32 |
| Other | 62 | 598 | 137 | 263 | 39 | 106 | 181 | 193 | 118 | 127 |
| Subtotal | 3,436 | 4,315 | 3,380 | 5,987 | 4,874 | 6,102 | 11,242 | 5,237 | 2,272 | 5,945 |
| Western | | | | | | | | | | |
| Togiak | 0 [a] | 234 | 445 [b] | 284 | 271 | 225 | 663 | 581 | 402 | 428 |
| Goodnews | 91 [a] | 68 | 27 [a] | 26 | 23 | 81 | 163 | 41 | 157 | 93 |
| Kanektok | 1,910 | 884 | 503 | 316 | 656 | 1,006 | 751 | 739 | 689 | 768 |
| Other | 91 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 2,092 | 1,223 | 975 | 626 | 950 | 1,312 | 1,577 | 1,361 | 1,248 | 1,290 |
| Northwestern | | | | | | | | | | |
| Aniak | 164 [a] | 738 | 285 | 214 | 172 | 300 | 437 | 279 | 592 | 356 |
| Kisaralik | | | | | | | 148 | 9 [a] | 20 [a] | 59 |
| Kwethluk | | | | | 31 | 0 | 19 [a] | 0 [a] | 59 [a] | 22 |
| Other | 146 | 201 | 82 | 187 | 110 | 200 | 311 | 84 | 496 | 240 |
| Subtotal | 310 | 939 | 367 | 401 | 313 | 500 | 915 | 372 | 1,167 | 653 |
| Eastern | 7,397 | 6,739 | 4,153 | 4,286 | 4,291 | 4,737 | 5,599 | 5,717 | 2,991 | 4,667 |
| Central | 3,436 | 4,315 | 3,380 | 5,987 | 4,874 | 6,102 | 11,242 | 5,237 | 2,272 | 5,945 |
| Western | 2,092 | 1,223 | 975 | 626 | 950 | 1,312 | 1,577 | 1,361 | 1,248 | 1,290 |
| Northwestern | 310 | 939 | 367 | 401 | 313 | 500 | 915 | 372 | 1,167 | 653 |
| Total | 13,235 | 13,216 | 8,875 | 11,300 | 10,428 | 12,651 | 19,333 | 12,687 | 7,678 | 12,555 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the statewide harvest survey. 1996 data are preliminary.

[a] Unpublished estimates from statewide harvest survey for sites with less than 12 responses.

[b] Estimates from onsite creel survey.

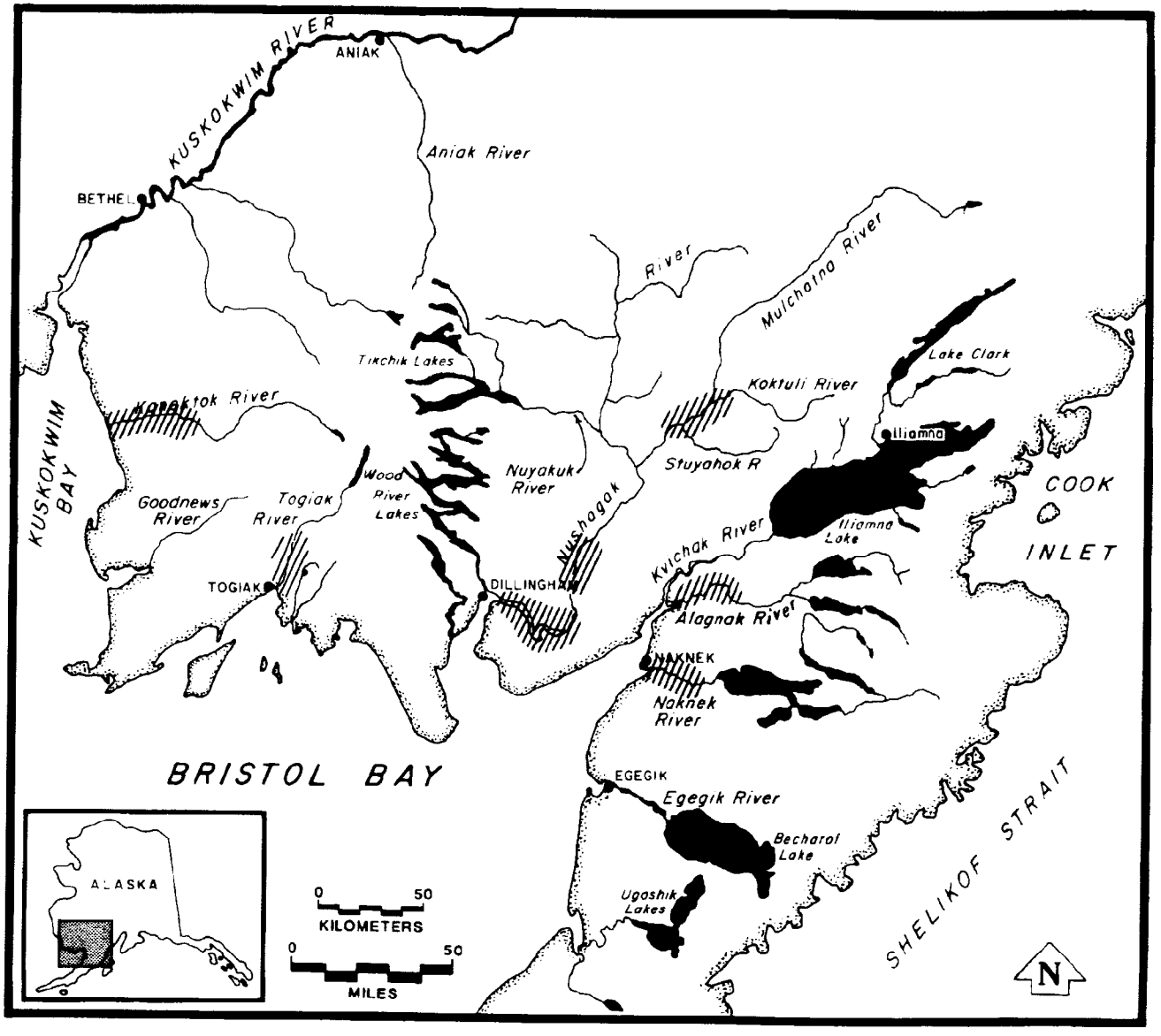


**Figure 9.-Popular chinook salmon sport fisheries in Southwest Alaska.**

## ALAGNAK RIVER

### Fishery Description

The chinook salmon fishery in the Alagnak River occurs in the lower 12 miles of the river and peaks in mid- to late-July, which is roughly 2 weeks later than other chinook salmon fisheries in the area (Dunaway 1994). Chinook salmon returning to the Alagnak are typically larger than those found in other systems. Effort is primarily a guided (80%), nonresident venture (Dunaway 1990a, 1994). Most anglers either fly in with float-equipped aircraft for 1-day trips, or base out of one of the several lodges located along the river. Retention rates average approximately 20%, typical of most of the area's chinook fisheries.

### Historical Performance

The largest estimated annual harvest of chinook salmon from the Alagnak River was 1,969 fish in 1987, and the lowest estimated harvest was 97 fish in 1981 (Table 6). The recent 5-year average (1992-1996) harvest of chinook in the Alagnak River is 1,057 fish. There is an obvious decreasing trend in harvest since 1993-despite very significant increases in sport fishing effort (Table 5), and above average escapements (Table 7). It may be that self-imposed bag restrictions set by the main lodges on the river are contributing to the reduced annual harvest.

The bag and possession limits for chinook salmon in the Alagnak River were decreased in 1988 from 5 per day and in possession, 2 over 28 inches in length to 3 per day and in possession, 2 over 28 inches in length. These bag and possession limits remain in effect (ADF&G 1997b). Terminal tackle is restricted to single-hook artificial lures only.

### Management

Sport harvests and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Commercial harvests are reported for the Naknek/Kvichak district which is a mixed-stock fishery comprised of Kvichak, Naknek, and Alagnak River stocks. It is not possible to separate the commercial harvests by river of origin. Sport Fish Division has conducted significant monitoring and stock assessment projects on the Alagnak River in the recent past (Brookover 1989a, Dunaway 1990a and 1994).

A chinook salmon escapement goal has not been established for Alagnak River stocks. Escapement of chinook salmon in the Alagnak drainage has been indexed by the use of fixed-wing aerial surveys each year since 1970, with the exception of 1979 (Table 7). Unexpanded counts of chinook salmon, called index counts, average 4,579 fish (1970 to 1996). Escapements for the last 5 years have been well above the long-term average (Table 7).

Management concerns for chinook stocks of the Alagnak River drainage center on the inability to estimate exploitation rates. Allocation of commercial catches from the Naknek/Kvichak district to the river of origin are not possible, and the lack of inseason assessment of escapement makes it impossible to effectively manage this stock. Run timing of chinook stocks to the Alagnak coincide with peak periods of commercial sockeye salmon fishing in the Naknek/Kvichak district. When sockeye returns are sufficient to allow for liberal fishing schedules, the potential

**Table 7.-Unexpanded escapement counts for chinook salmon in the Alagnak River, 1970 to 1997.**

| Year | Index |
|---|---|
| 1970 | 5,250 |
| 1971 | 1,420 |
| 1972 | 2,256 |
| 1973 | 824 |
| 1974 | 1,596 |
| 1975 | 6,620 |
| 1976 | 7,593 |
| 1977 | 3,634 |
| 1978 | 11,650 |
| 1979 | |
| 1980 | 2,930 |
| 1981 | 2,430 |
| 1982 | 3,400 |
| 1983 | 2,980 |
| 1984 | 6,090 |
| 1985 | 3,920 |
| 1986 | 3,090 |
| 1987 | 2,420 |
| 1988 | 4,600 |
| 1989 | 3,650 |
| 1990 | 1,720 |
| 1991 | 2,531 |
| 1992 | 3,042 |
| 1993 | 10,170 |
| 1994 | 8,480 |
| 1995 | 6,860 |
| 1996 | 9,885 |
| All Years Average | 4,579 |
| 1997 | 15,210 |

for substantial incidental harvest of the Alagnak chinook stocks exists. When sockeye returns to the Kvichak are down, as they have been the last several years, then escapement of chinook salmon into the Alagnak appear to benefit.

## 1997 Season

The 1997 chinook salmon return was the product of escapements observed in 1990 through 1993. Three of the parent year escapements (1990, 1991, and 1992) were below average and 1993 was above (Table 7).

Since parental escapements for the 5- and 6-year-old components of the run were below average, we anticipated a below-average return in 1997. Fishery performance inseason was reported spotty, and periods of slow fishing were mixed with occasional periods of excellent catch rates. Exceptionally low, warm water this season is thought to have significantly altered the entry pattern of chinook salmon into the Alagnak. From all reports, chinook entered the Alagnak and shot up river, spending little time in the areas traditionally fished. Commercial fishing time in the Kvichak district was minimal this season due to poorer than expected sockeye return. The estimated chinook salmon escapement index count of 15,210 (Table 7) is the largest reported for the system since 1970.

### Management Objectives

Explicit management objectives have not yet been developed for this fishery. Aerial survey data exist to develop a goal and it is likely that a biological escapement goal (BEG) will be developed for this fishery within the next several years.

### 1998 Outlook

The 1998 return will be the product of escapements observed between 1991 through 1994. Two of the parental escapements were above average and two were below. Of the years of low escapement, only 1991 was considered to be poor (2,531 fish). It appears that the spawning stock is sufficient to provide a normal sport fishery in 1998. We anticipate a modest showing of large fish this year since the 1991 and 1992 escapements are slightly below average. There should be a very strong showing of 4- and 5-year-old fish based on parental escapements. Sockeye salmon fishing time in the commercial fishery of the Naknek/Kvichak district affects chinook salmon escapement into the Alagnak River. When sockeye run strength into the district is large, commercial fishing is liberal; when small, commercial fishing time is more restrictive. 1998 is not considered an off-cycle year for sockeye salmon, therefore the restrictions on commercial fishing for sockeye that occurred during the previous two seasons are not expected in 1998; so inriver abundance of chinook salmon may be down as a result of the commercial sockeye salmon fishery in the district.

Sport fishing effort on the lower Alagnak River in 1996 was estimated to be higher than ever previously reported. Observations in 1997 indicated that effort was similar to that reported the previous 2 years. It is anticipated that effort in 1998 will again be high.

The Alaska Board of Fisheries adopted several regulation changes that will affect the Alagnak drainage chinook salmon sport fishery. They established a sport season for chinook salmon that extends from June 8 through July 31, this action is intended to protect spawning chinook salmon. Daily bag and possession limits were also revised down to 3 per day of which 1 may be larger than 28 inches in length. Finally the Board established a seasonal chinook salmon limit for Bristol Bay of 5 fish annually. Upon harvesting a chinook salmon from the waters of Bristol Bay drainages, an angler must now record the date and location of the harvest on the back of the sport fishing license in ink. Given the anticipated return for 1998 and the adjustments in regulations, no inseason adjustments to the fishery are anticipated.

## NAKNEK RIVER

### Fishery Description

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 3 peak weeks are from June 22 to

July 14. Effort is concentrated in a 12-mile stretch of the Naknek River adjacent to the community of King Salmon (Figure 9). This fishery is one of the most popular sport fisheries in the area, and accounts for over 25% of all the chinook salmon harvested by sport fishermen in the SWMA. This fishery has a significant amount of unguided effort, reasonably good catch rates, and a high retention rate. The results of a 1995 creel survey showed, for example, that 61% of the fishermen interviewed were unguided, and of the estimated catch of 4,238 chinook salmon, 3,537 or 83% were kept (Dunaway and Fleischman 1996a).

## Historical Performance

A period of significantly increasing sport effort resulted in increased harvests of chinook salmon from 1977 to 1987 (Table 8). Distribution of the harvest between user groups has remained relatively stable over the last 22 years. During the recent 5 years, 30% of the harvest has been taken by sport fishermen, and the remainder of the harvest was split between commercial (57%) and subsistence (13%) users (Table 8).

Effort in the Naknek River has increased to record levels last observed in 1986-88. The 1996 estimated effort of 16,647 angler-days (Table 5) represents all species effort, although much of that effort is directed toward chinook salmon. The current regulatory package, adopted in response to increased effort and harvest observed in the late 1980s, has been effective in balancing escapement with sport harvest. Since 1992, sport harvests have averaged 3,003 fish per year, very close to the long-term average for the fishery. Escapement for the same period has averaged 6,084 (Table 8), in excess of the goal of 5,000. Recent increased participation may tip the regulatory balance enjoyed during the previous two Board cycles.

## Management

Sport harvests and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division has conducted significant monitoring and stock assessment projects in the recent past (Dunaway and Fleischman 1996a, Coggins 1992, Coggins and Bingham 1993, Dunaway and Bingham 1991, Minard 1987a and 1989a, Minard and Brookover 1988a). Commercial, subsistence, and sport harvest data along with escapement information are reported under one cover in ADF&G (1997a).

Since 1986 the sport fishery has been managed to achieve a 5,000 chinook salmon index on the spawning grounds, the average escapement observed since 1970 (Table 9). Escapement of chinook salmon is estimated by fixed-wing aerial surveys of the four primary spawning areas (Paul's Creek, King Salmon Creek, mainstem of the Naknek River, and Big Creek) during the presumed peak of spawning. Aerial counts are left unexpanded and are considered minimum estimates of escapement. Results of the escapement surveys indicate the mainstem of the Naknek River, along with Big Creek, comprises approximately 88% of the observed escapement (Table 9). Escapements have generally been within biological limits, with the exception of the trends observed in the smaller systems of Paul's Creek and King Salmon Creek.

Concern over low escapements and increasing sport harvest prompted the Alaska Board of Fisheries in 1987 to adopt a regulation package addressing Naknek River chinook salmon. The key elements of that package included:

**Table 8.-Chinook salmon commercial, subsistence, and sport harvest plus escapement for the Naknek River fishery, 1970-1997.**

| | Harvest | | | | Escapement |
|---|---|---|---|---|---|
| Year | Commercial[a] | Subsistence[b] | Sport | Total | Index[c] |
| 1970 | 19,037 | 300 | 2,730 | 22,067 | 4,145 |
| 1971 | 10,254 | 200 | 2,417 | 12,871 | 2,885 |
| 1972 | 2,262 | 400 | 1,668 | 4,330 | 2,791 |
| 1973 | 951 | 600 | 1,000 | 2,551 | 2,536 |
| 1974 | 480 | 870 | 1,700 | 3,050 | |
| 1975 | 964 | 576 | 427 | 1,967 | 3,452 |
| 1976 | 4,064 | 675 | 800 | 5,539 | 7,131 |
| 1977 | 4,373 | 1,093 | 1,005 | 6,471 | |
| 1978 | 6,930 | 1,023 | 2,406 | 10,359 | |
| 1979 | 10,415 | 1,044 | 2,669 | 14,128 | |
| 1980 | 7,517 | 1,421 | 2,729 | 11,667 | |
| 1981 | 11,048 | 738 | 2,581 | 14,367 | 4,271 |
| 1982 | 12,425 | 933 | 3,264 | 16,622 | 8,610 |
| 1983 | 8,955 | 851 | 3,545 | 13,351 | 7,830 |
| 1984 | 8,972 | 754 | 4,524 | 14,250 | 4,995 |
| 1985 | 5,697 | 979 | 5,038 | 11,714 | |
| 1986 | 3,188 | 730 | 6,462 | 10,380 | 3,917 |
| 1987 | 5,175 | 1,067 | 11,419 | 17,661 | 4,450 |
| 1988 | 6,538 | 922 | 5,380 | 12,840 | 11,730 |
| 1989 | 6,611 | 740 | 3,879 | 11,230 | 2,710 |
| 1990 | 5,068 | 777 | 3,250 | 9,095 | 7,000 |
| 1991 | 3,584 | 1,008 | 3,115 | 7,707 | 4,391 |
| 1992 | 5,724 | 1,034 | 2,633 | 9,391 | 2,691 |
| 1993 | 7,477 | 1,361 | 2,603 | 11,441 | 8,016 |
| 1994 | 6,016 | 1,680 | 3,692 | 11,388 | 9,678 |
| 1995 | 5,084 | 1,199 | 4,153 | 10,859 | 4,960 |
| 1996 | 4,047 | 1,484 | 1,936 | 7,467 | 5,076 |
| All Years Avg. | 6,402 | 906 | 3,223 | 10,531 | 5,394 |
| Percent | 61% | 9% | 31% | | |
| 1992 to 1996 Avg. | 5,670 | 1,352 | 3,003 | 10,025 | 6,084 |
| Percent | 57% | 13% | 30% | | |
| 1997[d] | 1,288 | 1,400 | 3,000 | 5,688 | 10,453 |
| Percent | 23% | 25% | 53% | | |

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

[b] Previous tables presented rounded estimates; this table presents actual raw counts from returned permits, 1975 to 1996. 1970-1986 data based on permits issued in King Salmon, Naknek and South Naknek; 1987-1997 data based on Naknek watershed fishing sites as indicated on permit.

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

[d] 1997 estimates are preliminary. Subsistence and sport harvests are estimates based on recent 5-year averages.

**Table 9.-Unexpanded aerial escapement counts for chinook salmon in the Naknek River and drainage, 1970-1997.**

| Data Source | Year | Mainstream Naknek | Paul's Creek | King Salmon Creek | Big Creek | Total |
|---|---|---|---|---|---|---|
| A | 1970 | 3,060 | | 260 | 825 | 4,145 |
| A | 1971 | 1,639 | 52 | 704 | 490 | 2,885 |
| A | 1972 | 351 | 156 | 1,224 | 1,060 | 2,791 |
| A | 1973 | 1,315 | | 115 | 1,106 | 2,536 |
| A | 1974 | | 91 | 495 | 860 | |
| A | 1975 | 2,250 | 144 | 279 | 779 | 3,452 |
| A | 1976 | 5,950 | 31 | 180 | 970 | 7,131 |
| A | 1977 | 4,830 | | 1,860 | | |
| A | 1978 | | | | | |
| A | 1979 | | | | | |
| A | 1980 | 300 | 17 | | 30 | |
| A | 1981 | 2,890 | | 591 | 790 | 4,271 |
| A | 1982 | 5,360 | 340 | 980 | 1,930 | 8,610 |
| A | 1983 | 2,860 | 290 | 460 | 4,220 | 7,830 |
| A | 1984 | 790 | 400 | 385 | 3,420 | 4,995 |
| B | 1985 | 590 | | | | |
| C | 1986 | 2,200 | 73 | 102 | 1,542 | 3,917 |
| C | 1987 | 2,800 | 7 | 290 | 1,353 | 4,450 |
| C | 1988 | 7,380 | 150 | 600 | 3,600 | 11,730 |
| C | 1989 | 1,700 | 50 | 100 | 860 | 2,710 |
| C | 1990 | 4,500 | 150 | 350 | 2,000 | 7,000 |
| C | 1991 | 1,655 | 121 | 275 | 2,340 | 4,391 |
| C | 1992 | 1,550 | 88 | 158 | 895 | 2,691 |
| C | 1993 | 5,520 | 86 | 700 | 1,710 | 8,016 |
| C | 1994 | 5,970 | 203 | 974 | 2,531 | 9,678 |
| C | 1995 | 2,790 | 26 | 239 | 1,905 | 4,960 |
| C | 1996 | 2,965 | 157 | 312 | 1,576 | 5,010 |
| | All Year Average | 2,967 | 132 | 506 | 1,600 | 5,204 |
| | Percent | 57% | 3% | 10% | 31% | |
| | 1997 | 7,520 | 248 | 902 | 1,783 | 10,453 |
| | Percent | 72% | 2% | 6% | 31% | |

Data sources:

A Russell 1985.

B ADF&G 1986.

C ADF&G, Division Commercial and Sport Fish aerial surveys, 1986 through 1997.

- establishing a season for chinook salmon (May 1 to July 31),
- artificial-lure-only designation, and
- reduction in bag and possession limits.

Bag and possession limits for Naknek chinook salmon are currently 3 per day, 1 of which may be over 28 inches (ADF&G 1997b).

### Management Objectives

The Naknek River chinook salmon sport fishery is managed for a biological escapement goal of 5,000 spawners indexed by aerial survey. While managing for the BEG, consideration is also given to maintaining the historical distribution of spawners within the four major spawning areas.

### 1997 Season

The 1997 chinook salmon return was the product of escapements observed in 1990 through 1993 (Table 9). Two of the parent-year escapements were below average, while the other 2 years, 1990 (parent stock for the 7-year-old fish) and 1993 (parent stock for the 4-year-old fish) were well above the goal. A large return of 7-year-old fish was expected along with an average return of 5- and 6-year-old fish, based on parental run strength.

No formal estimate of harvest is available for the 1997 sport fishery. Observations inseason indicate sport harvests were likely average (roughly 3,000 fish). Commercial catches were well below average for the fishery and totaled 1,288 (Table 8). The commercial catch occurred primarily during June 1 to June 23, during which an emergency order restricted gear to 5.5 inches or smaller mesh size. Subsistence catches were estimated to be up from past years, accounting for an additional 1,400 fish (Table 8).

The escapement index of 10,453 chinook salmon was well above that observed in recent years (Table 9). Escapement in all four primary escapement areas was above average.

In response to extraordinarily low water and high temperatures, chinook salmon moved onto the spawning areas in the Naknek River earlier than normal in 1997. Due to an exceptionally early migration onto the spawning areas near Rapids Camp, an emergency order (E. O.) closing the Naknek River above the Rapids Camp markers was issued and made effective on July 11, 1997.

The purpose of the E. O. was to afford the protection to spawning chinook salmon intended by the August 1 closure of the sport fishery by regulation. This E. O. did not affect the sport fishery below the Rapids Camp markers, which closed by regulation on August 1.

### 1998 Outlook

The 1998 chinook salmon return will be the product of escapements observed in 1991 through 1994 (Table 9). Two of the four parent-year escapements are above average, suggesting an average to above average return. The 6-year-old component of the return will be produced by the 1992 escapement of only 2,691 spawners, and is not expected to be very strong in 1998. However a strong 5-year component is expected given the large parental escapement of 8,016 fish in 1993. The 4-year component is expected to be average, a product of a 9,678 fish escapement in 1994. See Alagnak River discussion above regarding new annual limits for the Bristol Bay chinook salmon sport fishery. The Naknek River upstream from the ADF&G marker

at Rapids Camp has been restricted to single-hooks with a point-to-shank gap of 1/2 inch or less until August 1.

Given the anticipated return for 1998, no inseason adjustments to the fishery are anticipated.

## NUSHAGAK AND MULCHATNA RIVERS

### Fishery Description

The Nushagak and Mulchatna rivers support significant recreational, commercial, and subsistence chinook salmon fisheries. Within the drainage, three areas of concentrated sport effort exist: the lower 12 miles of the Nushagak River near the village of Portage Creek, the middle section of the Nushagak River in the vicinity of the village of Ekwok, and the mid-section of the Mulchatna River between the Stuyahok and Koktuli rivers (Figure 9). Although sport fishing for chinook salmon does occur in some of the tributaries of the drainage, the overall impact of that activity in terms of harvest is considered slight.

### Historical Performance

Nushagak/Mulchatna chinook salmon total returns (Table 10) averaged 135,000 fish during the period 1966 to 1977. During the next 7 years (1978 to 1984), returns averaged an unprecedented 293,500 fish. Since 1985, returns have declined to normal levels of production, averaging approximately 125,000 fish. Chinook salmon stocks in the Nushagak/Mulchatna drainage are considered to be stable at average, or slightly above average, levels.

Harvest of chinook salmon by the recreational fishery has averaged 3,199 fish since 1977, and for the period 1992 to 1996 averaged 5,675 fish (Table 10). Distribution of the harvest between user groups, as shown in Table 10, indicated the majority (85%) of the harvest has historically been taken by commercial fishermen, with an additional 11% taken by subsistence fishermen, and 4% by sport fishermen. By comparison, the recent 5-year average suggests a redistribution of the harvest has occurred, with subsistence fishermen taking 16% (an increase of 5%) and the sport harvest increasing from 4% to a new level of 6% (Table 10).

### Management

Sport harvest and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division has conducted significant monitoring and stock assessment projects in the recent past (Minard 1987b, Minard and Brookover 1988c, Dunaway et al. 1991, Dunaway and Bingham 1992a, Dunaway and Fleischman 1995b, and Dunaway *In prep*).

Under the Nushagak and Mulchatna Chinook Salmon Management Plan (5 AAC 06.361, adopted 1/92 and amended 12/94) chinook salmon are managed to attain an inriver return of 75,000 fish which provides 65,000 spawning fish, a reasonable opportunity to harvest chinook salmon in the inriver subsistence fishery, and a guideline harvest in the sport fishery of 5,000. If the inriver return exceeds 75,000, then the guideline does not apply. If the inriver return falls below 65,000, then restrictive actions are called for in the sport fishery. If the inriver return falls below 40,000, then the sport fishery is to be closed.

**Table 10.-Chinook salmon commercial, subsistence, and sport harvest plus escapement for the Nushagak drainage, 1966-1997.**

| | Commercial | Subsistence | Sport Harvest | | | Total | Spawning | Total |
|---|---|---|---|---|---|---|---|---|
| Year | Harvest | Harvest | Nush[a] | Mul[b] | Total | Harvest | Escapement[c] | Run |
| 1966 | 58,184 | 3,700 | | | | 61,884 | 40,000 | 101,884 |
| 1967 | 96,240 | 3,700 | | | | 99,940 | 65,000 | 164,940 |
| 1968 | 78,201 | 6,600 | | | | 84,801 | 70,000 | 154,801 |
| 1969 | 80,803 | 7,100 | | | | 87,903 | 35,000 | 122,903 |
| 1970 | 87,547 | 6,300 | | | | 93,847 | 50,000 | 143,847 |
| 1971 | 82,769 | 4,400 | | | | 87,169 | 40,000 | 127,169 |
| 1972 | 46,045 | 4,000 | | | | 50,045 | 25,000 | 75,045 |
| 1973 | 30,470 | 6,600 | | | | 37,070 | 35,000 | 72,070 |
| 1974 | 32,053 | 7,900 | | | | 39,953 | 70,000 | 109,953 |
| 1975 | 21,454 | 7,100 | | | | 28,554 | 70,000 | 98,554 |
| 1976 | 60,684 | 6,900 | | | | 67,584 | 100,000 | 167,584 |
| 1977 | 85,074 | 5,200 | 402 | 521 | 923 | 91,197 | 65,000 | 156,197 |
| 1978 | 118,548 | 6,600 | 151 | 291 | 442 | 125,590 | 130,000 | 255,590 |
| 1979 | 157,321 | 8,900 | 312 | 342 | 654 | 166,875 | 95,000 | 261,875 |
| 1980 | 64,958 | 11,800 | 611 | 146 | 757 | 77,515 | 141,000 | 218,515 |
| 1981 | 193,461 | 11,500 | 929 | 291 | 1,220 | 206,181 | 150,000 | 356,181 |
| 1982 | 195,287 | 12,100 | 1,436 | 367 | 1,803 | 209,190 | 147,000 | 356,190 |
| 1983 | 137,123 | 11,800 | 1,615 | 388 | 2,003 | 150,926 | 161,730 | 312,656 |
| 1984 | 61,378 | 9,800 | 1,534 | 786 | 2,320 | 73,498 | 80,940 | 154,438 |
| 1985 | 67,783 | 7,900 | 1,546 | 292 | 1,838 | 77,521 | 115,720 | 193,241 |
| 1986 | 65,783 | 12,600 | 1,780 | 3,534 | 5,314 | 83,697 | 35,200 | 118,897 |
| 1987 | 45,983 | 12,428 | 1,398 | 1,860 | 3,258 | 61,669 | 78,224 | 139,893 |
| 1988 | 16,648 | 10,187 | 2,414 | 403 | 2,817 | 29,652 | 50,834 | 80,486 |
| 1989 | 17,637 | 8,122 | 2,859 | 754 | 3,613 | 29,372 | 73,147 | 102,519 |
| 1990 | 14,812 | 12,407 | 1,674 | 1,409 | 3,083 | 30,302 | 57,629 | 87,931 |
| 1991 | 19,718 | 13,627 | 3,657 | 1,894 | 5,551 | 38,896 | 96,449 | 135,345 |
| 1992 | 47,563 | 13,588 | 3,866 | 889 | 4,755 | 65,906 | 76,512 | 142,418 |
| 1993 | 62,976 | 17,709 | 4,916 | 983 | 5,899 | 86,584 | 88,687 | 175,271 |
| 1994 | 119,480 | 15,490 | 8,931 | 1,695 | 10,626 | 145,596 | 83,408 | 229,004 |
| 1995 | 79,943 | 13,701 | 4,549 | 402 | 4,951 | 98,595 | 74,803 | 173,398 |
| 1996 | 72,011 | 15,941 | 2,016 | 128 | 2,144 | 90,096 | 44,628 | 134,724 |
| All Years Avg. | 74,772 | 9,539 | 2,330 | 869 | 3,199 | 87,509 | 78,900 | 166,410 |
| Percent | 85% | 11% | | | 4% | | | |
| 1992-1996 Avg. | 76,395 | 15,286 | 4,856 | 819 | 5,675 | 97,355 | 73,608 | 170,963 |
| Percent | 78% | 16% | | | 6% | | | |
| 1997 | 64,294 | 15,000 | 2,000 | 500 | 2,500 | 81,794 | 82,000 | 163,794 |
| Percent[d] | 79% | 18% | | | 3% | | | |

[a] Nushagak River and tributaries including the Tikchik and Nuyakuk rivers.

[b] Mulchatna River and tributaries, including the Koktuli River.

[c] Inriver abundance (as reported by ADF&G, CFMD) minus subsistence and sport harvest above sonar.

[d] 1997 harvest estimates are preliminary. 1997 Escapement estimate based on aerial surveys.

Chinook salmon escapement into the Nushagak and Mulchatna rivers was first estimated by aerial survey from 1966 through 1986. Starting in 1987, side scan sonar was used to estimate chinook salmon inriver return to the Nushagak drainage. The sonar is considered a marked improvement over the aerial survey program since it gives real-time estimates of escapement on which management decisions can be based. In the recent 5 years (1992-1996), inriver returns have averaged 73,608 chinook (Table 10), very close to the desired 75,000 inriver run goal.

Declining stock abundance and increasing sport effort prompted restrictive actions on the inshore commercial and sport fisheries. A chronology of significant regulation changes follows:

- 1965. Bristol Bay bag and possession limits were 10 salmon (all species combined) daily.
- Bag limits for the Bristol Bay area were dropped to 5 chinook salmon per day and in possession, of which only 2 could be over 26 inches in length.
- 1987. Bag and possession limits dropped to 3 per day, only 2 over 28 inches in length.
- 1990. Sport season established from January 1 to July 25. Spawning season closure adopted to afford drainage-wide protection to spawning chinook salmon stocks.
- 1992. Gear restricted to single-hook artificial lures for the portion of the Mulchatna River between the Koktuli and Stuyahok rivers.
- 1992. Nushagak and Mulchatna Chinook Salmon Management Plan (5 AAC 06.361) is adopted capping the sport harvest at 5,000 fish.
- 1994. Nushagak and Mulchatna Chinook Salmon Management Plan (5 AAC 06.361) is amended, setting the sport allocation as a guideline harvest rather then a cap.

Bag and possession limits for Nushagak chinook salmon are currently 3 per day, 2 of which may be over 28 inches (ADF&G 1997b).

Uplands in the vicinity of Portage Creek are privately owned. A recreational land management program is administered by the Land Department of Choggiung Limited, an Alaska Native-owned corporation. Since its inception in the mid-1980s, this program has grown into a sound and profitable venture for the corporation. Private and commercial land use permits sold by the corporation allow anglers access to desirable camp sites while engaged in recreational fishing. Sales and estimates of camper nights are useful indicators of sport effort. Overnight use has risen from 1,365 camper nights in 1989 to 4,278 camper nights in 1997 (Nelson 1997).

## Management Objectives

The Nushagak/Mulchatna chinook salmon fishery is managed in accordance with the Nushagak and Mulchatna Chinook Salmon Management Plan. Specific objectives are to: (1) manage the commercial fishery to ensure an inriver return of 75,000 fish; (2) manage the inriver fisheries for a biological escapement goal of 65,000 spawners; and (3) manage the sport harvest for a guideline harvest of 5,000 fish.

## 1997 Season

The 1997 Nushagak district chinook salmon total return forecast was 156,000 (Hart et al. 1998). Harvest potential in the sport fishery, given an inriver abundance of 75,000 fish, was estimated to

be 10,000 chinook salmon, or 50% greater than the guideline harvest level. On January 30, 1997, department staff issued a preseason emergency order reducing the bag and possession limit for Nushagak chinook from 3 per day, of which 2 may be over 28 inches, to 1 fish, no size limit. The early restriction was intended to reduce the harvest potential in the sport fishery by 50% to keep the harvest in line with the guideline level prescribed in the management plan. By announcing the restriction in late January, it was hoped that anglers planning a trip could do with the knowledge of what the bag limits would be for the season and not be surprised when they arrived.

A fishery survey of the Nushagak and Mulchatna chinook salmon sport fishery was conducted in 1997 (Dunaway *In prep*). Staff interviewed anglers in the Portage Creek area and in the Mulchatna River between the Stuyahok and Koktuli rivers. Objectives included the estimation of chinook harvest below the sonar, the estimation of demographic information, size composition of harvested chinook salmon, and the harvest characteristics of guides and other anglers. The survey was conducted as planned for the duration of the fisheries.

In the commercial fishery a strategy was followed of fishing the backside of pushes of chinook into the Nushagak, in an effort to address the concern for escapement quality expressed the past two seasons. By fishing the backside of inriver pulses it was anticipated that groups of unfiltered escapement (fish not strained by gill nets) would enter the river in a more desirable distribution of size and age structure then observed in the past 2 years. Given the forecast of 156,000, and an inriver goal of 75,000, and a downriver subsistence harvest of 10,000, some 71,000 chinook salmon were available for commercial harvest. Approximately 40,000 were targeted for harvest in a directed commercial fishery, with the balance being taken during the sockeye fishery. Two directed commercial periods, for a total of 16 hours, were allowed with a peak effort of 278 boats and 58 setnets fishing. Commercial harvest during these directed periods accounted for 39,000 chinook salmon. Another 25,300 were taken during the sockeye fishery. Total commercial harvest for the season was 64,294 chinook salmon (Table 10).

By June 27, inriver passage was estimated at only 26,000 chinook salmon, and based on projections, a passage of less than 65,000 was anticipated for the season. Performance in the commercial district test fishery and local subsistence nets indicated that there remained little strength left in the district. Based on low sonar estimates and the absence of significant chinook salmon in the district, the department announced a catch-and-release restriction for the Nushagak and Mulchatna rivers effective June 30 and continuing through the remainder of the season. Sport effort appeared to drop significantly in the Portage Creek area and the restriction significantly affected participation in the Ekwok and Mulchatna areas. Final sonar estimated passage for chinook was placed at about 41,000.

In early August aerial escapement surveys of the majority of the spawning areas were flown and chinook escapement was estimated to be between 80,000 and 85,000 chinook salmon, or twice the estimated sonar passage. Aerial surveys were flown under ideal conditions, with an experienced surveyor, and covered the majority of the known spawning areas (Table 11). A second surveyor flew a replicate of a portion of the total and counts between surveyors differed only slightly. The conclusion was that the sonar had underestimated the inriver abundance by half. The under count was attributed to extremely low water conditions and accompanying high water temperatures. Steps were taken to begin to assess the offshore distribution of other species through a netting program. Results showed significant catches of coho offshore of the ensonified

**Table 11.-Historic aerial escapement counts of chinook salmon in selected streams in the Wood, Nushagak and Mulchatna drainages, 1966 to 1997.**

| | Wood R. | Nushakgak and Mulchatna drainages | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Muklung River | Iowithla River | Kokwok River | Klutispaw River | King Salmon River | Stuyahok River | Koktuli River | Nushagak River[a] | Mulchatna River[b] | Total |
| 1967 | 350 | 200 | | | | 2,500 | 3,300 | | | 6,000 |
| 1968[c] | 750 | 850 | | 310 | 1,000 | 2,470 | 4,220 | 970 | 510 | 10,330 |
| 1969 | 520 | 580 | 90 [d] | 90 | 670 | 1,220 | 1,600 | 910 [e] | 680 [e] | 5,840 |
| 1970 | 590 | 700 | 110 [d] | 320 | 1,060 | 1,900 | 1,500 | 1,180 [e] | 880 [e] | 7,650 |
| 1971 | 280 | 390 | 80 [d] | | | | | | | 470 |
| 1972 | 150 | 170 | | 280 | 900 | 610 | 1,450 | 690 [e] | 510 [e] | 4,610 |
| 1973 | | | | 380 | 1,470 | 1,220 | 950 | | | 4,020 |
| 1974[c] | 1,010 | 860 | 60 [d] | 440 | 2,000 | 2,300 | 3,920 | 2,340 | 2,160 | 14,080 |
| 1975 | 660 | 1,040 | 270 | 670 | 2,900 | 2,530 | 4,080 | 2,320 [e] | 1,710 [e] | 15,520 |
| 1976[c] | 840 | 1,110 | 560 | 1,180 | 3,510 | 3,750 | 6,710 | 1,760 | 2,580 | 21,160 |
| 1977[c] | 940 | 840 | 310 | 650 | 1,420 | 2,700 | 4,630 | 820 | 1,980 | 13,350 |
| 1978[c] | 1,170 | 1,700 | 520 | 1,940 | 4,450 | 4,400 | 6,730 | 5,850 | 2,280 | 27,870 |
| 1979[c] | 950 | 1,350 | 170 | 1,040 | 2,150 | 3,570 | 6,260 | 2,880 | 1,730 | 19,150 |
| 1980 | 1,600 | 2,310 [e] | 70 | 970 | 4,500 | 7,200 | 10,620 | 5,300 [e] | 3,920 [e] | 34,890 |
| 1981 | 2,260 | 2,630 | 70 | 1,650 | 2,950 | 5,980 | 9,960 | 4,960 [e] | 3,670 [e] | 31,870 |
| 1982 | 790 | 2,520 | 90 | 350 | 8,390 | 3,640 | 6,780 | 4,380 [e] | 3,240 [e] | 29,390 |
| 1983[c] | 1,830 | 2,430 | 350 | 2,090 | 5,990 | 2,910 | 8,060 | 6,330 | 4,260 | 32,420 |
| 1984[c] | 1,300 | 1,080 | 110 | 770 | 1,780 | 2,010 | 2,860 | 2,800 | 1,060 | 12,470 |
| 1985 | 1,250 | 1,610 | 60 | 1,950 | 4,460 | 2,690 | 4,940 | 3,420 [e] | 2,390 [e] | 21,520 |
| 1986 | 230 | 270 | | 170 | 380 | 520 | 290 | 380 [e] | 260 [e] | 2,270 |
| 1987 | 160 | 140 | | 340 | 570 | 280 | 440 | 390 [e] | 270 [e] | 2,430 |
| 1988 | 430 | 550 | | 780 | 1,380 | 2,040 | 2,580 | 1,800 | 710 | 9,840 |
| 1989 | | | | | | 190 [d] | 240 [d] | | | 430 |
| 1990 [f] | 60 | 120 | | 340 | 900 | 830 | 3,390 | 630 | 800 | 7,010 - |
| 1995 | 210 | 170 | 75 | 630 | 3,150 | 660 | 2,230 | | | 6,915 |
| 1996[f] | | | | | | | | | | - |
| 1997[g] | 1,240 | 640 | | 1,190 | 8,900 | 1,460 | 6,220 | 21818 | 1,496 | 41,724 |
| Mean | 815 | 1,011 | 187 | 806 | 2,821 | 2,383 | 4,158 | 3,425 | 1,766 | 16,558 |

[a] Nushagak River from the outlet of the Nuyakuk River to outlet of King Salmon River (to Big Bend in 1997).

[b] Mulchatna River from the outlet of Mosquito Creek to the outlet of the Koktuli River (to outlet of Stuyahok River in 1997)

[c] Years in which aerial survey coverage was complete.

[d] Minimal estimate - very poor survey conditions.

[e] These numbers are proportional estimates rather than aerial live counts; estimates are based on the mean proportion of fish counted in these areas during year in which aerial coverage was complete.

[f] No surveys conducted from 1991 through 1994, or in 1996.

[g] Survey conditions in 1997 excellent, water very clear and very low.

Source: Table 27, page 43. Russell et al. 1992. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, and ADF&G Spawning Ground Reports 1968-1994. T. Brookover, ADF&G, CFMD, Dillingham, personal communication 1995-1997.

area. The conclusion remained that significant chinook salmon were missed by the sonar and the aerial estimate would be used as the estimate of spawning escapement.

The actual return of chinook salmon to the Nushagak drainage in 1997 was approximately 163,800 fish (Table 10), very close to forecast of 156,000 fish. Commercial harvest totaled 64,300 chinook salmon, while subsistence harvest was estimated to be 15,000 chinook salmon. Roughly 2,500 chinook salmon are estimated to have been harvested in the sport fishery.

### 1998 Outlook

The 1998 chinook salmon forecast for the Nushagak and Mulchatna drainage is 159,00 fish which is 11% greater than the recent 10-year average. Five- and 6-year-old fish are expected to dominate the return. Management of the 1998 sport fishery will be governed by the recently amended Nushagak Chinook Salmon Management Plan. This plan calls for managing the commercial fishery such that 75,000 chinook salmon are allowed inriver. Commercial fishing periods are to be timed such that escapement inriver is comprised of a naturally occurring composition of size classes. This direction came from the Alaska Board of Fisheries and is intended to address concerns over escapement quality. The Sport Fishery is to be managed to provide for a spawning escapement of 65,000 chinook salmon and a guideline harvest of 5,000 fish. To remain within the 5,000 fish guideline the Board reduced the daily bag and possession limits to 2 chinook salmon per day of which 1 may be larger than 28 inches in length. Additionally the Board adopted a seasonal limit of 4 chinook salmon; upon harvesting a chinook salmon anglers must now record on the back of their licenses the location and date the fish was taken.

Given the 1998 forecast of 159,000 and the recent changes to the management plan for this fishery, it appears that the issues of escapement quality and stability in the sport fishery have been addressed, and therefore, it appears highly unlikely that adjustments made in the sport fishery in recent years will need to be enacted in 1998.

## KANEKTOK RIVER

### Fishery Description

The chinook salmon fishery on the Kanektok River occurs in the lower 12 miles of the river in the vicinity of the village of Quinhagak (Figure 9). The fishery peaks in late June and early July, slightly earlier than the fisheries further to the east. Because of its relatively small size, clear water, and consistent returns of chinook salmon, the Kanektok River is considered one of the finest chinook salmon sport fisheries in western Alaska.

### Historical Performance

Harvest estimates for the Kanektok River sport fishery date back to 1983 and range from a high of 1,910 fish in 1988 to a low of 316 fish in 1991. The average harvest for the recent 5 years (1992 to 1996) is 768 fish (Table 12). Distribution of the harvest between user groups has been relatively unchanged over the past 30 years. The commercial fishery accounts for over 80% of the harvest, with the subsistence fishery taking an additional 14%, and the recreational fishery harvesting 5% (Table 12). The sport fishery is characterized by a relatively low retention rate (43% in 1986, 20% in 1987, 25% in 1991), a high proportion of guided anglers (60% or more), and a low incidence of bait as terminal tackle (Minard 1987c, Minard and Brookover 1988b, Dunaway and Bingham 1992b, Dunaway and Fleischman 1995a).

**Table 12.-Chinook salmon commercial, subsistence, and sport harvest plus escapement for the Kanektok River, 1960 to 1997.**

| | Harvest | | | | Escapement | |
|---|---|---|---|---|---|---|
| Year | Commercial | Subsistence | Sport | Total | Index[a] | Total Run[b] |
| 1960 | 0 | | | 0 | 6,047 | 6,047 |
| 1961 | 4,328 | | | 4,328 | | 4,328 |
| 1962 | 5,526 | | | 5,526 | 935 | 6,461 |
| 1963 | 6,555 | | | 6,555 | | 6,555 |
| 1964 | 4,081 | | | 4,081 | | 4,081 |
| 1965 | 2,976 | | | 2,976 | | 2,976 |
| 1966 | 278 | | | 278 | 3,718 | 3,996 |
| 1967 | 0 | 1,349 | | 1,349 | | 1,349 |
| 1968 | 8,879 | 2,756 | | 11,635 | 4,170 | 15,805 |
| 1969 | 16,802 | | | 16,802 | | 16,802 |
| 1970 | 18,269 | | | 18,269 | 4,112 | 22,381 |
| 1971 | 4,185 | | | 4,185 | | 4,185 |
| 1972 | 15,880 | | | 15,880 | | 15,880 |
| 1973 | 14,993 | | | 14,993 | 814 | 15,807 |
| 1974 | 8,704 | | | 8,704 | | 8,704 |
| 1975 | 3,928 | | | 3,928 | | 3,928 |
| 1976 | 14,110 | | | 14,110 | | 14,110 |
| 1977 | 19,090 | 2,012 | | 21,102 | 5,787 | 26,889 |
| 1978 | 12,335 | 2,328 | | 14,663 | 19,180 | 33,843 |
| 1979 | 11,144 | 1,420 | | 12,564 | | 12,564 |
| 1980 | 10,387 | 1,940 | | 12,327 | 6,172 | 18,499 |
| 1981 | 24,524 | 2,562 | | 27,086 | 15,900 | 42,986 |
| 1982 | 22,106 | 2,402 | | 24,508 | 8,142 | 32,650 |
| 1983 | 46,385 | 2,542 | 1,511 | 50,438 | 8,890 | 59,328 |
| 1984 | 33,633 | 3,109 | 922 | 37,664 | 12,182 | 49,846 |
| 1985 | 30,401 | 2,341 | 667 | 33,409 | 13,465 | 46,874 |
| 1986 | 22,835 | 2,682 | 844 | 26,361 | 3,643 | 30,004 |
| 1987 | 26,022 | 2,663 | 375 | 29,060 | 4,223 | 33,283 |
| 1988 | 13,883 | 2,508 | 1,910 | 18,301 | 11,140 | 29,441 |
| 1989 | 20,820 | 3,048 | 884 | 24,752 | 7,914 | 32,666 |
| 1990 | 27,644 | 5,050 | 503 | 33,197 | 2,563 | 35,760 |
| 1991 | 9,480 | 3,536 | 316 | 13,332 | 2,100 | 15,432 |
| 1992 | 17,197 | 2,545 | 656 | 20,398 | 3,856 | 24,254 |
| 1993 | 15,784 | 2,726 | 1,006 | 19,516 | 4,670 | 24,186 |
| 1994 | 8,564 | 3,000 | 751 | 12,315 | 7,386 | 19,701 |
| 1995 | 38,584 | 2,715 | 739 | 42,038 | 6,575 | 48,613 |
| 1996 | 14,165 | 3,164 | 689 | 18,018 | 6,107 | 24,125 |
| All Years Average | 14,986 | 2,654 | 841 | 18,481 | 6,788 | 25,269 |
| Percent | 81% | 14% | 5% | | | |
| 1992 to 1996 Avg. | 18,859 | 2,830 | 768 | 22,457 | 5,719 | 28,176 |
| Percent | 84% | 13% | 3% | | | |
| 1997[c] | 35,492 | 2,800 | 800 | 39,092 | 7,990 | 47,082 |
| Percent | 91% | 7% | 2% | | | |

[a] Unexpanded observed count made from fixed-wing aircraft between 20 July to 5 August.

[b] Considered a minimum number since escapement estimates are unexpanded.

[c] 1997 Commercial, subsistence and sport harvests are preliminary. Subsistence and sport harvests are the recent 5-year average. Actual subsistence harvests may be larger than usual to compensate for lack of commercial fishery markets.

## Management

Sport harvest and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division has conducted significant monitoring and stock assessment projects in the recent past (Minard 1987c, Minard and Brookover 1988b, Dunaway and Bingham 1992b, Dunaway and Fleischman 1995a). The U.S. Fish and Wildlife Service has collected age and size data from chinook salmon spawning in the Kanektok River since 1994 (Lisac and MacDonald 1995, and MacDonald 1996).

Escapement of chinook salmon into the Kanektok River is estimated by aerial survey from fixed-wing aircraft. Counts are left unexpanded and represent minimum escapement estimates. Since 1960, the escapement goal of 5,800 chinook salmon has been reached or exceeded in most years.

A chronology of significant regulation changes follows:

- 1965. Kuskokwim drainage chinook salmon limit was set at 15 per day, 30 in possession.
- 1985. Bag and possession limits for chinook salmon were dropped to 5 chinook salmon with no size limit.
- 1988. Bag and possession limits were again dropped to the current limit of 3 chinook per day, of which only 2 can be 28 inches or larger.

## Management Objectives

The Kanektok River chinook salmon fishery is managed to achieve escapement of 5,800 chinook salmon indexed by aerial survey.

## 1997 Season

The 1997 return to the Kanektok River totaled 47,082 chinook salmon, well above average for this system (Table 12). Commercial harvests totaled 35,492 chinook. Sport and subsistence fisheries were believed to have been average and harvested approximately 800 and 2,800, respectively. Escapement was estimated to be 7,990 chinook, well above the escapement goal of 5,800 fish.

## 1998 Outlook

The 1998 return will be the product of escapements observed in 1991 through 1994. Of the 4 years contributing to the 1998 return, escapements in 3 years (1991, 1992 and 1993) were below desired levels and in the other year (1994) escapement was above desired levels. Based on parental escapements, an average showing of age-5 and -6 fish and an excellent showing of age-4 fish are expected. Below average returns of age-7 fish are anticipated. Since neither of the primary age classes (5- and 6-year-olds) are expected to be strong, we anticipate an average or below average return in 1998. Based on parental escapement it is not likely that the sport fishery will be restricted in 1998. Performance of the commercial fishery will be assessed to determine run strength, as will the performance of the subsistence and sport fisheries. If adjustments to the sport fishery are warranted, we will attempt to implement them early enough such that continued sport fishing opportunity will be preserved throughout the season albeit at a reduced level.

The Board of Fisheries made several significant changes to regulations governing the Kanektok River sport fishery. The chinook salmon season is now restricted to the period from May 1 through July 24. Additionally, sport fishing throughout the Kanektok River drainage is restricted to unbaited single-hook artificial lures the entire year. Bag and possession limits for grayling and char were reduced to 2 and 3, respectively. From June 8 through October 31, rainbow trout in the Kanektok River may not be possessed or retained.

## TOGIAK RIVER

### Fishery Description

The Togiak River is one of three major river systems within the Togiak National Wildlife Refuge (Figure 9). The relatively small chinook salmon sport fishery on the Togiak River is concentrated along the lower 10 miles of the river and runs from mid-June through the month of July. The Togiak River historically supported the second largest chinook salmon run in Bristol Bay, but its remote location, refuge regulations on guides, recent declines in run strength, and a controversy between user groups have limited development of the fishery.

### Historical Performance

Commercial harvests of Togiak River chinook salmon have averaged 19,191 fish for the period 1969 to 1996, but in the recent 5 years have averaged only 10,208 (Table 13). Subsistence harvests have remained relatively stable, averaging 632 fish since 1974, and 859 fish in the recent 5 years (Table 13). Sport harvest of Togiak River chinook salmon was estimated to be less than 100 fish per year until the early 1980s, then ranged as high as 925 chinook salmon in 1985. During the last 5 years sport harvests have averaged 428 fish (Table 13). Distribution of the harvest between user groups has remained stable over the history of the fishery. Commercial harvest accounts for 89%, subsistence harvest about 7% and sport harvest about 4% of the total harvest. Total run estimates were first made in 1980, coincident with high abundance of western Alaska chinook stocks. Total run declined from the mid-1980s, dropping to almost half that previously observed. Given the performance of other chinook salmon fisheries in the area, this was likely a shift to more normal levels of production. In the recent 5 years, total runs have averaged 22,223 fish (Table 13).

### Management

Sport harvest and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division has conducted significant monitoring and stock assessment projects in the recent past (Minard and Lisac 1984, Dunaway 1990b).

Escapement of chinook salmon into the Togiak River has been estimated by aerial survey from fixed-wing aircraft since 1980. Aerial counts are expanded to account for missed fish and therefore represent total escapement estimates. The escapement goal for Togiak chinook salmon, established in 1984, is 10,000. From 1987 to 1992, department managers failed to manage harvests to achieve the escapement goal (Table 13). Since 1992, the goal has been achieved 4 out of 5 years. Recent escapements average 10,727 fish. Reduced commercial fishing time during the last half of June is primarily responsible for the improved escapement levels. Fishing time was reduced from 5 days per week to 1 or 2 days per week. Based upon the balance

**Table 13.-Escapement and commercial, subsistence, and sport harvests of chinook salmon from the Togiak River, 1969-1997.**

| Year | Harvest | | | | Escapement[c] | Total Run |
|---|---|---|---|---|---|---|
| | Commercial[a] | Subsistence[b] | Sport[b] | Total | | |
| 1969 | 20,092 | | | | | |
| 1970 | 28,618 | | | | | |
| 1971 | 26,105 | | | | | |
| 1972 | 17,099 | | | | | |
| 1973 | 9,225 | | | | | |
| 1974 | 9,284 | 1,200 | | | | |
| 1975 | 7,206 | 800 | | | | |
| 1976 | 28,513 | 500 | | | | |
| 1977 | 33,827 | 400 | 62 | 34,289 | | |
| 1978 | 53,460 | 300 | 35 | 53,795 | | |
| 1979 | 27,744 | 200 | 78 | 28,022 | | |
| 1980 | 10,858 | 900 | 34 | 11,792 | 8,045 | 19,837 |
| 1981 | 22,744 | 400 | | | 12,435 | |
| 1982 | 33,607 | 400 | 231 | 34,238 | 6,800 | 41,038 |
| 1983 | 35,669 | 700 | 535 | 36,904 | 10,975 | 47,879 |
| 1984 | 19,958 | 600 | 46 | 20,604 | 19,085 | 39,689 |
| 1985 | 33,110 | 600 | 925 | 34,635 | 12,010 | 46,645 |
| 1986 | 16,267 | 700 | 618 | 17,585 | | |
| 1987 | 14,555 | 661 | 338 | 15,554 | 7,170 | 22,724 |
| 1988 | 13,205 | 367 | | | 6,390 | |
| 1989 | 9,049 | 551 | 234 | 9,834 | 6,640 | 16,474 |
| 1990 | 9,651 | 480 | 445 | 10,576 | 6,473 | 17,049 |
| 1991 | 6,472 | 470 | 284 | 7,226 | 8,380 | 15,606 |
| 1992 | 11,764 | 1,361 | 271 | 13,396 | 7,410 | 20,806 |
| 1993 | 10,769 | 784 | 225 | 11,778 | 10,210 | 21,988 |
| 1994 | 9,492 | 904 | 663 | 11,059 | 15,117 | 26,176 |
| 1995 | 10,736 | 448 | 581 | 11,765 | 12,600 | 24,365 |
| 1996 | 8,281 | 800 | 402 | 9,483 | 8,299 | 17,782 |
| All Years Avg. | 19,191 | 632 | 334 | 20,157 | 9,877 | 30,034 |
| Percent | 95% | 3% | 2% | | | |
| 1992 to 1996 Avg | 10,208 | 859 | 428 | 11,496 | 10,727 | 22,223 |
| Percent | 89% | 7% | 4% | | | |
| 1997[d] | 5,381 | 900 | 400 | 6,681 | 10,300 | 16,981 |
| Percent | 81% | 13% | 6% | | | |

[a] Commercial harvests from Togiak Section of Togiak District.

[b] Sport and subsistence estimates for 1996, 1997 are preliminary estimates.

[c] Estimated by aerial survey and expanded for missed fish.

[d] 1997 Data are preliminary and subject to revision. Sport harvest shown is the recent 5-year average and subsistence harvest is the recent 5-year average plus a small amount of growth. Final estimates will not be available for several months to a year.

between commercial harvest and escapement, it appears this new schedule is sustainable, while the previous one was not.

## Management Objectives

The Togiak River chinook salmon sport fishery is managed to achieve a biological escapement goal (BEG) of 10,000 chinook salmon. The annual escapement is estimated by expanded aerial survey counts.

## 1997 Season

Three of the four parent-year escapements (1990 and 1992) were below the 10,000 fish goal (Table 13) and only a modest return of chinook was expected (between 18,000 and 22,000) for the 1997 season. Commercial fishing time was permitted during the first part of June and run strength was assessed on commercial catch performance. In an effort to maintain a sustainable commercial fishing schedule and meet the escapement goal of 10,000 fish, commercial managers intended to provide a 2-day per week fishing schedule during the last 2 weeks of June. Adjustments to that schedule would be based on the performance of the commercial fishery relative to previous years. The sport fishery started the season under the published regulations. Sport fish management intended to use performance in the commercial and sport fisheries, along with an aerial survey, to assess the run strength as the season progressed. Because of a small harvest potential in the sport fishery, and the notion that the sport fishery is separated temporally from the commercial fishery, this strategy would not jeopardize attainment of the escapement goal.

During a commercial period on June 23, catch per unit effort (CPUE) was 75% below the normal rate for the period, and the accumulated commercial catch of 2,500 was below expected levels. Aerial surveys flown on June 26 and 28 indicated few chinook salmon in the lower portion of the Togiak River. Based on the poor performance in the commercial fishery and the apparent low abundance in the lower portion of the Togiak River, the sport fishery was reduced from 3 chinook salmon of which 2 may be over 28 inches to 1 chinook salmon, no size limit. This action, coupled with steps in the commercial fishery, was believed sufficient to achieve the escapement goal and still provide some sport opportunity, albeit at a reduced level. Reductions in the sport fishery were announced June 29 and became effective June 30. This restriction remained in effect for the remainder of the season.

Restrictions on the commercial fishery, along with restrictions in the sport fishery, appear to have been sufficient to address the conservation concern. Chinook salmon escapement totaled 10,300, commercial harvest was 5,381, subsistence approximately 900 and sport harvest was likely around 400 chinook (Table 13). The total return of 16,981 was slightly lower than had been expected, and was less than the recent 5-year average of approximately 22,200 fish.

## 1998 Outlook

Since 1992, the total return of chinook salmon has averaged 22,223 fish, and the 1998 return is expected to be similar. Parent escapements for two of the major age classes were below the biological escapement requirement for optimum returns. Based on the parental escapements (1991-1994) the 6- and 7-year-old fish are expected to be below average, while the 4- and 5-year-old components are expected to be average or above. Sport opportunity should be good, however, the bulk of the catch will consist of smaller sized chinook salmon. Management of the commercial fishery is expected to include a 2 day, or less, fishing schedule during the last half of

June. This action is intended to provide a balance between commercial harvest opportunity and escapement. Staff believe that schedule to be sustainable. The sport fishery will commence under the published regulations and, as in the past, performance in the commercial and sport fisheries as well as aerial surveys will be used to gauge run strength inseason.

The Alaska Board of fisheries adopted several regulation changes that will affect the Togiak chinook salmon sport fishery in 1998. The chinook salmon fishery is open from May 1 through July 31. Anglers are now required to record on the back of their sport fishing license the date and location of chinook salmon harvested in the Bristol Bay drainage. Anglers are limited to a total of 5 chinook salmon annually, daily bag and possession limits still apply. The bag and possession limits for Dolly Varden/Arctic char, and grayling were reduced as well.

### NORTHWESTERN CHINOOK SALMON FISHERIES

The Kuskokwim River and its tributaries host large runs of chinook salmon but the broad muddy waters of the main river and limited access to the tributaries within the management area attract few sport anglers. No estimates of sport harvest are available before 1983 and since 1984 most of the chinook salmon harvest has come from the Aniak River. In recent years, roughly 2% to 5% of the SWMA chinook salmon harvest has come from the Northwestern section.

In response to conservation concerns, bag limits for Kuskokwim River chinook salmon were reduced from 5 per day and in possession, no size limit to 1 per day and in possession, no size limit in 1988. By 1994 it was apparent that chinook stocks had recovered sufficiently to allow normal subsistence and above average commercial fisheries to occur, therefore staff recommended to the Board of Fisheries that the bag and possession limits for these waters be returned to the normal level of 3 per day and in possession of which only 2 may be greater than 28 inches in length. In November of 1994, the Board adopted those recommended changes to the sport fishery, which became effective in 1995.

### 1998 Outlook

Based upon parent-year escapement estimates, this chinook salmon run is expected to be about average in 1998. Increasing escapements during the 1992 to 1994 seasons should result in good returns of age-4 and -5 fish. Larger, age-6 fish are likely to be less abundant. The Kuskokwim River chinook salmon season is now restricted to the period from May 1 through July 24 from the Holitna River drainage downstream, and the drainages entering the southeastern side of Kuskokwim Bay. New gear restrictions apply to all, or portions of, the Kisaralik, Kasigluk, and Kwethluk rivers. Please check the 1998 regulation book for details.

# SECTION IV: COHO SALMON FISHERIES

Coho, or silver, salmon is a very popular sport fish species to Southwest Alaska's recreational fishing industry. Coho salmon fisheries occur from August through September with some isolated pockets of fish available into October. Significant fisheries occur in the Naknek, Alagnak, Nushagak, Mulchatna, Togiak, and Kanektok rivers as well as a host of smaller, less popular waters (Figure 10). Commercial fisherman take the greatest share of the southwest Alaska coho harvest at 88%, followed by 8% harvested by subsistence users and 4% by sport anglers.

Coho salmon account for approximately 30% of all the salmon harvested by sport fishermen in the SWMA. Harvest increased along with sport fishing effort from 1977 to 1989, increasing from fewer than 1,000 fish to almost 19,000 fish (Figure 11). Since 1992, the average harvest has been 10,239 fish areawide (Table 14). The 1996 harvest of 20,220 fish by sport anglers represents a substantial increase in sport harvest and was in part due to extraordinarily strong returns to western Alaska.

Most anglers pursue coho salmon with the assistance of a guide. Annual estimates of harvest (Howe et al. 1997) indicate that despite the more liberal 5 fish daily bag limit, coho salmon are harvested in approximately the same total numbers as chinook salmon. The mail survey (Howe et al. 1997) also indicates that considerable numbers of coho salmon are caught and released.

The bag and possession limits for coho salmon are 5 salmon per day, no size limit; the same regionwide limit that has been in effect since 1972. Some coho salmon runs, particularly in the Central and Western sections, have declined in recent years, precipitating occasional closures or reductions in bag limits for the sport anglers. Except for rare instances, however, limitations on sportsmen have been of little consequence to the health of the runs which are more heavily impacted by commercial harvests. The lack of escapement data on which to judge the health of the stocks, or base reasonable escapement and harvest goals for all segments of the coho salmon fishery, has become a major concern. The declines observed in some of the area's runs may be the result of excessive harvests in previous years.

The Alaska Board of Fisheries adopted several regulation changes that will affect the coho sport fishery in the Kvichak River drainage in 1998. In most of the Kvichak River drainage (the only exception being the Alagnak River) and Lake Iliamna area, the daily bag and possession limits for coho salmon were reduced from 5 to 2 per day. In the Alagnak (Branch River) drainage, the daily bag and possession limits were reduced from 5 to 3.

## NAKNEK RIVER

### Fishery Description

In the Naknek River, the coho salmon sport fishery develops in late July and continues well into September. The peak 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, however, significant effort occurs above Rapids Camp as well. 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.

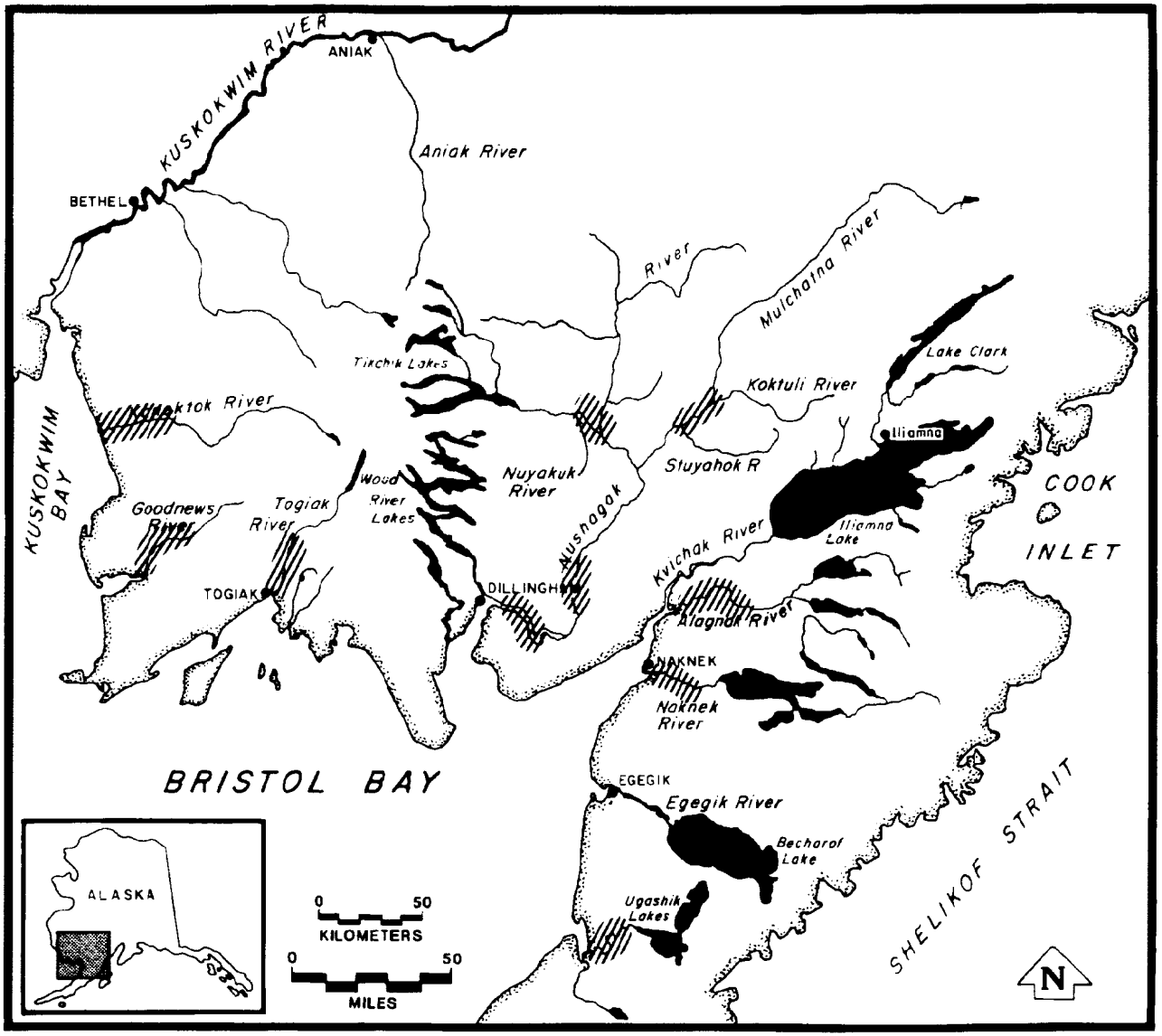


**Figure 10.-Popular coho salmon sport fisheries in Southwest Alaska.**

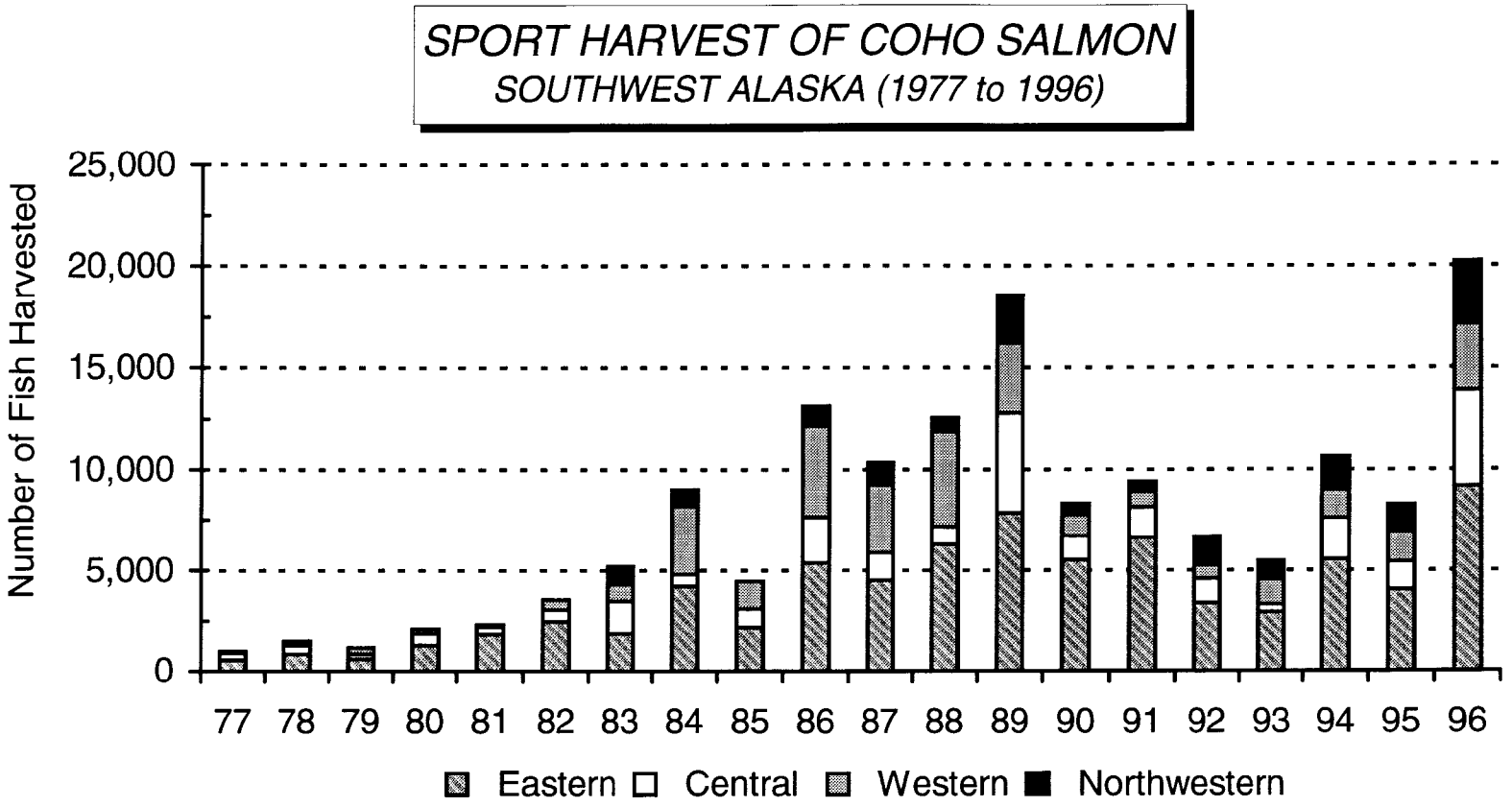


**Figure 11.-Sport harvest of coho salmon from the Eastern, Central, Western, and Northwestern sections of the Southwest Alaska sport fish management area, 1977 to 1996.**

**Table 14.-Sport harvest of coho salmon from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 26 | 163 | 125 | 17 | 87 | 314 | 157 | 611 | 0 [a] | 31 [a] | 215 |
| Egegik/Becharof | 138 | 0 | 0 | 155 | 65 | 10 | 115 | 312 [a] | 0 [a] | 0 [a] | 0 [a] |
| Naknek R. | 297 | 646 | 300 | 818 | 1,156 | 1,676 | 1,385 | 2,332 | 1,281 | 1,942 | 2,187 [b] |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 92 | 0 |
| Bay of Islands | | | | | | | 0 | 0 | 37 | 153 [a] | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 37 | 46 | 215 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 107 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 86 | 38 | 150 | 258 | 65 | 42 | 42 | 100 | 0 | 850 | 0 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 400 | 422 | 147 | 599 | 11 | 1,699 | 46 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 404 | 238 | 687 |
| L Talarik Cr. | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 75 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 212 [a] | 204 | 962 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 0 | 49 | 181 | 91 | 64 |
| Subtotal | 552 | 847 | 575 | 1,248 | 1,773 | 2,464 | 1,846 | 4,190 | 2,174 | 5,346 | 4,483 |

-continued-

**Table 14.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 186 [a] | 234 | 840 | 97 | 445 | 92 | 739 | 346 | 451 | 415 |
| Egegik/Becharof | 217 [a] | 104 | 300 | 97 | 275 | 48 | 426 | 48 | 536 | 267 |
| Naknek R. | 4,065 [b] | 4,801 [b] | 2,179 | 4,475 | 1,579 | 1,034 | 1,940 | 1,788 | 4,964 | 2,261 |
| Naknek L. | 217 [a] | 78 | 0 | 32 | 73 | 0 | 0 | 68 | 0 | 28 |
| Bay of Islands | 0 [a] | 26 | 0 | 11 | 32 | 19 | 0 | 0 | 0 | 10 |
| Brooks R. | 0 | 52 | 200 | 65 | 24 | 36 | 10 | 141 | 20 | 46 |
| Brooks L. | | | 420 | 0 | 0 | 10 | 0 | 39 | 40 | 18 |
| American Cr. | 0 [a] | 26 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | | | | 24 | 38 | 0 | 0 [a] | 268 [a] | 66 |
| Kvichak R. | 31 | 227 | 444 | 329 | 162 | 370 | 553 | 213 | 338 | 327 |
| Copper R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 588 [a] | 403 | 194 | 602 | 324 | 246 | 763 | 331 | 1,902 | 713 |
| Newhalen R. | 248 | 1,160 | 467 | 261 | 81 | 444 | 484 | 394 | 20 | 285 |
| L Talarik Cr. | 93 [a] | 0 [a] | 0 | 0 | 0 | 19 | 9 | 19 | 0 | 9 |
| Lake Clark | 0 [a] | 0 | 0 | 102 | 32 | 120 | 0 | 76 | 0 | 46 |
| Lake Iliamna | 62 | 302 | 57 | 114 | 0 | 93 | 54 | 206 | 0 | 71 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 558 | 390 | 400 | 424 | 316 | 363 | 535 | 379 | 599 | 438 |
| Subtotal | 6,265 | 7,803 | 5,501 | 6,609 | 3,367 | 2,932 | 5,513 | 4,048 | 9,138 | 5,000 |

**Table 14.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 65 | 126 | 212 | 379 | 216 | 451 | 849 | 399 | 0 | 934 | 595 |
| Mulchatna | 90 | 113 | 0 | 129 | 173 | 52 | 524 | 37 | 130 | 496 | 0 |
| Wood River L. | 61 | 25 | 25 | 43 | 22 | 52 | 126 | 100 | 781 | 701 | 366 |
| Tikchik/Nuyakuk | 93 | 151 | 0 | 43 | 0 | 0 | 31 | 0 | 0 | 0 [a] | 366 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 94 | 37 | 0 | 146 | 46 |
| Subtotal | 309 | 415 | 237 | 594 | 411 | 555 | 1,624 | 573 | 911 | 2,277 | 1,373 |
| Western | | | | | | | | | | | |
| Togiak | 114 | 214 | 300 | 258 | 119 | 524 | 294 | 1,295 [b] | 342 [b] | 2,851 | 409 [b] |
| Goodnews | | | | | | | 168 | 195 [a] | 386 | 0 [a] | 685 [a] |
| Kanektok | | | | | | | 367 | 1,895 | 622 | 1,680 [b] | 2,300 |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 114 | 214 | 300 | 258 | 119 | 524 | 829 | 3,385 | 1,350 | 4,531 | 3,394 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 42 [a] | [a] | 12 [a] | 905 [a] | 254 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 850 | 857 | 12 | 24 | 815 |
| Subtotal | | | | | | | 892 | 857 | 24 | 929 | 1,069 |
| Eastern | 552 | 847 | 575 | 1,248 | 1,773 | 2,464 | 1,846 | 4,190 | 2,174 | 5,346 | 4,483 |
| Central | 309 | 415 | 237 | 594 | 411 | 555 | 1,624 | 573 | 911 | 2,277 | 1,373 |
| Western | 114 | 214 | 300 | 258 | 119 | 524 | 829 | 3,385 | 1,350 | 4,531 | 3,394 |
| Northwestern | | | | | | | 892 | 857 | 24 | 929 | 1,069 |
| Total | 975 | 1,476 | 1,112 | 2,100 | 2,303 | 3,543 | 5,191 | 9,005 | 4,459 | 13,083 | 10,319 |

-continued-

**Table 14.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 124 | 1,586 | 331 | 415 | 445 | 124 | 845 | 521 | 2,333 | 854 |
| Mulchatna | 371 | 364 | 95 | 437 | 275 | 53 | 230 | 204 | 496 | 252 |
| Wood River L. | 341 | 2,417 | 131 | 394 | 275 | 100 | 820 | 450 | 307 | 390 |
| Tikchik/Nuyakuk | 31 | 442 | 12 | 22 | 32 | 17 | 50 | 0 | 824 | 185 |
| Koktuli R. | | | | | 0 | 0 | 18 | 0 [a] | 60 | 16 |
| Other | 31 | 156 | 622 | 241 | 185 | 57 | 75 | 196 | 730 | 249 |
| Subtotal | 898 | 4,965 | 1,191 | 1,509 | 1,212 | 351 | 2,038 | 1,371 | 4,750 | 1,944 |
| Western | | | | | | | | | | |
| Togiak | 1,238 [a] | 1,976 [b] | 367 | 87 | 251 | 330 | 531 | 408 | 1,400 | 584 |
| Goodnews | 0 [a] | 224 | 36 [a] | 297 | 138 | 189 | 170 | 114 | 466 | 215 |
| Kanektok | 1,837 | 1,096 | 644 | 358 | 275 | 734 | 675 | 970 | 1,251 | 781 |
| Other | 1,637 | 112 | 0 | 0 | 16 | 0 | 0 | 0 | 119 | 27 |
| Subtotal | 4,712 | 3,408 | 1,047 | 742 | 680 | 1,253 | 1,376 | 1,492 | 3,236 | 1,607 |
| Northwestern | | | | | | | | | | |
| Aniak | 618 [a] | 939 | 182 | 327 | 235 | 213 | 507 | 852 | 986 | 559 |
| Kisaralik | | | | | | | 72 | 0 [a] | 636 [a] | 236 |
| Kwethluk | | | | | 624 | 313 | 525 [a] | 0 [a] | 656 [a] | 424 |
| Other | 36 | 1,420 | 363 | 195 | 558 | 399 | 577 | 466 | 818 | 564 |
| Subtotal | 654 | 2,359 | 545 | 522 | 1,417 | 925 | 1,681 | 1,318 | 3,096 | 1,687 |
| Eastern | 6,265 | 7,803 | 5,501 | 6,609 | 3,367 | 2,932 | 5,513 | 4,048 | 9,138 | 5,000 |
| Central | 898 | 4,965 | 1,191 | 1,509 | 1,212 | 351 | 2,038 | 1,371 | 4,750 | 1,944 |
| Western | 4,712 | 3,408 | 1,047 | 742 | 680 | 1,253 | 1,376 | 1,492 | 3,236 | 1,607 |
| Northwestern | 654 | 2,359 | 545 | 522 | 1,417 | 925 | 1,681 | 1,318 | 3,096 | 1,687 |
| Total | 12,529 | 18,535 | 8,284 | 9,382 | 6,676 | 5,461 | 10,608 | 8,229 | 20,220 | 10,239 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the statewide harvest survey. 1996 data are preliminary.

[a] Unpublished estimates from statewide harvest survey for sites with less than 12 responses.

[b] Estimates from onsite creel survey.

## Historical Performance

Harvests of coho salmon by the recreational fishery have averaged 2,261 fish during the recent 5 years (Table 15). Total annual harvest of coho from the Naknek River increased significantly in 1988, and remained high through 1991. Since 1992 total harvests have been significantly lower than those previously observed. The decline in total harvest is attributed to reduced run size and slightly more conservative management in the commercial fishery. Sport harvests of coho salmon have been stable, with the exception of 1996, at around 1,500 to 2,000 fish per year since 1992.

The development of a Fall Fishing Cooperative, a local venture engineered by local commercial fishermen to ensure markets for salmon beyond the normal sockeye season, has resulted in substantial increases in fishing effort in August and September. Subsistence harvests of coho salmon appear stable in the recent past averaging 1,242 fish per year, and account for about 13% of the harvest (Table 15).

## Management

Sport harvest and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division has conducted significant monitoring and stock assessment projects in the recent past (Minard and Brookover 1988a, Minard 1989a, Coggins 1992, Dunaway and Fleischman 1996a).

No biological escapement goal (BEG) has been established for Naknek River coho salmon stocks. In 1997 the first aerial surveys were flown to assess coho salmon escapement in the Naknek drainage. Because of the lack of escapement information it is impossible to assess fishery impacts on the total run.

The present bag and possession limit for coho salmon on the Naknek River is 5 fish per day, no size limit; the same regionwide limit has been in effect since 1972. No adjustments to the Naknek River coho salmon fishery bag and possession limits have ever occurred by inseason emergency order.

Management concerns for this fishery center on the lack of escapement data, the department's inability to assess fishery impacts, and the lack of a management goal or target for this growing fishery. Without a clearer management target, justification for adjusting fishing time in the various fisheries is tenuous.

## Management Objectives

No explicit management objectives exist for this fishery.

## 1997 Season

The estimated 1997 harvest of 3,878 fish by all user groups is approximately one-half the average for the recent 5-year period (Table 15). Reduced commercial harvests were a function of market conditions and demand as well as a poorer than average return. It is estimated that the sport fishery accounted for 2,000 fish, and the commercial and subsistence fisheries another 678 and 1,200 fish, respectively (Table 15).

**Table 15.-Coho salmon commercial, subsistence, and sport harvest from the Naknek River, 1971 to 1997.**

| Year | Harvest | | | |
|---|---|---|---|---|
| | Commercial[a] | Subsistence[b] | Sport | Total |
| 1971 | 89 | 100 | | |
| 1972 | 402 | 100 | | |
| 1973 | 255 | 500 | | |
| 1974 | 916 | 200 | | |
| 1975 | 43 | 200 | | |
| 1976 | 1,195 | 600 | | |
| 1977 | 2,883 | 300 | 297 | 3,480 |
| 1978 | 913 | 300 | 646 | 1,859 |
| 1979 | 12,355 | 1,200 | 300 | 13,855 |
| 1980 | 7,802 | 800 | 818 | 9,420 |
| 1981 | 1,229 | 1,100 | 1,156 | 3,485 |
| 1982 | 10,586 | 1,000 | 1,676 | 13,262 |
| 1983 | 7,282 | 900 | 1,385 | 9,567 |
| 1984 | 3,209 | 600 | 2,332 | 6,141 |
| 1985 | 10,474 | 1,103 | 1,281 | 12,858 |
| 1986 | 5,824 | 650 | 1,942 | 8,416 |
| 1987 | 5,274 | 1,044 | 2,292 | 8,610 |
| 1988 | 29,988 | 823 | 4,065 | 34,876 |
| 1989 | 22,668 | 1,927 | 4,801 | 29,396 |
| 1990 | 16,091 | 726 | 2,179 | 18,996 |
| 1991 | 17,527 | 1,056 | 4,475 | 23,058 |
| 1992 | 18,553 | 831 | 1,579 | 20,963 |
| 1993 | 1,779 | 1,572 | 1,034 | 4,385 |
| 1994 | 5,877 | 1,311 | 1,940 | 9,128 |
| 1995 | 981 | 1,013 | 1,788 | 3,782 |
| 1996[c] | 3,816 | 1,482 | 4,964 | 10,262 |
| All Years Avg. | 7,231 | 825 | 2,048 | 10,103 |
| Percent | 72% | 8% | 20% | |
| 1992 to 1996 Avg. | 6,201 | 1,242 | 2,261 | 9,704 |
| Percent | 64% | 13% | 23% | |
| 1997[c] | 678 | 1,200 | 2,000 | 3,878 |
| Percent | 17% | 31% | 52% | |

[a] Commercial harvests are for the Naknek/Kvichak district and therefore include stocks destined for the Kvichak, Alagnak, and Naknek rivers.

[b] Previous tables may have presented rounded estimates; this table presents actual raw counts from returned permits, 1975 to 1996. 1970-1986 data based on permits issued in King Salmon, Naknek, South Naknek; 1987-1997 data based on Naknek watershed fishing sites as indicated on permit.

[c] 1996 and 1997 preliminary estimates. 1997 sport and subsistence estimates are based on recent 5-year average.

The 1997 commercial fishing schedule for cohos on the Naknek River was 4 days per week during July 28 to September 30, however, lower than average catches per boat and the lack of market interest resulted in the last delivery occurring on August 1.

### 1998 Outlook

The lack of stock assessment data makes it difficult to generate a forecast for the 1998 coho salmon return to the Naknek River. Harvests from 1994, the parent year for the 1998 return, approximate the long-term average. Presuming the 1994 run produced an average escapement in addition to the harvests, the 1998 Naknek River coho salmon return is expected to be stronger than 1997 and on par with 1996. The stability of coho harvests in the sport fishery, the declining market interest in the commercial fishery, and an outlook for an average return in 1998, make inseason actions unlikely. The Naknek River upstream from the ADF&G marker at Rapids Camp has been restricted to single hooks with a point-to-shank gap of 1/2 inch or less until August 1.

## NUSHAGAK AND MULCHATNA RIVERS

### Fishery Description

The Nushagak and Mulchatna rivers produce the largest return of coho salmon in the SWMA. Within the drainage there are four areas of concentrated recreational effort: the lower 12 miles of the Nushagak River near the village of Portage Creek, the middle section of the Nushagak River in the vicinity of the village of Ekwok, the mid section of the Mulchatna River between the Stuyahok and Koktuli rivers, and the Nuyakuk River at its confluence with the Nushagak River (Figure 10). Although sport fishing for coho salmon does occur in some of the tributaries of the drainage, the overall harvest resulting from that activity is considered slight. Of the areas mentioned above, the lower portion of the Nushagak River and the mouth of the Nuyakuk River are the most significant. The lower Nushagak River provides fishing opportunity for early coho salmon in late July and early August, a time when other fisheries have not yet begun.

### Historical Performance

The sport harvest has averaged 1,305 fish, or about 4% of the total harvest of Nushagak and Mulchatna coho stocks since 1992 (Table 16). Commercial harvest accounts for 79%, and subsistence 17%, of the total harvest. The only shift in the distribution of the harvest since 1971 is a growing subsistence component. At these levels, the coho salmon sport fishery is considered to have negligible impact on the overall productivity of Nushagak and Mulchatna drainage coho stocks.

The Nushagak coho salmon stocks are considered to be depressed but in stable condition. A chronic inability to hit escapement targets despite significant management actions in recent years supports this assessment of stock status. In only 1 of the last 6 years has the escapement goal of 90,000 been reached. Significant restrictions have been placed on all fisheries, including closure of the subsistence fishery, to reduce exploitation on this stock.

### Management

Sport harvest and effort is estimated through the statewide harvest survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Inriver abundance of coho salmon in the Nushagak is estimated by side scan sonar operated near the village of Portage

**Table 16.-Coho salmon commercial, subsistence, and sport harvest plus escapement for the Nushagak drainage, 1972 to 1997.**

| | Harvest | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Sport | | | | Spawning | Total |
| Year | Commercial[a] | Subsistence[b] | Nush[c] | Mul[d] | Total | Total | Escapement[e] | Run |
| 1972 | 3,654 | 1,000 | | | | 4,654 | | |
| 1973 | 28,709 | 2,200 | | | | 30,909 | | |
| 1974 | 12,569 | 4,700 | | | | 17,269 | | |
| 1975 | 7,342 | 4,300 | | | | 11,642 | | |
| 1976 | 6,778 | 2,100 | | | | 8,878 | | |
| 1977 | 52,562 | 4,500 | 158 | 90 | 248 | 57,310 | | |
| 1978 | 44,740 | 2,502 | 277 | 113 | 390 | 47,632 | | |
| 1979 | 129,607 | 5,156 | 212 | 0 | 212 | 134,975 | | |
| 1980 | 146,354 | 4,099 | 422 | 129 | 551 | 151,004 | 95,368 [f] | 246,372 |
| 1981 | 219,310 | 7,930 | 216 | 173 | 389 | 227,629 | 141,468 [f] | 369,097 |
| 1982 | 345,903 | 8,044 | 451 | 52 | 503 | 354,450 | 294,151 | 648,601 |
| 1983 | 66,109 | 4,880 | 880 | 571 | 1,451 | 72,440 | 36,885 | 109,325 |
| 1984 | 257,649 | 7,449 | 399 | 55 | 454 | 265,552 | 140,804 | 406,356 |
| 1985 | 20,230 | 6,006 | 0 | 130 | 130 | 26,366 | 82,258 | 108,624 |
| 1986 | 68,568 | 9,150 | 934 | 569 | 1,503 | 79,221 | 45,483 | 124,704 |
| 1987 | 13,263 | 5,358 | 961 | 23 | 984 | 19,605 | 21,268 | 40,873 |
| 1988 | 53,125 | 4,627 | 155 | 386 | 541 | 58,293 | 130,171 | 188,464 |
| 1989 | 77,073 | 8,130 | 2,028 | 364 | 2,392 | 87,595 | 81,107 [f] | 168,702 |
| 1990 | 7,447 | 5,622 | 343 | 95 | 438 | 13,507 | 140,500 | 154,007 |
| 1991 | 5,399 | 10,190 | 437 | 437 | 874 | 16,463 | 37,584 | 54,047 |
| 1992 | 84,898 | 6,496 | 477 | 275 | 752 | 92,146 | | |
| 1993 | 14,244 | 4,850 | 141 | 53 | 194 | 19,288 | 42,161 | 61,449 |
| 1994 | 6,814 | 4,632 | 895 | 248 | 1,143 | 12,589 | 80,425 | 93,014 |
| 1995 | 4,181 | 3,905 | 521 | 204 | 725 | 8,811 | 45,269 | 54,080 |
| 1996[g] | 12,477 | 6,000 | 3,157 | 556 | 3,713 | 22,190 | 187,439 | 209,629 |
| All Years Avg. | 67,560 | 5,353 | 653 | 226 | 879 | 73,793 | 100,146 | 173,939 |
| Percent | 92% | 7% | | | 1% | | | |
| 1992-1996 Avg. | 24,523 | 5,177 | 1,038 | 267 | 1,305 | 31,005 | 88,824 | 119,828 |
| Percent | 79% | 17% | | | 4% | | | |
| 1997[g] | 3,123 | 4,000 | 500 | 200 | 700 | 7,823 | NA[h] | NA[h] |
| Percent | 40% | 51% | | | 9% | | | |

[a] Commercial harvests for 1972-1995 represent final numbers based on fish receipts. Numbers for 1996 are preliminary.

[b] Subsistence harvests for whole Nushagak drainage, based on permit returns by community of residence including Manokotak.

[c] Nushagak River and tributaries including the Tikchik and Nuyakuk rivers, and excluding the Wood River. To conservatively estimate the number of potential spawners, the entire Nushagak River sport harvest was assumed to have been taken upstream of the Portage Creek sonar.

[d] Mulchatna River and tributaries including the Koktuli River.

[e] Inriver abundance estimated by sonar counter at Portage Creek minus upriver subsistence and sport harvests.

[f] 1980, 1981, 1989 escapements are estimates based on exploitation rates from the harvest and not on sonar.

[g] 1996 harvest estimates are preliminary. 1997 estimate preliminary - no escapement estimate available hence no total run estimate possible.

[h] NA = Not Available.

Creek. Sport and subsistence harvests that occur above the sonar site are considered negligible and therefore the sonar estimated inriver abundance is also considered the estimated escapement.

From 1984 to 1992, Nushagak coho salmon stocks were managed to achieve a biological escapement (BEG) of 150,000 fish, estimated by sonar at Portage Creek. Spawning escapements (Table 16) during that period consistently fell short of the goal, averaging 120,026 fish. Recent spawner-recruit analysis suggests the 150,000 fish goal is higher than necessary to manage for maximum sustained yield. In 1992, based on its findings, the department lowered the BEG to 90,000 spawners (ADF&G 1992). To achieve 90,000 spawners necessitated managing the commercial fishery to achieve an inriver abundance of 100,000 fish. The additional 10,000 coho salmon provided for subsistence and sport harvests above the sonar site at Portage Creek.

The present bag and possession limit for coho salmon on the Nushagak and Mulchatna drainage is 5 fish per day, no size limit. That is the same limit for the region, and has been in effect since 1972. The first adjustment to that limit occurred in 1991 when the daily bag and possession limit was reduced from 5 to 2 by emergency order. Since then the limits have been adjusted by emergency order several times in response to stock conservation problems.

## Management Objectives

Currently management of Nushagak/Mulchatna River coho salmon is governed by 5 AAC 06.368. Nushagak River Coho Salmon Management Plan adopted by the Alaska Board of Fisheries in December of 1995. The plan calls for managing the commercial fishery for an inriver return of 100,000 which provides for a spawning escapement of 90,000, a reasonable opportunity in the subsistence fishery, and a 2,000 guideline harvest in the sport fishery. The plan goes on to address management actions that should be taken should the inriver return fall short of the goal. In the sport fishery, should the inriver return fall below 60,000, then restrictions to maintain the sport harvest below 2,000 are required. If the inriver return is less than 50,000 then closure of the sport fishery is called for. Along with these management actions there are actions called for in the commercial and subsistence fisheries. All fisheries are to close when the inriver return falls below 50,000.

## 1997 Season

The 1997 coho salmon return was a product of a poor escapement (41,000) in 1993. Rough in-house forecasts ranged from 87,000 to 43,400. Given the recent poor returns of coho and the poor parental escapement, department staff entered the 1997 season cautiously. Commercial fishing in the Nushagak district was closed due to sockeye and coho salmon conservation concerns on July 24. In accordance with the Nushagak Coho Salmon Management Plan the Wood River Special Harvest Area was opened and fished until July 29. The Nushagak inriver sport fishery progressed slowly, and passage by the sonar appeared slow as well. Sonar estimated passage of coho was less than 10,000 fish on August 4, on average the date at which 22% of the run has passed the sonar. Department staff projected a final escapement of less than 60,000 by season end, triggering closure of the sport fishery under the Nushagak Coho Salmon Management Plan. On August 5 the department issued an emergency order closing the Nushagak drainage to the taking of coho salmon until further notice. That E. O. became effective August 7, 1997. The subsistence fishery was restricted to 3 days per week on August 7, and then closed on August 13 when projected escapement fell below the 50,000 mark.

Given the problem of under counting chinook salmon experienced this season, research staff began an assessment of the extent and variability of coho salmon offshore distribution. Inseason results indicated that significant numbers of coho were migrating offshore of the sonar and hence, not being counted. No formal increase in sonar estimate was possible, however, staff were confident that more than 50,000 had passed the sonar. Based on this new information, the subsistence fishery was reopened on September 1 to 3 days per week, consistent with the reduced schedule called for under the management plan. No final escapement estimate is available for coho salmon for the 1997 season, however, staff believe it was at least 50,000.

### 1998 Outlook

The 1998 coho salmon return to the Nushagak drainage will be primarily the product of the 1994 parental escapement. Escapement in 1994 was approximately 80,425 coho salmon. Combined harvests across all user groups was approximately 12,589 fish; far below the long and short term averages. Based on parental run strength it is not likely the 1998 return will be sufficient to sustain a normal commercial fishery, and may not be able to sustain a sport fishery as provided for under the Nushagak Mulchatna Coho Salmon Management Plan. The recent poor returns argue for extreme caution if all user groups are to avoid extended closed periods or severe seasonal limitations on Nushagak coho salmon. Inseason restrictions to the sport fishery may be necessary. Anglers are encouraged to call 907-842-REGS before making a trip.

## WOOD RIVER LAKES

### Fishery Description

The Wood River Lakes is a series of six, large, deep-water lakes connected by short swift rivers within the Wood-Tikchik State Park. Known for a variety of fishery resources including Arctic char/Dolly Varden, rainbow trout, and sockeye salmon, the Wood River system also supports significant coho salmon stocks. The majority of the sport fishing effort directed toward Wood River drainage coho salmon occurs at the confluence of Silver Salmon Creek and the Wood River and the mouths of Ice, Youth, and Sunshine creeks on Lake Aleknagik. Sport fishing effort directed toward coho salmon has grown substantially in recent years and has come primarily from greater numbers of local residents pursuing sport fishing as a leisure activity.

### Historical Performance

Harvest data for coho salmon in the Wood River Lake system (Table 14) date back to 1977. From 1977 through 1984, the drainage harvest never exceeded 200 fish. Since 1985, however, the harvest levels have increased. The recent 5-year average harvest of sport-caught coho salmon is 390 fish. This level of harvest is in sharp contrast to the estimated harvest of 2,417 coho salmon reportedly taken in 1989. Estimates of sport harvest noted in the statewide harvest survey are obviously not without error. All things considered, it is safe to say that the coho salmon sport fishery in the Wood River Lake system is growing, probably accounting for about 500 to 1,000 fish annually, and is primarily used by local residents as a form of recreation.

### Management

No biological escapement goal (BEG) has been established for coho salmon stocks in the Wood River drainage. There is no escapement assessment program in place or planned for these stocks, making it impossible to assess fishery impacts on total run.

Sport harvests are limited to 5 per day and in possession, with no size limit. Terminal tackle is not restricted in any manner beyond the normal methods and means generally allowed in fresh waters.

Management concerns for this stock focus primarily on the effect commercial and subsistence harvests may be having on Wood River stocks. The driving force behind management is the Nushagak coho salmon escapement. Presumably, a fishing schedule in the commercial fishery that allows achievement of the desired escapement in one system will allow sufficient numbers into the other, but there is no way to measure this. A full stock assessment program is needed to better describe the extent to which Wood River drainage coho stocks are impacted by the commercial fishery, what order of magnitude the escapements are, and to what degree the Nushagak and Wood River stocks are mingled in the commercial district.

### Management Objectives
No explicit management objectives exist for this fishery.

### 1997 Season
No data are available to address the 1997 season other than that reports from village residents in Aleknagik indicated "fair numbers" of coho salmon off the mouths of Ice and Sunshine creeks this fall.

### 1998 Outlook
No data are available to make a projection.

## KANEKTOK RIVER

### Fishery Description
Coho salmon play a major role in the Kanektok River sport fishery and are caught primarily in the lower 12 miles of the river in the vicinity of the village of Quinhagak (Figure 10). The fishery peaks in mid August, slightly earlier than the fisheries further to the east. Because of its relatively small size, clear water, and consistent returns of coho salmon, the Kanektok River is one of the finest silver salmon sport fisheries in western Alaska.

### Historical Performance
The total run of coho salmon in the Kanektok River averages about 84,000 fish annually and produces an average total harvest of approximately 70,000 fish annually (Table 17). Over 90% of the harvest is taken by the commercial fishery which averaged 82,211 coho salmon per year from 1992 through 1996 (Table 17). Recent sport harvests account for 1% to 2% of the total harvest and have not returned to the peak levels observed in 1984 through 1988 (Table 17). After dropping to an all time low in 1992, the annual sport harvest has generally increased to average 781 coho salmon from 1992 through 1996. Recent subsistence harvests average 1,996 per year and account for 2% of the average total harvest (Table 17).

### Management
Sport harvest and effort are estimated through the annual statewide harvest and participation survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Bethel office of the Commercial Fisheries Management and Development Division (CFMD) and reported in the Annual Management Report series (ADF&G 1994, Francisco et al. 1995, Burkey et al. 1997). Sport Fish Division has

**Table 17.-Coho salmon commercial, subsistence, and sport harvest plus escapement for the Kanektok River, 1983 to 1997.**

| Year | Harvest | | | | Escapement Index[a] | Total Run[b] |
|---|---|---|---|---|---|---|
| | Commercial | Subsistence | Sport | Total | | |
| 1983 | 32,442 | | 367 | 32,809 | | |
| 1984 | 132,151 | | 1,895 | 134,046 | 46,830 | 180,876 |
| 1985 | 29,992 | | 622 | 30,614 | | |
| 1986 | 57,544 | | 2,010 [c] | 59,554 | | |
| 1987 | 50,070 | | 2,300 | 52,370 | 20,056 | 72,426 |
| 1988 | 68,605 | 2,933 | 1,837 | 73,375 | | |
| 1989 | 44,607 | 3,346 | 1,096 | 49,049 | 1,755 | 50,804 |
| 1990 | 26,926 | 3,510 | 644 | 31,080 | | |
| 1991 | 42,571 | 2,901 | 358 | 45,830 | 4,330 | 50,160 |
| 1992 | 86,404 | 2,172 | 275 | 88,851 | | |
| 1993 | 55,817 | 1,381 | 734 | 57,932 | | |
| 1994 | 83,912 | 2,282 | 675 | 86,869 | | 86,869 |
| 1995 | 66,203 | 2,650 | 970 | 69,823 | 2,250 [d] | 72,073 |
| 1996 | 118,718 | 1,497 | 1,251 | 121,466 | 23,656 [d] | 145,122 |
| All Years Avg. | 63,997 | 2,519 | 1,074 | 67,590 | 16,480 | 84,070 |
| Percent | 95% | 4% | 2% | | | |
| 1992 to 1996 Avg. | 82,211 | 1,996 | 781 | 84,988 | 12,953 | 97,941 |
| Percent | 97% | 2% | 1% | | | |
| 1997[e] | 35,510 | 2,000 | 800 | 38,310 | 23,166 | 61,476 |
| Percent | 93% | 5% | 2% | | | |

[a] Unexpanded observed count made from fixed-wing aircraft.

[b] Considered a minimum number since escapement estimates are unexpanded.

[c] Estimate of sport harvest from an onsite creel survey in 1986 was 1,680.

[d] 1995 and 1996 escapement surveys were partial due to poor conditions.

[e] 1997 estimates are preliminary. 1997 Sport and subsistence harvest estimates are recent 5-year averages. 1997 escapement estimate is a tower count ending August 21 before the entire run had entered the river. Aerial survey conditions were poor.

conducted significant monitoring and stock assessment projects in the recent past (Alt 1986, Minard 1987c, Dunaway and Bingham 1992b, Dunaway and Fleischman 1995a).

Escapement of coho salmon into the Kanektok River is usually estimated by aerial survey. Counts, made between August 20 and September 5, are left unexpanded and represent only minimum escapement estimates. Since 1984, the observed escapement of coho salmon into the Kanektok River has ranged from 1,755 to 46,830 (Table 17). No formal escapement goal has been established for Kanektok River coho salmon. Poor weather and lack of funding contribute to the erratic string of aerial escapement estimates.

In 1996, the Quinhagak Indian Reorganization Act (IRA) Council, Togiak National Wildlife Refuge, and the Arctic-Yukon-Kuskokwim region of CFMD, initiated a salmon escapement counting tower project in the lower Kanektok River. The 1996 project closed too early in the coho salmon run to provide useful information (Burkey et al. 1998). In 1997 the tower was manned until August 21 and provided the only estimate of coho salmon escapement for the season. The presence of significant numbers of sockeye salmon during the early coho salmon run has confounded staff's ability to make accurate counts. Successful continuation of this project has the potential to improve harvest opportunities for all users of the Kanektok River salmon fisheries. The results of the tower project will be reported by CFMD, Bethel (Burkey et al. *In prep*).

Bag limits for coho salmon were very liberal, allowing 15 fish per day, 30 in possession until 1986. In 1987, the Board recognized the significance of the harvest potential of this fishery and reduced bag and possession limits to 5 fish daily, the standard limit for the area. Interestingly, the bag limit of 5 fish per day is seldom taken by sport fishermen on the Kanektok River. Fishery surveys conducted in 1991 and 1994 found only 7% to 15% of the anglers interviewed left the river with a full limit of 5 fish (Dunaway and Bingham 1992b, Dunaway and Fleischman 1995a). Most interviewed anglers (61% in 1991 and 66% in 1994) elected to take no fish, even though over 95% of them had caught and released at least one fish.

Harvests, which appear relatively minor, do not totally reflect the importance of this species to the recreational fishery. In 1986, over 22,500 coho salmon were landed of which only 1,680 (7%) were harvested (Minard 1987c). In 1990, approximately 14% of the coho salmon caught were retained, and since 1992 the retention rate has averaged approximately 25% (Mills 1991-1994, Howe et al. 1995-1997). Hook-and-release mortality has been found to be significant for sport-caught coho salmon, particularly those caught in intertidal areas (Vincent-Lang et al. 1993). The Kanektok River coho salmon sport fishery occurs upstream of the intertidal area, therefore mortality due to hook and release is judged to have a minor impact on the overall health of the stocks.

### Management Objectives

No explicit management objectives exist for this fishery.

### 1997 Season

The 1997 Kanektok coho salmon return was expected to be average or slightly below average based upon the 1993 parental year harvest levels. The primary indicator of Kanektok River coho salmon run strength is the performance of the commercial fishery that typically opens for 12-hour periods on Monday, Wednesday and Friday of each week. On August 1, the department shifted management of the commercial fishery to coho salmon when the harvest of coho salmon exceeded the catch of sockeye salmon. The commercial harvests each period varied from average to well below average throughout the season. As established in the commercial fisheries management plan, only two periods were allowed during the weeks of August 11-15 and August 25-29 when commercial harvests dropped below average levels for two consecutive periods. Poor harvests the last week of August resulted in a single commercial fishery opening the week of September 3 and the fishery was closed for the season September 8.

The indicators of low run strength kept the Sport Fish Division in close contact with CFMD, the Quinhagak IRA staff, as well as several sport fishing operations throughout the coho salmon

season. Data collected informally by the Togiak Refuge river rangers (USFWS) during 1997 indicated sport anglers experienced catch rates that daily ranged from poor to fair, and overall were below average but not to an alarming degree. Daily passage of coho salmon at the counting tower, occasionally exceeding 2,000 fish in a day, was a reassurance that fish were continuing to enter the river even though no previous data were available for comparison. Reports from the community of Quinhagak indicated that subsistence needs were being met. Therefore it was concluded that the coho salmon return was below average, but not to levels warranting emergency restrictions in the sport fishery.

Overall, the actual return appears to have been below average as predicted, or about 60% of the recent and long-term averages (Table 17). The commercial fishery landed 35,510 coho salmon, well below recent and long-term averages for the fishery (Table 17). Subsistence and sport harvests are probably below average but, at the time this is written, estimates are based only on the 1992-1996 average. Bad weather prevented aerial surveys of the spawning grounds and, once again, there is no escapement estimate. The counting tower operated until August 21 and half or more of the coho salmon entering the river were probably counted. While the tower count of 23,166 coho salmon is encouraging, it may not be comparable to aerial surveys and the total run estimate of 61,476 should be viewed with caution.

### 1998 Outlook

The 1994 coho salmon return, parent year for the 1998 return, produced average commercial, subsistence, and sport harvests. Sport catches of coho salmon (all fish caught, including those released) in the 1994 sport fishery were excellent according to the department fishery survey (Dunaway and Fleischman 1995a). No escapement estimates are available for the parent year. Considering the performance of the 1994 fisheries, and the modest parental escapement index, an average coho salmon return is expected for the Kanektok River in 1998. The performance of the commercial fishery, subsistence fishery, and tower counts will be closely watched to detect any conservation problems as early as possible. Staff will be prepared to make inseason changes to fishing regulations if warranted.

The Board of Fisheries has changed the type of tackle allowed in the Kanektok River. Sport fishing throughout the Kanektok River drainage is now restricted to unbaited single-hook artificial lures the entire year. Bag and possession limits for grayling and char were reduced to 2 and 3, respectively. From June 8 through October 31, rainbow trout in the Kanektok River may not be possessed or retained (catch-and-release only). Catch-and-release regulations for Kanektok River rainbow trout are intended to enhance angling opportunities in this important fishery.

## TOGIAK RIVER

### Fishery Description

The bulk of the Togiak River coho salmon fishery occurs in the lower 20 miles of the Togiak River below the Wilderness boundary of the Togiak National Wildlife Refuge (Figure 10). The sport fishery occurs from early August to the middle of September, usually peaking between August 21 and September 7. 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 a couple of river-based lodges that cater to nonresident anglers, the largest of which is owned by the local native corporation in Togiak and leased to a concession group.

## Historical Performance

Sport harvest of coho salmon from the Togiak River has averaged 584 fish annually since 1992, or about 2% of the total coho salmon harvest (Table 18). Annual sport harvest peaked in 1986 at 2,851. Low run strength and ensuing restrictions in the sport fishery in 1990 and 1991, cancellation of a local salmon derby sponsor, and a general downturn in lodge business about 1992 and 1993 caused the lower sport harvest in the early 1990s. The 1996 run was an unexpectedly and unusually abundant return. A high degree of voluntary catch-and-release has been documented for this fishery and ranges from 40% to 60% of the catch. Concern over hook-induced mortality, given previous department studies (Vincent-Lang et al. 1993), prompted staff to evaluate the potential hook-and-release mortality. The department concluded that although the released proportion of the catch was large, the total number of fish caught is small in terms of the total run. Therefore, the potential impact of catch-and-release affects a small number of fish and has minor impact to the overall health of the stocks. In addition, these studies have demonstrated that the mortality of released coho salmon is low when catches are made above the intertidal area, as in the case of most of the Togiak River fishery.

Commercial catches have been erratic, ranging from a high of 111,829 fish in 1980 to a low of 1,284 in 1987. Average harvest since 1992 has been 34,537, accounting for 96% of the Togiak coho salmon harvest (Table 18). Over the recent 5 years, the commercial harvests have been quite erratic, but on average have increased from levels recorded for the 1987 through 1993 seasons.

Subsistence harvests are probably relatively stable, and have recently ranged from 700 to 1,200 fish per year (Table 18). Considering the excellent return documented in 1996, the low subsistence harvest seems more likely to be a reporting problem rather than an actual reduction in take.

## Management

Sport harvest and effort is estimated through the statewide mail survey and reported by Mills (1979-1994) and Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division last conducted significant monitoring and stock assessment projects in 1984 and 1989 (Minard and Lisac 1984, Dunaway 1990b). When weather and water conditions permit, the Commercial Fisheries Management and Development Division estimates annual spawning escapement of Togiak River coho salmon by conducting aerial escapement index counts (Regnart et al. 1997).

The bag and possession limit for coho salmon on the Togiak River is 5 per day with no size limit. The limit was adjusted three times in recent years in response to conservation concerns. In 1987, when it appeared the escapement goal for coho salmon would not be achieved, the fishery was restricted to catch-and-release. In 1990 and 1991, the bag limit was dropped to 1 per day and in possession. In 1995 the department again reduced the bag limit to 2 coho salmon per day based on a poor parental year return, very low commercial catches and low aerial survey counts in the river. For years when parental escapements have been adequate, such as 1996, the current bag limit of 5 has been satisfactory, but in poor years the department has responded with emergency order authority to reduce overall harvest.

**Table 18.-Coho salmon commercial, subsistence, and sport harvest plus escapement for the Togiak River, 1977-1997.**

| Year | Harvest | | | | Escapement[b] | Total Run |
|---|---|---|---|---|---|---|
| | Commercial[a] | Subsistence | (SWHS Creel) Sport | Total | | |
| 1977 | 33,824 | 1,100 | 114 | 35,038 | | |
| 1978 | 36,959 | 500 | 214 | 37,673 | | |
| 1979 | 80,073 | 700 | 300 | 81,073 | | |
| 1980 | 111,829 | 1,200 | 258 | 113,287 | 65,130 | 178,417 |
| 1981 | 19,504 | 2,200 | 119 | 21,823 | 43,500 | 65,323 |
| 1982 | 107,927 | 1,300 | 524 | 109,751 | 69,900 | 179,651 |
| 1983 | 4,977 | 800 | 294 | 6,071 | NS[c] | |
| 1984 | 111,631 | 3,800 | 1,154 | 116,585 | 60,840 | 177,425 |
| 1985 | 35,765 | 1,500 | 0 [c] | 37,265 | 33,210 | 70,475 |
| 1986 | 28,030 | 500 | 2,851 | 31,381 | 21,400 | 52,781 |
| 1987 | 1,284 | 1,393 | 183 [c] | 2,860 | 60,000 | 62,860 |
| 1988 | 8,744 | 673 | 1,238 [c] | 10,655 | 65,000 | 75,655 |
| 1989 | 35,814 | 976 | 416 | 37,206 | NS[c] | |
| 1990 | 2,296 | 1,111 | 367 | 3,774 | 21,390 | 25,164 |
| 1991 | 4,262 | 1,238 | 500 | 6,000 | 25,560 | 31,560 |
| 1992 | 3,918 | 1,231 | 251 | 5,400 | 80,100 | 85,500 |
| 1993 | 12,613 | 743 | 330 | 13,686 | NS[d] | |
| 1994 | 88,522 | 910 | 531 | 89,963 | NS[d] | |
| 1995 | 8,910 | 703 | 408 | 10,021 | NS[d] | |
| 1996 | 58,722 | 107 | 1,400 | 60,229 | 64,980 | 125,209 |
| All Years Avg. | 39,780 | 1,134 | 573 | 41,487 | 50,918 | 92,405 |
| Percent | 96% | 3% | 1% | | | |
| 1992 - 1996 Avg | 34,537 | 739 | 584 | 35,860 | 72,540 | 108,400 |
| Percent | 96% | 2% | 2% | | | |
| 1997[e] | 2,782 | 700 | 600 | 4,082 | 20,625 | 24,707 |
| Percent | 68% | 17% | 15% | | | |

[a] Commercial harvests are from Togiak Section of Togiak District.

[b] Escapement estimates are based on fixed-wing aerial surveys, and are expanded to account for missed fish, except 1987 and 1988 which are based on sonar estimates. The escapement goal is 50,000.

[c] Unpublished estimate from SWHS based on less than 12 responses.

[d] NS = no survey or incomplete survey; no total run estimate possible.

[e] 1997 harvest estimates are preliminary; subsistence and sport harvest estimates are 1992-1996 average.

### Management Objectives

The escapement goal for the Togiak River drainage is 50,000 coho salmon as estimated by expanding aerial survey counts for missed fish. This fishery has been successfully managed to achieve the escapement goal in 7 of the 13 years for which estimates are available.

### 1997 Season

The 1997 Togiak coho salmon return was expected to be average or slightly below average based upon parental year (1993) fishery performance. Throughout Bristol Bay and western Alaska, there were early indications that the coho salmon return was slightly later than usual and below average strength. The commercial fishery was restricted to four 24-hour openings, one per week, from August 1 to August 26 when the season was closed. Inseason aerial surveys of the Togiak River indicated the coho salmon run was weak but coming in small pulses. The pulsed escapements resulted in mixed reports of catch rates and low harvests from the sport fishery. Overall, the available indicators obscured just how low the total run was likely to be until late in the season. By late August, when it was clear the run had peaked at a low level, the Division of Sport Fish concluded that imposing restrictions on the sport fishery at that time would be of little biological consequence and no action was taken.

The commercial fishery harvested only 2,782 coho salmon, the lowest recorded since 1990. Subsistence harvests were probably below normal but until data are available, will be assumed to be similar to the 1992 to 1996 average of 700 fish (Table 18). As with the subsistence harvest, the sport harvest of coho salmon is assumed to be similar to the recent 5-year average of about 600 fish. Overall, no more than 4,082 coho salmon were harvested from the Togiak River in 1997 and the total run was estimated to be about 24,707 fish (Table 18).

Fortunately, and for the second time in five seasons, weather and water conditions permitted aerial surveys of the Togiak River system. Expanded aerial counts resulted in an estimated spawning escapement of 20,625 coho salmon (Table 18).

### 1998 Outlook

The 1994 coho salmon escapement into the Togiak River, parent year for the 1998 return, was not estimated. The 1994 commercial harvest of 88,522 fish was the highest recorded since 1984. Subsistence and sport harvests however, were below average. Based on parent-year escapement and fishery performance, the 1998 return of coho salmon to the Togiak River may be average or slightly above. If the return materializes as anticipated, the sport fishery will proceed under the published regulations with no further restrictions necessary in the sport fishery. If the run is found to be weak, and inseason restrictions to the sport fishery become necessary, management will strive to maintain some angling opportunity without harming the biological integrity of the run. We intend to closely watch the commercial fishery and other indicators to ensure adequate escapement is achieved. Anglers are encouraged to call 907-842-REGS before making a trip.

## NORTHWESTERN COHO SALMON FISHERIES

The Kuskokwim River and its tributaries sustain one of the largest coho salmon returns in Alaska, usually producing a combined commercial and subsistence harvest of 200,000 to over 600,000 fish annually. This run passes through the Northwestern section of the SWMA. Present exploitation by sport anglers is light but increasing. Prior to 1992, annual sport harvests from the Northwestern section contributed 6% to 13% of the SWMA's total sport harvest and since 1992 has ranged from 15% to 21%. From 1985 to 1995, the annual Kuskokwim River coho salmon

harvest by all fisheries averaged 645,697 fish. The sport harvest represents less than 1% of that harvest. More recently, the sport harvest in this section averaged 1,687 fish annually from 1992 through 1996 (Table 14). The few services catering to recreational anglers and the difficulty of access hinders sport fisheries for all species in this section.

### 1997 Season

The 1997 coho salmon run in the Kuskokwim River was well below average. The commercial fishery was restricted to four 6-hour openings in the lower river and two openings in the upper, W-2, district. Total commercial harvest was 130,631 coho salmon, one of the lowest on record. During the month of August, Sport Fish staff participated in several of the Kuskokwim Working Group meetings to stay abreast of the coho run assessment work and the Group's commercial fishery recommendations. Restrictions were not issued for the sport fishery because the harvest is so small, the fishery is very widely dispersed, and restrictions would have provided no discernible biological gain.

### 1998 Outlook

There is no formal forecast for Kuskokwim coho salmon. However, in 1994, the parent year for coho salmon returning in 1998, the commercial harvest set a record high of 724,084 fish. In addition, all sources of information indicated the spawning escapement of coho salmon within the drainage was good. The 25,000 fish escapement goal at the Kogrukluk weir was exceeded by nearly 10,000 coho salmon. If the offspring of the 1994 run survived at average or better levels, the 1998 return could be average to excellent. It should be noted, however, coho salmon often exhibit very erratic rates of return. The limited data available render this commentary to no more than educated speculation. Management of all fisheries will be based on inseason indications of run strength. New gear restrictions apply to all or portions of the Kisaralik, Kasigluk, and Kwethluk rivers; please check the 1998 regulation book for details.

# SECTION V: SOCKEYE SALMON FISHERIES

Sockeye salmon is the most numerous of the Pacific salmon species to spawn in Bristol Bay, 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. Traditionally, sockeye salmon have not enjoyed the popularity anglers have granted to other species due in large part to their indifference to most fishing lures. Since the late 1960s however, anglers have discovered innovative ways to legally catch sockeye salmon with customary sport gear, and the species has gained favor as a delectable and hard fighting game fish. Popular fisheries exist in the Naknek and Kvichak drainages (Figure 12).

Harvests of sockeye salmon in the SWMA were stable at 3,000 to 4,000 fish from 1977 through 1981; then increased from 6,000 to 10,000 fish starting from 1982 to 1988 (Table 19, Figure 13). After 1988, the sport harvest of sockeye salmon increased substantially in number and variability with a peak estimate of nearly 33,000 fish taken in 1989 and subsequently dropping to about 16,000 fish in 1990, 1992, and 1996. From 1992 through 1996 the sport harvest averaged 19,523 sockeye salmon per year (Table 19). The most active sport fisheries occur in the Eastern section of the management area where about 17,000 fish or 87% of the annual harvest is taken. The Central section fishery harvests about 2,000 sockeye per year and harvests in the Western and Northwestern sections provide annual harvests of about 400 and 200 fish, respectively (Table 19). Even with the elevated harvests of recent years, the sport harvest is a minute 0.04% of the millions of sockeye salmon returning to spawn in the area. Roughly 60% of the annual Bristol Bay sockeye total return has been taken in the commercial fishery since 1980, and 168,000 fish, or less than 1% of the run, have been harvested by subsistence fishermen.

Sockeye salmon share the same bag and possession limit with all salmon except chinook: 5 salmon per day, no size limit. This regionwide limit has been in effect since 1972. The department's ability to manage for sustained yield is essentially unaffected by the recreational harvest of sockeye salmon. No adjustments have been made to the bag and possession limits in the past and none were made in 1997. Sockeye salmon are expected to play an increasingly important role in the development and expansion of the recreational fishery in Southwest Alaska.

## BROOKS RIVER

### Fishery Description

Brooks River, which drains Brooks Lake into Naknek Lake, is a 2-mile long stretch of water located within the boundaries of the Katmai National Park and Preserve (Figure 12). Brooks Camp, located on Naknek Lake, was established in 1960 by Northern Consolidated Airlines as primarily a sport fishing facility, but in recent years 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. Beside guest cabins, a campground facility is available for overnight visitors. At the lower end of Brooks River is a foot bridge which 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 recreational fishery occupies waters also used by brown bears fishing for salmon. This overlap has caused management problems and conflicts for the Department of Fish and Game and the National Park Service (NPS). At issue is the safety of

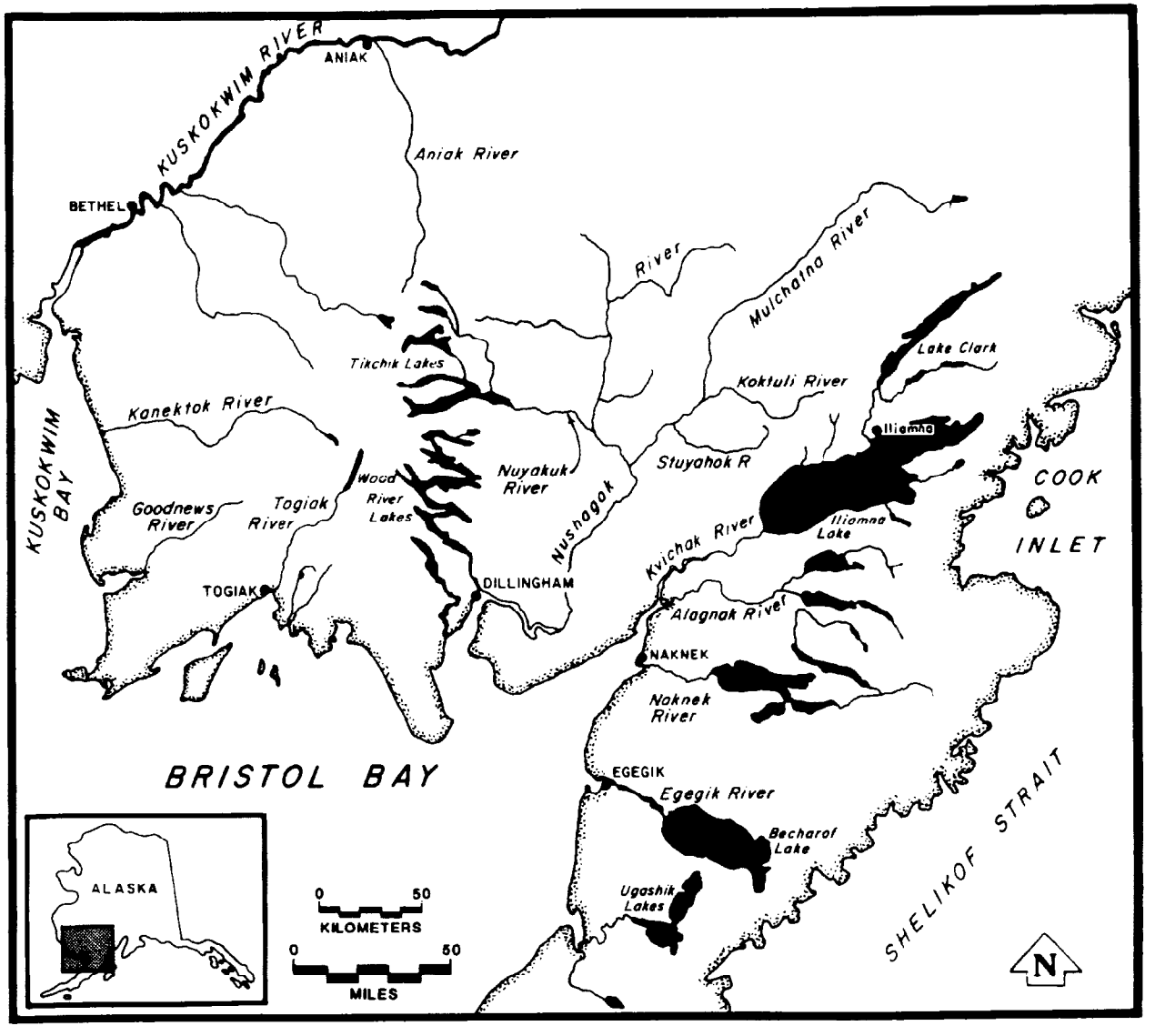


**Figure 12.-Popular sockeye salmon sport fisheries in Southwest Alaska.**

**Table 19.-Sport harvest of sockeye salmon from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 213 | 127 | 189 | 379 | 11 | 126 | 55 | 100 | 12 [a] | 0 [a] | 370 |
| Egegik/Becharof | 144 | 56 | 31 | 34 | 0 | 42 | 137 | 37 [a] | 25 [a] | 92 [a] | 173 [a] |
| Naknek R. | 78 | 345 | 236 | 542 | 184 | 534 | 644 | 436 | 1,157 | 107 | 69 |
| Naknek L. | 165 | 42 | 299 | 112 | 140 | 73 | 137 | 37 | 50 [a] | 0 [a] | 173 |
| Bay of Islands | | | | | | | 0 | 75 | 0 | 15 [a] | 23 |
| Brooks R. | 135 | 113 | 79 | 121 | 43 | 157 | 284 [b] | 449 | 299 | 566 | 1,097 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 50 [a] | 15 [a] | 23 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 583 | 380 | 283 | 654 | 400 | 639 | 603 | 898 | 1,827 | 102 | 1,805 |
| Copper R. | 62 | 183 | 252 | 122 | 281 | 1,038 | 1,206 | 75 [a] | 127 [a] | 0 [a] | 82 [a] |
| Alagnak R. | | | | | 11 | 0 | 21 | 100 | 127 | 544 | 54 |
| Newhalen R. | 805 | 1,479 | 1,163 | 715 | 1,490 | 1,786 | 1,671 | 2,581 | 2,623 | 238 | 4,185 |
| L Talarik Cr. | 58 | 0 | 47 | 0 | 22 | 0 | 0 | 187 [a] | 53 | 0 [a] | 0 [a] |
| Lake Clark | 420 | 648 | 1,022 | 155 | 292 | 220 | 603 | 449 | 106 | 0 | 110 |
| Lake Iliamna | | | | | | | 41 [a] | 474 [a] | 382 [a] | 272 | 602 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | 8 | 113 | | | 22 | | 247 | 74 | 612 | 0 | 421 |
| Subtotal | 2,671 | 3,486 | 3,601 | 2,834 | 2,896 | 4,615 | 5,649 | 5,972 | 7,450 | 1,951 | 9,187 |

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**Table 19.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 340 [a] | 884 | 20 | 77 | 8 | 174 | 263 | 96 | 726 | 253 |
| Egegik/Becharof | 0 [a] | 1,040 | 183 | 96 | 485 | 149 | 90 | 556 | 33 | 263 |
| Naknek R. | 1,082 | 598 | 835 | 979 | 641 | 946 | 575 | 925 | 762 | 770 |
| Naknek L. | 62 [a] | 286 | 10 | 163 | 90 | 106 | 142 | 66 | 24 | 86 |
| Bay of Islands | 31 [a] | 364 | 0 | 106 | 41 | 0 | 44 | 89 | 0 | 35 |
| Brooks R. | 557 | 702 | 1,181 | 624 | 904 | 586 | 331 | 567 | 609 | 599 |
| Brooks L. | | | 753 | 134 | 123 | 101 | 19 | 56 | 60 | 72 |
| American Cr. | 0 [a] | 26 | 51 | 0 [a] | 0 | 0 | 0 | 11 | 71 | 16 |
| King Salmon R. | | | | | 0 | 0 | 9 | 0 [a] | 24 [a] | 7 |
| Kvichak R. | 526 | 4,769 | 2,988 | 1,249 | 1,964 | 2,923 | 4,001 | 3,811 | 2,139 | 2,968 |
| Copper R. | 93 [a] | 378 | 246 | 707 | 148 | 818 | 844 | 391 | 426 | 525 |
| Alagnak R. | 124 [a] | 479 | 562 | 502 | 608 | 3,179 | 725 | 1,496 | 1,375 | 1,477 |
| Newhalen R. | 2,414 | 14,508 | 6,093 | 9,523 | 6,509 | 9,889 | 7,973 | 7,859 | 4,795 | 7,405 |
| L Talarik Cr. | 186 [a] | 151 [a] | 0 | 82 | 329 | 78 | 38 | 125 | 96 | 133 |
| Lake Clark | 0 [a] | 252 | 246 | 143 | 510 | 297 | 782 | 800 | 91 | 496 |
| Lake Iliamna | 619 | 1,741 | 474 | 788 | 1,011 | 1,431 | 849 | 1,469 | 418 | 1,036 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 197 | 58 | 275 | 0 [a] | 0 [a] | 106 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 589 | 1,404 | 167 | 301 | 536 | 836 | 1,051 | 680 | 631 | 747 |
| Subtotal | 6,623 | 27,582 | 13,809 | 15,474 | 14,104 | 21,571 | 18,011 | 18,997 | 12,280 | 16,993 |

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**Table 19.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 94 | 310 | 204 | 60 | 140 | 796 | 1,123 | 236 | 260 | 88 | 274 |
| Mulchatna | 280 | 56 | 79 | 17 | 0 | 199 | 397 | 536 | 14 | 1,548 | 301 |
| Wood River L. | 129 | 211 | 110 | 112 | 270 | 461 | 466 | 100 | 506 | 876 | 109 |
| Tikchik/Nuyakuk | 16 | 99 | 16 | 34 | 65 | 105 | 123 | 25 | 0 | 58 [a] | 27 [a] |
| Koktuli | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 68 | 124 | 0 | 204 | 246 |
| Subtotal | 519 | 676 | 409 | 223 | 475 | 1,561 | 2,177 | 1,021 | 780 | 2,774 | 957 |
| Western | | | | | | | | | | | |
| Togiak | 14 | 183 | 393 | 69 | 108 | 241 | 69 | 75 | 116 [a] | 0 | 27 [a] |
| Goodnews | | | | | | | 14 | 156 [a] | 75 | 24 [a] | 49 [a] |
| Kanektok | | | | | | | 0 | 143 | 12 | 200 | 153 |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 14 | 183 | 393 | 69 | 108 | 241 | 83 | 374 | 203 | 224 | 229 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 28 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 0 | 0 | 12 | 98 | 42 |
| Subtotal | | | | | | | 0 | 0 | 12 | 98 | 70 |
| Eastern | 2,671 | 3,486 | 3,601 | 2,834 | 2,896 | 4,615 | 5,649 | 5,972 | 7,450 | 1,951 | 9,187 |
| Central | 519 | 676 | 409 | 223 | 475 | 1,561 | 2,177 | 1,021 | 780 | 2,774 | 957 |
| Western | 14 | 183 | 393 | 69 | 108 | 241 | 83 | 374 | 203 | 224 | 229 |
| Northwestern | | | | | | | 0 | 0 | 12 | 98 | 70 |
| Total | 3,204 | 4,345 | 4,403 | 3,126 | 3,479 | 6,417 | 7,909 | 7,367 | 8,445 | 5,047 | 10,443 |

-continued-

**Table 19.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 279 | 338 | 184 | 480 | 608 | 521 | 432 | 153 | 933 | 529 |
| Mulchatna | 433 | 390 | 532 | 280 | 288 | 568 | 219 | 153 | 444 | 334 |
| Wood River L. | 93 | 2,105 | 522 | 840 | 526 | 505 | 813 | 539 | 874 | 651 |
| Tikchik/Nuyakuk | 31 | 598 | 20 | 150 | 58 | 557 | 54 | 32 | 62 | 153 |
| Koktuli R. | | | | | 156 | 95 | 96 | 32 [a] | 199 | 116 |
| Other | 31 | 1,141 | 346 | 120 | 0 | 391 | 63 | 45 | 153 | 130 |
| Subtotal | 867 | 4,572 | 1,604 | 1,870 | 1,636 | 2,637 | 1,677 | 954 | 2,665 | 1,914 |
| Western | | | | | | | | | | |
| Togiak | 62 [a] | 416 | 10 | 80 | 16 | 61 | 26 | 22 | 480 | 121 |
| Goodnews | 164 [a] | 146 | 62 [a] | 63 | 8 | 53 | 70 | 34 | 87 | 50 |
| Kanektok | 109 | 101 | 462 | 88 | 66 | 331 | 313 | 148 | 335 | 239 |
| Other | 182 | 112 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 517 | 775 | 534 | 231 | 90 | 445 | 409 | 204 | 902 | 410 |
| Northwestern | | | | | | | | | | |
| Aniak | 164 [a] | 22 | 49 | 38 | 25 | 17 | 17 | 43 | 66 | 34 |
| Kisaralik | | | | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | | | | 0 | 19 | 0 [a] | 0 [a] | 0 [a] | 4 |
| Other | 0 | 11 | 0 | 0 | 57 | 200 | 299 | 52 | 240 | 170 |
| Subtotal | 164 | 33 | 49 | 38 | 82 | 236 | 316 | 95 | 306 | 207 |
| Eastern | 6,623 | 27,582 | 13,809 | 15,474 | 14,104 | 21,571 | 18,011 | 18,997 | 12,280 | 16,993 |
| Central | 867 | 4,572 | 1,604 | 1,870 | 1,636 | 2,637 | 1,677 | 954 | 2,665 | 1,914 |
| Western | 517 | 775 | 534 | 231 | 90 | 445 | 409 | 204 | 902 | 410 |
| Northwestern | 164 | 33 | 49 | 38 | 82 | 236 | 316 | 95 | 306 | 207 |
| Total | 8,171 | 32,962 | 15,996 | 17,613 | 15,912 | 24,889 | 20,413 | 20,250 | 16,153 | 19,523 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the statewide harvest survey. 1996 data are preliminary.

[a] Unpublished estimates from statewide harvest survey for sites with less than 12 responses.

[b] Estimates from onsite creel survey.

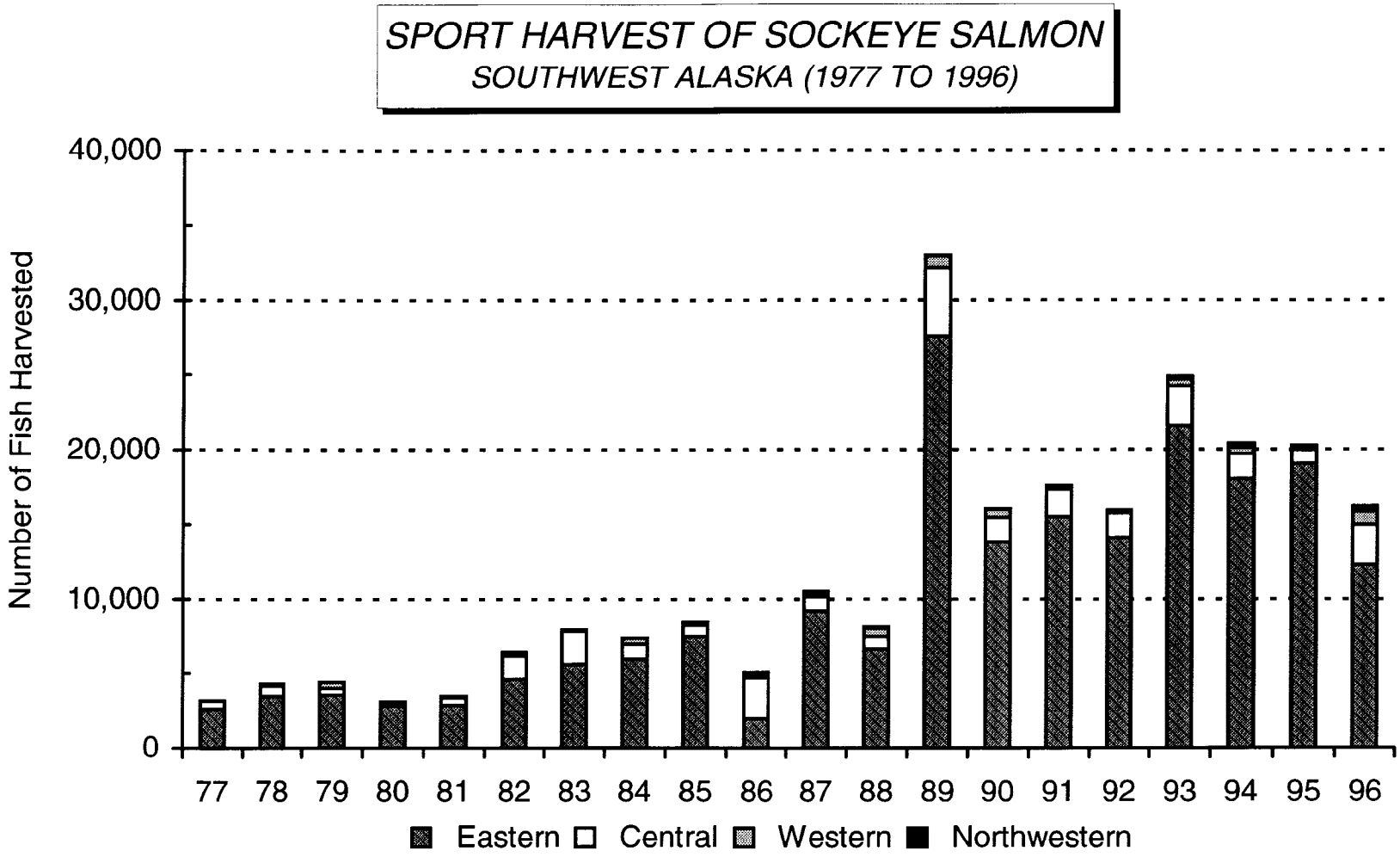


**Figure 13.-Sport harvest of sockeye salmon from the Eastern, Central, Western, and Northwestern sections of the Southwest Alaska sport fish management area, 1977 to 1996.**

visitors and the priority that the different groups (bear viewers, sport fishermen, hikers) should have. According to the Final Development Concept Plan Environmental Impact Statement for the Brooks River Area (NPS 1996), the Service's proposed action is to significantly curtail or restrict sport fishing opportunity on the Brooks River, particularly the sockeye salmon fishery downstream from the bridge.

## Historical Performance

The abundance of sockeye salmon at Brooks River is a function of the escapement into the Naknek River. The Naknek drainage escapement goal is 1.0 million sockeye salmon. The magnitude of the escapement dwarfs the historical harvest by the sport fishery so that variations in inriver abundance have little effect on fishery performance at Brooks River. Harvests of sport-caught sockeye salmon at Brooks River have ranged from a low of 43 in 1981 to a high of 1,181 in 1990 (Table 19). The recent 5-year (1992-1996) average annual harvest of 599 fish can be easily sustained by this run.

## Management

Sport harvest and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and by Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division has not conducted any significant monitoring or stock assessment projects for this fishery in recent seasons. Forecasts of next season's return are provided by the Commercial Fisheries Management and Development Division and are reported in a statewide salmon forecast summary (Hart et al. 1998). Escapement of sockeye salmon in the Brooks River is estimated from fixed-wing aerial surveys during the presumed peak of spawning. Survey results were most recently reported in Regnart et al. (1997)

The memorandum of agreement between the Department of Fish and Game and the National Park Service clearly places management authority for fishery resources of Brooks River with the Department of Fish and Game, and management of use levels and habitat protection with the National Park Service. This management structure has lead to a complicated history of regulation regarding the sport fishery. Current regulations for Brooks River allow the keeping of 1 fish per day and in possession except rainbow trout which are managed for catch-and-release fishing. Anglers are restricted to single-hook artificial lures below the foot bridge and unbaited single-hook artificial flies above the bridge. The current regulations are the result of a total revamping of the regulations in 1990 as part of the development of a rainbow trout management plan for the area. Over the years, significant concessions of sport fishing opportunity 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 fly-fishing-only above the bridge.

The Park Service has adopted regulations requiring anglers to immediately place a harvested fish in a plastic bag and proceed to the cleaning house with the fish for cleaning and storage. The objective is to avoid conditioning bears to link fish harvested by sport fishermen with an easy meal. Since the early 1990s the NPS has been inconsistent in their enforcement of their fish handling regulations, and bears have occasionally stolen fish that were illegally kept along the

river. On occasion, public and angling access in the immediate vicinity of Brooks River has been temporarily restricted by the Service. Such restrictions have typically occurred in mid July at the peak of the sockeye run, were imposed after some incident, and terminated within a period of 2 to 3 weeks. The degree of coordination concerning these restrictions with the department of Fish and Game and NPS has been variable.

The general erosion of angling opportunities as well as difficulties coordinating emergency management actions emphasize the need for a long-range management plan for the sockeye salmon sport fishery. Angling opportunity for Brooks River sockeye salmon will continue to be eroded and replaced with other activities unless the National Park Service and the Department of Fish and Game can develop a plan that will be supported by both agencies.

### Management Objectives

Naknek River sockeye salmon stocks are managed to achieve a biological escapement of 1 million. The Brooks River is managed to provide an average of 5,000 angler-days per year and a diversity of angling opportunity by providing a special management area restricted to unbaited single-hook artificial flies.

### 1997 Season

Escapement of sockeye salmon into the Naknek drainage totaled 1,025,664, successfully achieving the goal of 1 million fish. The large escapement into the Naknek River system provided an abundance of sockeye in Brooks River.

On July 14 NPS staff notified the Dillingham Sport Fish staff of an emergency closure of the Brooks River below the falls. Except for the viewing platforms, all public access to the lower river area was prohibited. Events leading to the 1997 closure were similar to those of previous seasons: bears stealing illegally stored fish. However, 1997 presented several new situations as well. On two occasions bears took an angler's fish before the fish could be landed. An exceptional number of bears were congregated at Brooks River because low water delayed salmon entering the smaller tributaries. The unusual concentration created stress among the bears and may have induced a grown bear to kill a cub. A short time later a different bear killed another grown bear. One fish stealing and the killings all occurred along the river within a 1-hour period. These events, in addition to three minor incidents over the preceding weeks, convinced the park superintendent to announce the closure. The restrictions were lifted July 31. While coordination prior to the closure could have been better, the department and NPS maintained good communications afterwards.

Such restrictions have been less frequent since 1994. At that time, after a similar restriction, the Park Service strengthened the visitors orientation lecture, assigned additional staff to monitor bears and angler compliance on problem areas of the river, and improved contact with ADF&G Sport Fish staff. Frequent rotation of park staff seems to hinder the agency's ability to maintain close communications with the department over the long term.

When the fishery was accessible, angling success was reported to have been good to excellent for sockeye salmon.

### 1998 Outlook

The inshore run forecast for the 1998 sockeye salmon return to the Naknek River is 3.4 million fish (Table 20) meeting the 1.1 million escapement goal will leave 2.3 million salmon to be

**Table 20.-1998 Bristol Bay sockeye salmon forecast.**

| District/ River | Number of Sockeye Salmon Bristol Bay Inshore Run | | |
|---|---|---|---|
| | Total Return | Spawning Goal | Potential Inriver Harvest |
| NAKNEK-KVICHAK | | | |
| Kvichak | 8,880,000 | 4,500,000 | 4,380,000 |
| Branch | 350,000 | 185,000 | 165,000 |
| Naknek | 3,407,000 | 1,100,000 | 2,307,000 |
| Total | 12,637,000 | 5,785,000 | 6,852,000 |
| EGEGIK | 8,620,000 | 1,100,000 | 7,520,000 |
| UGASHIK | 3,235,000 | 850,000 | 2,385,000 |
| CENTRAL | | | |
| Wood | 3,056,000 | 1,000,000 | 2,056,000 |
| Igushik | 1,055,000 | 200,000 | 855,000 |
| Nushagak/ Mulchatna | 1,175,000 | 550,000 | 625,000 |
| Total | 5,286,000 | 1,750,000 | 3,536,000 |
| TOGIAK | 466,000 | 150,000 | 316,000 |
| TOTAL BRISTOL BAY | 30,244,000 | 9,635,000 | 20,609,000 |

From: Hart et al. 1998.

harvested. Given the expected level of escapement into the Naknek drainage, there should be an abundance of sockeye salmon at Brooks River this season. Good to excellent sport fishing opportunity is expected from late June through July 20.

The Alaska Board of Fisheries recently changed some of the regulations affecting the Brooks River sport fishery. The Brooks River above the foot bridge is now closed to the harvesting of any fish species. All fish caught above the bridge must be released immediately. Sport fishermen may continue to harvest sockeye salmon below the footbridge. Park Service and ADF&G staff will continue to monitor human use and will work together should it become necessary to take actions for the safety of visitors/anglers. Anglers are advised to check with

Katmai National Park staff in King Salmon (907-246-3305) regarding inseason restrictions to public access of the Brooks River.

## KVICHAK RIVER

The Kvichak River drainage hosts the single largest sockeye salmon run in the world and the river itself is a popular destination for anglers targeting this species (Figure 12). Two locations within the drainage support significant sport fisheries for sockeye salmon. First to occur is the fishery on the Kvichak River at the outlet of Lake Iliamna. The other, often larger fishery which occurs on the Newhalen River near the community of Iliamna, is discussed further in this report. Other smaller tributaries within the drainage are fished much less intensively and sport harvests are relatively minor.

### Fishery Description

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.

Anglers prefer to fish this medium-sized river's clear waters during the first half of the run when the salmon are more readily taken on sport gear. A modern airstrip in the village of Igiugig provides easy access to the river where it drains out of Lake Iliamna, and float planes can land on the lake or on the river. Although much of the sport effort is from nonresident guided anglers, a growing component is the resident unguided angler arriving from Anchorage in private or charter aircraft.

Since most of the uplands along the upper Kvichak River are owned by the Igiugig Native Corporation, anglers may expect to pay modest daily fees for access and commercial operators are expected to pay more substantial fees for annual leases.

### Historical Performance

The Bristol Bay commercial salmon fleet harvests roughly 50% of the annual Kvichak River sockeye salmon run, and the subsistence fishery takes an average of nearly 76,000 fish annually, or less than 0.5% of the total run. Kvichak River sockeye salmon sport harvests ranged between 300 and 600 fish per year until 1984 when nearly 900 fish were taken (Table 19).

After 1984, estimates of the sport harvest were widely erratic, ranging from 102 sockeye salmon in 1986 to nearly 4,800 in 1989. From 1992 through 1996, the annual sport harvest averaged 2,968 sockeye salmon (Table 21). Even the highest estimates of sport harvest amounted to about 2% (1989) of the total Kvichak River sockeye salmon harvest, even less of the total return, and did not jeopardize the department's ability to manage for sustained yield.

In 1995 the department conducted a benchmark survey of the sockeye salmon sport fishery near Igiugig (Dunaway and Fleischman 1996b). Harvest was found to be an important aspect of this fishery with nearly 60% of the angler-trips harvesting the daily limit of 5 sockeye salmon. Virtually all anglers fished from the shore, fly tackle was used in 97% of the trips, 66% of the anglers were guided, and 81% were nonresidents (Dunaway and Fleischman 1996b). The onsite effort estimate was very similar to effort levels estimated by the annual statewide harvest survey.

### Management

Sport harvest and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and by Howe et al. (1995-1997). Commercial and subsistence harvests are

**Table 21.-Historic sockeye salmon harvests and escapements for the Kvichak River, 1974 to 1997.**

| Year | Commercial[a] Harvest | Subsistence[b] Harvest | Sport Harvest: Kvichak River[c] | Sport Harvest: All Other Tributaries[d] | Sport Harvest: Total | Total Harvest[e] | Escapement[f] |
|---|---|---|---|---|---|---|---|
| 1974 | 148,595 | 98,015 | | | | 246,610 | 4,433,844 |
| 1975 | 1,605,407 | 115,516 | | | | 1,720,923 | 13,140,450 |
| 1976 | 1,458,180 | 75,936 | | | | 1,534,116 | 1,965,282 |
| 1977 | 739,464 | 71,940 | 583 | 1,353 | 1,936 | 813,340 | 1,341,144 |
| 1978 | 3,815,636 | 83,859 | 380 | 2,423 | 2,803 | 3,902,298 | 4,149,288 |
| 1979 | 13,418,829 | 65,520 | 283 | 2,484 | 2,767 | 13,487,116 | 11,218,434 |
| 1980 | 12,743,074 | 72,556 | 754 | 892 | 1,646 | 12,817,276 | 22,505,268 |
| 1981 | 5,234,733 | 75,554 | 400 | 2,107 | 2,507 | 5,312,794 | 1,754,358 |
| 1982 | 1,858,475 | 61,375 | 639 | 3,044 | 3,683 | 1,923,533 | 1,134,840 |
| 1983 | 16,534,901 | 96,580 | 603 | 3,768 | 4,371 | 16,635,852 | 3,569,982 |
| 1984 | 12,523,803 | 100,514 | 898 | 3,840 | 4,738 | 12,629,055 | 10,490,670 |
| 1985 | 6,183,103 | 86,426 | 1,827 | 3,603 | 5,430 | 6,274,959 | 7,211,046 |
| 1986 | 787,303 | 59,423 | 102 | 510 | 612 | 847,338 | 1,179,322 |
| 1987 | 3,526,824 | 72,630 | 1,805 | 5,400 | 7,205 | 3,606,659 | 6,065,880 |
| 1988 | 2,654,364 | 75,223 | 526 | 3,901 | 4,427 | 2,734,014 | 4,065,216 |
| 1989 | 11,456,509 | 72,050 | 4,769 | 18,434 | 23,203 | 11,551,762 | 8,317,500 |
| 1990 | 10,468,631 | 76,600 | 2,988 | 7,226 | 10,214 | 10,555,445 | 6,970,020 |
| 1991[g] | 3,837,923 | 66,786 | 1,249 | 11,544 | 12,793 | 3,917,502 | 4,222,788 |
| 1992[g] | 5,678,494 | 72,148 | 1,964 | 9,240 | 11,204 | 5,761,846 | 4,725,864 |
| 1993[g] | 5,239,770 | 74,123 | 2,923 | 13,407 | 16,330 | 5,330,223 | 4,025,166 |
| 1994[g] | 13,840,448 | 64,343 | 4,001 | 11,812 | 15,813 | 13,920,604 | 8,337,840 |
| 1995[g] | 17,509,862 | 54,679 | 3,811 | 11,324 | 15,135 | 17,579,676 | 10,038,720 |
| 1996[h] | 8,187,720 | 54,872 | 2,139 | 5,826 | 7,965 | 8,250,557 | 1,450,578 |
| 1974 -96 Avg. | 6,932,698 | 75,942 | 1,632 | 6,107 | 7,739 | 7,016,379 | 6,187,543 |
| % of harvest | 0.99 | 0.01 | | | <0.01 | | |
| 1992 -96 Avg. | 10,091,259 | 64,033 | 2,968 | 10,322 | 13,289 | 10,168,581 | 6,270,076 |
| % of harvest | 0.99 | 0.01 | | | <0.01 | | |
| 1997[h] | 329,000 | 64,000 | 2,000 | 5,000 | 7,000 | 400,000 | 1,503,732 |

[a] Estimated Kvichak River fish only - captured in Naknek/Kvichak District commercial fishery.

[b] 1975-1988 based upon permits issued to Kvichak watershed communities. 1989-1997 based upon Kvichak watershed fishing sites indicated on permits. (Jeff Regnart, ADF&G, CFMD, King Salmon, personal communication). Significant portions of the subsistence harvests were taken above the counting tower, and total run cannot be calculated at this time.

[c] Kvichak River sport harvest only; estimated by Mills 1977-1994, Howe et al. 1995-1997.

[d] Estimated sport harvest from other tributaries of the Kvichak River excluding the Alagnak River (Mills 1979-1994, Howe et al. 1995-1997).

[e] Total harvest = sum of commercial, subsistence and total sport harvest columns.

[f] Tower counts conducted at Igiugig. (ADF&G 1997a).

[g] Preliminary commercial and subsistence estimates.

[h] Preliminary estimates (Jeff Regnart, ADF&G, CFMD, King Salmon, personal communication). Sport and subsistence estimates are recent 5-year average harvest.

monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division conducted a survey on this fishery in 1995 (Dunaway and Fleischman 1996a). Escapement is estimated by counts made from towers as the salmon migrate up the Kvichak River. Forecasts of each season's return are provided by the Commercial Fisheries Management and Development Division and are reported in a statewide salmon forecast summary (Hart et al. 1998).

Kvichak River sockeye salmon stocks are managed to achieve a biological escapement goal (BEG) of between 4 and 10 million fish, depending on the cycle year. For high-cycle years the point goal is set between 7 and 10 million. During off-cycle years the point goal is set between 4 and 6 million. The specific point goal is established preseason and published.

The large number of available salmon, crowding in the nearby Newhalen River fishery, and improved facilities in Igiugig are all contributing to the growth of this fishery. Increased effort in recent years has raised the potential for conflicts between the long-existing subsistence net fishery at the village of Igiugig and sport anglers. A challenge to management of this fishery will be to provide for increased opportunity while ensuring that gear and user conflicts are addressed.

The sport fishery is actively managed to provide increased participation and opportunity. Presently, an average of nearly 5,000 angler-days per year are expended by anglers seeking rainbow trout and sockeye salmon (Table 5). The level of participation could double in 4 years by improving access to desirable fishing sites, promoting the fishery as a destination, and working to assure necessary facilities are provided to accommodate the growth in a responsible manner. To this end the department has worked closely with the Igiugig City Council on a project that would entail building trails to desirable fishing locations close to the village airfield. Initiated in 1994 and expected to be complete by 1995, the project has been slowed by problems with easements and liability concerns. The project remains incomplete in 1997.

### Management Objectives

The Kvichak River sockeye salmon stocks are managed to achieve a biological escapement goal (BEG) of 4 to 10 million depending on the cycle year. In 1997, the BEG was 4 million fish and the total run was expected to be 6.9 million sockeye.

### 1997 Season

Escapement into the Kvichak River totaled 1.5 million sockeye salmon in 1997, nearly 63% below the goal, and the total run was estimated to be about 1.8 million fish. The extremely low return resulted in extensive restrictions in the commercial fisheries.

Publicity on the poor return resulted in significantly reduced sport effort at Igiugig and other fisheries in the drainage. However, no restrictions were issued for the sport fishery. The rationale for no action was that subsistence needs were being met, sport effort was low, and the sport harvest of less than 1% of the total harvest or return is insignificant to the management and overall sustainability of the run. No monitoring program was in place and the 1997 figures for sport and subsistence harvest in Table 21 are the recent 5-year averages as estimated by the annual mail survey, and must be regarded as very preliminary estimates. The 1997 run was very similar to that of 1996 when anglers were estimated to have harvested 2,139 sockeye salmon (Table 21) (Howe et al. 1997).

### 1998 Outlook

The 1998 Kvichak drainage forecast is for a total return of over 8.9 million sockeye salmon of which 4.5 million are to be allowed into the river for spawning and inriver use. If the 8.9 million fish inshore run projection and 4.5 million fish escapement goal materializes, anglers should have plenty of sockeye salmon available to them. The optimum fishing time will be from late June through July 16. Spotty fishing success can be expected before and after these dates. Exceptional fishing may be accessed from the village of Igiugig, where the Igiugig Native Corporation and the Alaska Department of Fish and Game are in partnership on a sport fishing access project. The project, scheduled for construction in the summer of 1998, is intended to provide anglers safe and efficient access to sockeye salmon fishing waters downstream of the village. The village of Igiugig has granted an easement across uplands for anglers to reach the fishing hot spots. The intention is to minimize the overlap of sport fishermen with ongoing subsistence fishing activities occurring in other parts of the river. Anglers visiting the Kvichak River should note that most of this river is restricted to catch-and-release only for rainbow trout from June 8 to October 1, and char and grayling bag limits have been reduced.

## NEWHALEN RIVER

### Fishery Description

The Newhalen River is the major 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 12). Since it is further 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.

### Historical Performance

The sockeye salmon entering the Newhalen River are one segment of the normally huge 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 for its large component of unguided anglers and for its history of regularly producing 25% to over 40% of the entire area's annual sport harvest of sockeye salmon (Table 19). For the period 1992 to 1996, the annual sport harvest averaged 7,405 sockeye salmon. No onsite studies of this fishery have been conducted by the department.

### Management

Sport harvest and effort are estimated through the statewide harvest survey and reported by Mills (1979-1994) and by Howe et al. (1995-1997). Commercial and subsistence harvests are monitored by the Commercial Fisheries Management and Development Division and are reported in their Annual Management Report series (ADF&G 1997a). Sport Fish Division has not conducted any significant monitoring or stock assessment projects for this fishery. Escapement is estimated by counts made from towers as the salmon migrate up the Kvichak River. Forecasts of next season's return are provided by the Commercial Fisheries Management

and Development Division and are reported in a statewide salmon forecast summary (Hart et al. 1998).

In response to the growth of the Newhalen River sport fishery, the Sport Fish Division provided funds through its Small Projects Access program to install regulatory signs, several portable toilets and bear-proof garbage facilities along the trail. These modest improvements have been received very well by the angling public and the adjacent land owners.

### Management Objectives

The Newhalen River sockeye salmon sport fishery is managed to provide an average of 5,000 angler-days of effort and an average harvest of 8,000 sockeye salmon per year. Escapement is addressed by achieving the biological escapement goal (BEG) for the Kvichak River.

### 1997 Season

Escapement into the Kvichak River totaled 1.5 million sockeye in 1997, far below the goal of 4.0 million fish. As mentioned in the discussion of the Kvichak River fishery, the extremely low sockeye return resulted in extensive restrictions in the commercial fisheries of eastern Bristol Bay. However, no restrictions were issued for the sockeye salmon sport fisheries in the Kvichak drainage. The rationale for no action was that subsistence needs appeared to be met, sport effort was low, and the total sport harvest of less than 1% of the total harvest or return is insignificant to the management and overall sustainability of the run. No monitoring program was in place and the 1997 figures for sport and subsistence harvest in Table 21 are the recent 5-year averages of the annual state mail survey and must be regarded as very preliminary estimates.

Local reports indicated that angling effort in 1997 was about half or less of the 200 plus anglers per day observed during the peak days of the early 1990s fisheries. Those anglers who ventured to the Newhalen River reported fair to good success during the peak of the fishery. The 1997 run was very similar to that of 1996 when sport anglers were estimated to have taken 4,795 sockeye salmon or about two-thirds the recent average (Table 19) (Howe et al. 1997).

Access along the trail to the Newhalen River occurred without interruption this season. Facilities provided by the department access program continued to be used heavily by the visiting public.

### 1998 Outlook

The Newhalen River component of the Kvichak return is expected to be considerably stronger in 1998 than it has been during the recent 2 years. Fishing access via the trail from the airport to the river remains public with camping opportunities on adjacent private lands available. The department has installed outhouses, signs, and fish cleaning tables to help manage and accommodate the obvious demand anglers have for access to a sockeye salmon sport fishery such as this one. Peak fishing time will occur during the July 4 weekend and the weekend following. Prior to and after that time the number of sockeye will be lower, however, fishing success may also be good. Anglers visiting the area should be aware that there has been increasing problems with bears in camps. Plan to take precautions concerning camping and fishing in the area. For more information about this fishery and tips on how to be successful, contact the Department of Fish and Game and request sport fishing information for the Newhalen River.

## CENTRAL SOCKEYE SALMON FISHERIES

About 15% of Bristol Bay sockeye salmon return to the Central section. This section is not heavily fished for sockeye salmon and typically produces sport harvests of 1,000 to 2,000 fish, or

10% to 16% of the area's total annual sport harvest (Table 19). Harvest of sockeye in 1996 totaled 2,665, and was the second highest reported for the section. It appears that interest in harvesting sockeye is growing. The stocks are generally healthy and virtually unaffected by the harvest impact of recreational anglers. Commercial fishermen take as much as 58% of the sockeye salmon run and subsistence harvests are usually 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. With an escapement goal of 1.75 million fish (Table 20), angling opportunity during the 1998 season should be good.

Bag and possession limits are 5 per day, no size limit (ADF&G 1997b).

## 1998 Outlook

Sockeye salmon returns to the Nushagak drainage are expected to total 5.3 million with some 1.7 million escaping into the river systems to provide for spawning escapement and inriver uses. The best sockeye sport fishing opportunities will be in the Wood River and the Wood River Lake system. The best time to fish sockeye will be from June 21 to July 10. Anglers should look for locations where large numbers of sockeye are migrating, or where they are schooled in lakes before migrating onto the spawning grounds. The department will have periodic updates available concerning the strength of the sockeye return. Inseason information may be obtained from department offices in Dillingham, Anchorage or King Salmon.

# SECTION VI: RAINBOW TROUT FISHERIES

Wild rainbow trout stocks of the SWMA are cornerstone to a multimillion dollar recreational fishing industry. Sport fishing opportunity for both guided and unguided anglers is primarily during the ice-free season, generally from June through October. Popular waters include tributaries of the Kvichak River drainage, the Naknek River drainage, portions of the Nushagak/Mulchatna River drainages, streams of the Wood River Lake system, the Kanektok, Goodnews, and Aniak rivers (Figure 14).

The rainbow trout fisheries within the SWMA underwent rapid growth from the late 1970s to mid 1980s. Annual harvests climbed to 10,785 fish in 1983, averaged 5,216 fish per year from 1986 through 1991, and from 1992 through 1996 averaged 3,072 fish (Table 22). The species' importance to the recreational fisheries is not adequately described by estimates of harvest. Studies indicate that during the last 10 years, the retention rate, or the number of fish kept from the total catch, has declined steadily while the total effort and catch remained stable or increased (Minard 1989b and 1990, Brookover 1989b, Dunaway 1993). Estimates of catch (number of fish kept plus fish released) were first available in 1991 and have consistently ranged from about 122,000 fish to 173,000 fish annually (Table 23). Since 1992 the annual catch has averaged 143,801 rainbow trout and appears stable. It is evident the angling public has embraced the concept of catch-and-release for rainbow trout, and has voluntarily reduced their harvests throughout the area.

The status of rainbow trout as a subsistence species is changing under the direction of the Alaska Board of Fisheries. In 1993, the Board ruled that rainbow trout, caught incidental to other species, may be retained by subsistence users. This is a change from previous years where rainbow trout were explicitly excluded from harvest under the subsistence priority. The taking of rainbow trout from nonnavigable waters located within federal land holdings (Refuges and National Parks) has been allowed since December of 1991. Since there are few, if any, significant subsistence fisheries for rainbow trout occurring on nonnavigable waters, the federal regulations do little to affect legal fishing opportunity. Although the Alaska Board of Fisheries does not recognize targeted subsistence use of rainbow trout, it has provided seasonal opportunities for harvesting rainbow trout by liberalizing bag limits during the winter months, the time when most local residents pursue rainbow trout for food. For example, in most waters of the SWMA, the summer bag limit is 2 rainbow trout per day, but in the winter months the limit increases to 5 rainbow trout per day. Seasonal changes in the bag limits accommodate the winter harvest needs of the few local residents but do little to jeopardize the health of local rainbow trout stocks.

## SOUTHWEST ALASKA RAINBOW TROUT MANAGEMENT PLAN

In February of 1990, the Alaska Board of Fisheries adopted regulations implementing a comprehensive management plan for rainbow trout in Southwest Alaska (ADF&G 1990). The plan provides guidance in the form of policy that gives the Board and the public a clear understanding of the underlying principles by which rainbow stocks are to be managed and provide guidance for the Board in developing future regulations.

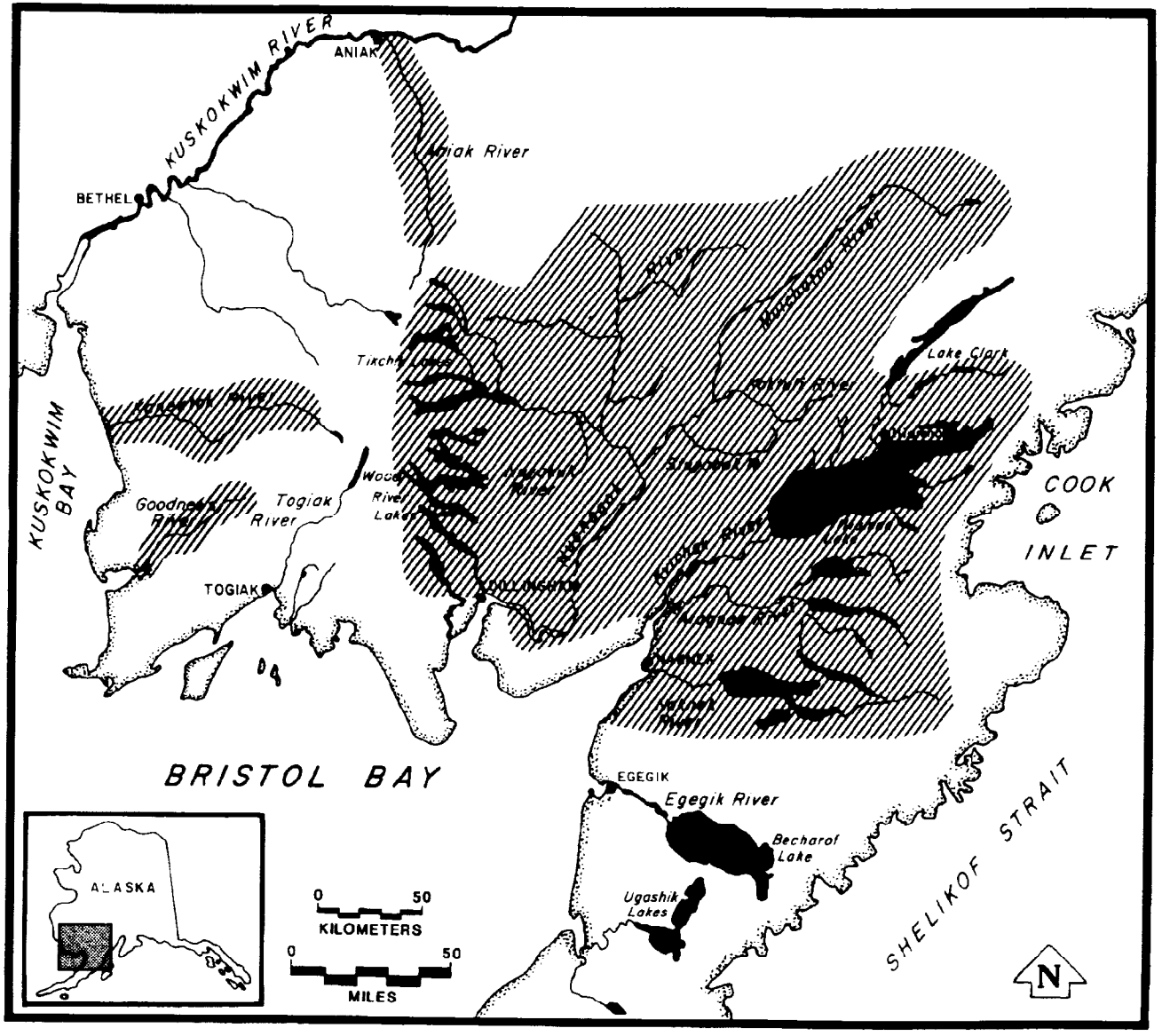


**Figure 14.-Popular rainbow trout sport fisheries in Southwest Alaska.**

**Table 22.-Sport harvest of rainbow trout from waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 69 [a] | 0 [a] | 0 |
| Egegik/Becharof | 0 | 0 | 136 | 0 | 0 | 0 | 0 | 50 [a] | 520 [a] | 153 [a] | 21 [a] |
| Naknek R. | 586 | 371 | 954 | 1,705 | 2,184 [b] | 975 | 2,398 [b] | 2,881 | 1,561 | 2,425 | 1,167 [b] |
| Naknek L. | 37 | 63 | 109 | 198 | 216 | 555 | 126 | 150 | 0 [a] | 381 | 215 |
| Bay of Islands | | | | | | | 105 | 237 | 312 | 186 [a] | 43 |
| Brooks R. | 173 | 181 | 227 | 224 | 227 | 42 | 136 [b] | 50 | 69 | 79 | 86 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 25 [a] | 17 [a] | 0 [a] | 64 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 672 | 226 | 355 | 637 | 421 | 398 | 283 | 175 | 578 | 136 | 275 |
| Copper R. | 14 | 325 | 55 | 34 | 119 | 514 | 294 | 12 [a] | 89 [a] | 0 [a] | 92 [a] |
| Alagnak R. | | | | | 76 | 157 | 178 | 187 | 518 | 340 | 824 |
| Newhalen R. | 122 | 190 | 255 | 629 | 250 | 430 | 283 | 187 | 459 | 102 | 92 |
| L Talarik Cr. | 57 | 81 | 91 | 69 | 97 | 84 | 63 | 0 [a] | 74 | 20 [b] | 2 [b] |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 44 | 0 | 92 |
| Lake Iliamna | | | | | | | 0 [a] | 312 [a] | 0 [a] | 578 | 92 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | 62 | 127 | 82 | 17 | 184 | 210 | 376 | 298 | 553 | 170 | 581 |
| Subtotal | 1,723 | 1,564 | 2,264 | 3,513 | 3,774 | 3,365 | 4,242 | 4,589 | 4,863 | 4,570 | 3,646 |

-continued-

**Table 22.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 52 | 22 | 0 | 0 | 0 | 19 | 0 | 0 | 4 |
| Egegik/Becharof | 0 [a] | 20 | 22 | 32 | 32 | 18 | 95 | 12 | 12 | 34 |
| Naknek R. | 1,187 [b] | 997 [b] | 491 | 720 | 705 | 842 | 366 | 457 | 597 | 593 |
| Naknek L. | 418 [a] | 62 | 44 | 160 | 63 | 18 | 43 | 40 | 12 | 35 |
| Bay of Islands | 237 [a] | 177 | 109 | 240 | 222 | 10 | 0 | 0 | 62 | 59 |
| Brooks R. | 127 | 31 | 33 | 112 | 0 | 0 | 19 | 9 | 0 | 6 |
| Brooks L. | | | 240 | 80 | 40 | 9 | 114 | 90 | 0 | 51 |
| American Cr. | 0 [a] | 21 | 22 | 32 [a] | 0 | 0 | 113 | 0 | 109 | 44 |
| King Salmon R. | | | | | 0 | 0 | 0 | 0 [a] | 71 [a] | 14 |
| Kvichak R. | 91 | 50 | 254 | 37 | 356 | 269 | 191 | 12 | 59 | 177 |
| Copper R. | 18 [a] | 30 | 42 | 56 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 18 [a] | 343 | 423 | 243 | 111 | 312 | 74 | 107 | 24 | 126 |
| Newhalen R. | 73 | 81 | 53 | 693 | 55 | 89 | 175 | 208 | 83 | 122 |
| L Talarik Cr. | 36 [a] | 4 [b] | 0 | 37 | 16 | 0 | 0 | 0 | 0 | 3 |
| Lake Clark | 18 [a] | 10 | 32 | 37 | 0 | 20 | 40 | 0 | 0 | 12 |
| Lake Iliamna | 18 | 91 | 53 | 75 | 24 | 122 | 103 | 155 | 24 | 86 |
| Kulik R. | | | | | 0 | 0 | 239 | 0 | 0 | 48 |
| Tazimina R. | | | | | 0 | 0 | 35 | 119 [a] | 0 [a] | 31 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 163 | 293 | 290 | 665 | 8 | 148 | 174 | 34 | 157 | 104 |
| Subtotal | 2,404 | 2,262 | 2,130 | 3,219 | 1,632 | 1,857 | 1,800 | 1,243 | 1,210 | 1,548 |

-continued-

**Table 22.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 31 | 108 | 191 | 387 | 670 | 252 | 346 | 599 | 87 | 263 | 92 |
| Mulchatna | 116 | 497 | 236 | 189 | 281 | 409 | 1,018 | 611 | 607 | 496 | 412 |
| Wood River L. | 252 | 217 | 409 | 258 | 475 | 461 | 944 | 1,060 | 304 | 262 | 595 |
| Tikchik L. | 62 | 145 | 136 | 232 | 216 | 220 | 178 | 25 | 58 | 0 [a] | 137 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 210 | 2,137 | 124 | 29 | 234 | 824 |
| Subtotal | 461 | 967 | 972 | 1,066 | 1,642 | 1,552 | 4,623 | 2,419 | 1,085 | 1,255 | 2,060 |
| Western | | | | | | | | | | | |
| Togiak | 102 | 54 | 82 | 215 | 130 | 168 | 336 | 32 [b] | 0 [b] | 58 | 46 [b] |
| Goodnews | | | | | | | 52 | 104 [a] | 451 [a] | 0 [a] | 111 [a] |
| Kanektok | | | | | | | 640 | 312 | 156 | 70 [b] | 132 |
| Other | | | | | | | 0 | 100 | 0 | 0 | |
| Subtotal | 102 | 54 | 82 | 215 | 130 | 168 | 1,028 | 548 | 607 | 128 | 289 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 336 [a] | 52 [a] | 0 [a] | 221 [a] | 56 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 556 | 0 | 52 | 24 | 293 |
| Subtotal | | | | | | | 892 | 52 | 52 | 245 | 349 |
| Eastern | 1,723 | 1,564 | 2,264 | 3,513 | 3,774 | 3,365 | 4,242 | 4,589 | 4,863 | 4,570 | 3,646 |
| Central | 461 | 967 | 972 | 1,066 | 1,642 | 1,552 | 4,623 | 2,419 | 1,085 | 1,255 | 2,060 |
| Western | 102 | 54 | 82 | 215 | 130 | 168 | 1,028 | 548 | 607 | 128 | 289 |
| Northwestern | | | | | | | 892 | 52 | 52 | 245 | 349 |
| Total | 2,286 | 2,585 | 3,318 | 4,794 | 5,546 | 5,085 | 10,785 | 7,608 | 6,607 | 6,198 | 6,344 |

-continued-

**Table 22.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 272 | 135 | 55 | 200 | 190 | 122 | 230 | 172 | 325 | 208 |
| Mulchatna | 145 | 229 | 273 | 444 | 515 | 375 | 253 | 197 | 444 | 357 |
| Wood River L. | 601 | 478 | 593 | 215 | 547 | 306 | 383 | 209 | 179 | 325 |
| Tikchik L. | 164 | 20 | 11 | 43 | 0 | 10 | 19 | 9 | 100 | 28 |
| Koktuli R. | | | | | 55 | 36 | 40 | 144 | 12 | 57 |
| Other | 36 | 182 | 220 | 339 | 55 | 28 | 98 | 280 | 48 | 102 |
| Subtotal | 1,218 | 1,044 | 1,152 | 1,241 | 1,362 | 877 | 1,023 | 1,011 | 1,108 | 1,076 |
| Western | | | | | | | | | | |
| Togiak | 91 [b] | 437 | 22 | 14 | 0 | 0 | 8 | 19 | 59 | 17 |
| Goodnews | 127 [a] | 316 | 141 [a] | 258 | 0 | 145 | 19 | 43 | 36 | 49 |
| Kanektok | 400 | 126 | 281 | 182 | 55 | 130 | 59 | 198 | 138 | 116 |
| Other | 982 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 24 | 14 |
| Subtotal | 1,600 | 879 | 444 | 454 | 102 | 275 | 86 | 260 | 257 | 196 |
| Northwestern | | | | | | | | | | |
| Aniak | 18 [a] | 101 | 35 | 76 | 32 | 10 | 8 | 0 | 24 | 15 |
| Kisaralik | | | | | | | 124 | 9 [a] | 215 [a] | 116 |
| Kwethluk | | | | | 71 | 58 | 72 | 66 [a] | 71 [a] | 68 |
| Other | 0 | 214 | 18 | 243 | 222 | 84 | 9 | 113 | 71 | 100 |
| Subtotal | 18 | 315 | 53 | 319 | 325 | 152 | 213 | 188 | 381 | 252 |
| Eastern | 2,404 | 2,262 | 2,130 | 3,219 | 1,632 | 1,857 | 1,800 | 1,243 | 1,210 | 1,548 |
| Central | 1,218 | 1,044 | 1,152 | 1,241 | 1,362 | 877 | 1,023 | 1,011 | 1,108 | 1,076 |
| Western | 1,600 | 879 | 444 | 454 | 102 | 275 | 86 | 260 | 257 | 196 |
| Northwestern | 18 | 315 | 53 | 319 | 325 | 152 | 213 | 188 | 381 | 252 |
| Total | 5,240 | 4,500 | 3,779 | 5,233 | 3,421 | 3,161 | 3,122 | 2,702 | 2,956 | 3,072 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the statewide harvest survey. 1996 data are preliminary.

[a] Unpublished estimates from statewide harvest survey for sites with less than 12 responses.

[b] Estimates from onsite creel survey.

**Table 23.-Sport catch of rainbow trout from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 208 | 467 | 272 | 498 | 297 | 169 | 341 |
| Egegik/Becharof | 96 | 1,195 | 1,404 | 194 | 743 | 107 | 729 |
| Naknek R. | 13,863 | 14,850 | 16,393 | 10,113 | 14,501 | 10,678 | 13,307 |
| Naknek L. | 672 | 1,021 | 900 | 620 | 805 | 1,497 | 969 |
| Bay of Islands | 2,526 | 3,150 | 2,094 | 1,028 | 1,342 | 1,566 | 1,836 |
| Brooks R. | 4,573 | 9,634 | 13,575 | 12,301 | 6,091 | 7,189 | 9,758 |
| Brooks L. | 1,295 | 1,781 | 1,306 | 1,450 | 1,610 | 1,392 | 1,508 |
| American Cr. | 1,759 [a] | 2,889 | 5,816 | 3,871 | 1,767 | 2,901 | 3,449 |
| King Salmon R. | | 348 | 20 | 17 | 111 [a] | 83 [a] | 116 |
| Kvichak R. | 15,115 | 10,161 | 11,465 | 7,187 | 4,741 | 10,966 | 8,904 |
| Copper R. | 11,706 | 13,916 | 15,951 | 12,732 | 12,683 | 11,285 | 13,313 |
| Alagnak R. | 23,244 | 18,452 | 30,665 | 11,062 | 19,499 | 24,395 | 20,815 |
| Newhalen R. | 4,795 | 2,422 | 2,975 | 3,949 | 2,874 | 1,853 | 2,815 |
| L Talarik Cr. | 3,165 | 1,480 | 1,272 | 2,183 | 1,352 | 2,368 | 1,731 |
| Lake Clark | 862 | 760 | 173 | 309 | 642 | 109 | 399 |
| Lake Iliamna | 281 | 2,224 | 3,413 | 2,893 | 1,683 | 3,007 | 2,644 |
| Kulik R. | | 2,201 | 7,225 | 5,373 | 3,717 | 7,253 | 5,154 |
| Tazimina R. | | 1,172 | 1,035 | 996 | 2,027 [a] | 1,237 [a] | 1,293 |
| Moraine Cr. | | 989 | 4,541 | 3,208 | 6,082 | 6,571 | 4,278 |
| Other | 30,502 | 8,653 | 13,135 | 15,443 | 9,482 | 18,040 | 12,951 |
| Subtotal | 114,662 | 97,765 | 133,630 | 95,427 | 92,049 | 112,666 | 106,307 |
| Central | | | | | | | |
| Nushagak | 8,750 | 5,407 | 8,966 | 6,530 | 5,808 | 9,425 | 7,227 |
| Mulchatna | 3,251 | 4,433 | 4,416 | 3,740 | 5,962 | 5,960 | 4,902 |
| Wood River L. | 8,879 | 5,897 | 8,283 | 8,677 | 7,260 | 11,274 | 8,278 |
| Tikchik L. | 1,647 | 1,599 | 2,574 | 1,350 | 1,315 | 2,487 | 1,865 |
| Koktuli R. | | 823 | 917 | 832 | 1,461 [a] | 1,325 | 1,072 |
| Other | 1,934 | 499 | 1,250 | 3,693 | 2,931 | 2,624 | 2,199 |
| Subtotal | 24,461 | 18,658 | 26,406 | 24,822 | 24,737 | 33,095 | 25,544 |
| Western | | | | | | | |
| Togiak | 616 | 538 | 1,298 | 1,206 | 1,873 | 2,706 | 1,524 |
| Goodnews | 2,776 | 1,282 | 3,994 | 945 | 1,263 | 1,581 | 1,813 |
| Kanektok | 5,856 | 1,496 | 4,106 | 4,779 | 3,046 | 6,833 | 4,052 |
| Other | 0 | 8 | 267 | 0 | 0 | 374 | 130 |
| Subtotal | 9,248 | 3,324 | 9,665 | 6,930 | 6,182 | 11,494 | 7,519 |
| Northwestern | | | | | | | |
| Aniak | 1,881 | 934 | 1,144 | 656 | 1,581 | 3,347 | 1,532 |
| Kisaralik | | | | 1,226 | 1,153 [a] | 1,379 [a] | 1,253 |
| Kwethluk | | 158 | 333 | 87 [a] | 66 [a] | 1,179 [a] | 365 |
| Other | 790 | 1,211 | 2,279 | 312 | 3,423 | 1,685 | 1,782 |
| Subtotal | 2,671 | 2,303 | 3,756 | 2,281 | 6,223 | 7,590 | 4,431 |
| Total | 151,042 | 122,050 | 173,457 | 129,460 | 129,191 | 164,845 | 143,801 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the statewide harvest survey. 1996 data are preliminary.

[a] Unpublished estimates from statewide harvest survey for sites with less than 12 responses.

## 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 which 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 predicated on 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 wishes and desires of most of the angling public presently using the resource.

The Southwest Alaska Rainbow Trout Management Plan contains policies which are intended to protect the biological integrity of the region's wild trout stocks and maximize their recreational benefit and economic potential. The policies provide management biologists within the Department of Fish and Game, Board of Fisheries members, and the public with clear policies to govern management of rainbow trout fisheries in the SWMA and guide the development of sport fishing regulations designed to implement these policies.

| **Policy I** |
| --- |
| |
| **Native rainbow trout populations will be managed to maintain historic size and age compositions and at stock levels sufficient such that stocking is not needed to enhance or supplement the wild population.** |

This policy addresses the department's primary responsibility to ensure that resources are being managed on a sustained yield basis. Adherence to this policy ensures that management practices do not alter the historic size and age compositions of rainbow trout stocks within the management area. Additionally, this policy addresses the desire to maintain wild rainbow trout throughout the area and that mitigating loss of wild stocks through enhancement or stocking is not a desirable management alternative.

Policy I is realized by managing rainbow trout stocks in a biologically sound manner under a conservative yield philosophy. Consistent with this philosophy, the general bag and possession limits for rainbow trout within the area do not exceed 2 per day of which only 1 may be greater than 20 inches. More restrictive limits may be applied to satisfy the goals associated with waters designated for special management or to address a biological problem.

| Policy II |
| --- |
| |
| **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 Board of Fisheries.** |

Under this policy, special management areas are established to provide the sport fishing public with a variety of angling opportunities. Selection of waters for special management is based on criteria established by the Board of Fisheries designed to ensure the most suitable waters are selected.

Policy II has been implemented by establishing special management areas that provide the sport fishing public with a range of desirable angling opportunities. In Southwest Alaska, special management may be designated as either Catch-and-Release or Trophy. To support these harvest strategies, in waters designated as Catch-and-Release or Trophy areas, only unbaited, single-hook artificial lures may be used. Catch-and-Release or Trophy areas may further be designated as fly-fishing-only. In waters not designated for special trout management, but during times when directed wild trout fisheries occur, the use of artificial lures (no single-hook restriction) can be considered depending on current harvest and effort levels.

Waters designated through regulation for special management are to be selected according to a process that addresses stock status, location, historical use patterns, accessibility, aesthetics, geographical distribution of angling opportunities, and the economic return in terms of commerce generated and jobs created. Each candidate water is ranked according to 11 criteria to determine its suitability for special management. These criteria include:

1. STOCK STATUS. To be considered for Catch-and-Release or Trophy designation, a candidate water must meet the biological objectives of conservative yield, which call for the maintenance of the historical size and age composition and stock levels of the rainbow trout population(s). Historical fisheries statistics are used to make this determination. Any candidate water that meets the conservative yield objectives is considered by the Board against criteria 2-11.
2. HISTORY OF SPECIAL MANAGEMENT. This is a subjective category that considers the public's perception of the history of rainbow trout fishing in the candidate water. It is assumed that a water which people associate with having provided "quality" trout fishing can more easily be managed for that purpose than a water with no history of fine trout fishing.
3. PROXIMITY TO LOCAL COMMUNITY. A water is preferred if it is not located near enough to a permanent community to be commonly used and/or visited by local residents. The intent of this criteria is to avoid conflict with traditional consumptive use patterns of local residents.
4. LEGAL ACCESS. This refers to public ownership of the adjacent lands or the water being classified as navigable. A water with over 50% of its banks publicly owned, or a navigable designation, would be preferred.

5. OVERLAP WITH FRESHWATER NET FISHERIES. Special management areas should be seasonally and/or specially segregated from subsistence and freshwater commercial net fisheries.
6. ABUNDANCE AND SIZE OF RAINBOW TROUT. This refers to the number and average size of the catchable rainbow trout seasonally present in a candidate water. Waters with relatively high numbers of rainbow trout and waters with uniquely large rainbow trout would be favored for special management.
7. WATER CHARACTERISTICS. This refers to the habitat characteristics and appearances of a water. A stream with clear water and riffle-pool configuration with a gravel bottom would be preferred.
8. CLEAR GEOGRAPHICAL BOUNDARIES. This refers to the angling public's ability to clearly distinguish the legal regulatory boundary of a candidate special management area.
9. RELATIVE IMPORTANCE OF RAINBOW FISHERY TO SPORT FISHING INDUSTRY. A candidate water of high economic value to the sport fishing industry would be favored as an area for special management.
10. GEOGRAPHICAL DISTRIBUTION OF SPECIAL MANAGEMENT WATERS. The designation of a candidate water for special trout management should take into consideration its proximity to other special management waters and the availability of alternative locations not designated for special management.
11. RESEARCH, EDUCATIONAL, OR UNIQUE CONSIDERATIONS. Where necessary, waters may be designated for special management for research or educational reasons. This category recognizes unusual situations which would further diversify angling opportunity, such as the potential for a catch-and-release water near a rural community if local support is expressed.

| **Policy III** |
| --- |
| |
| **Management strategies should be consistent with the prudent economic development of the state's recreational sport fishing industry while at the same time acknowledging the intrinsic value of this fishery resource to the people of Alaska.** |

This policy acknowledges that Southwest Alaska's wild rainbow trout are of vital importance to the state's recreational industry and that wise development of commercial recreation is to the economic benefit of the region and the state. Management practices that maintain or enhance the marketability of high quality recreation are favored under this policy.

Consideration of the economic impact to the recreational industry, of both the local area and the state in general, should be given in all regulatory actions regarding rainbow trout within the management area. Whenever possible, emergency orders and regulations should be structured to foster the prudent economic development of the industry.

To implement Policy III, department managers are asked to recognize that due to the remoteness and logistical difficulty of travel in southwestern Alaska, fishery closures may severely impact angling opportunity and the related recreational industry.

To assist the department with implementing Policy III, the Board of Fisheries has expanded the department's emergency order authority to include not only the ability to effect time and area closures, but to also adjust bag limits and methods and means that if employed inseason could avoid disruptive closures.

### Plan Implementation

Regulations based on the Southwest Alaska Rainbow Trout Management Plan were adopted by the Alaska Board of Fisheries in February of 1990. These regulations were designed to implement the three management policies contained in the rainbow trout management plan. Specifically, the Board:

- 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.
- Established eight catch-and-release areas (Figure 15).
- Established six fly-fishing/catch-and-release-only areas (Figure 16).
- Established 11 unbaited single-hook artificial lure only areas to protect rainbow trout stocks (Figure 17).

Adoption of regulations implementing the management policies contained in this plan is not expected to be a one-time effort. Rather, the implementation of these policies is a long-term process, using the policies contained in this plan as the framework for development of a very important and unique resource.

## 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 (Figure 14). 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 spawn and salmon carcasses in the fall. The sport fishery takes advantage of this migration and is most active from mid-August until freeze-up in 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. From 10 to 20 anglers can be accommodated at any given time in the lower portion of the creek that is commonly fished.

### Historical Performance

Fisheries managers first estimated angler effort and harvest on Lower Talarik Creek rainbow trout with onsite creel surveys from 1970 through 1976 (Table 24). Annual effort averaged 1,362 angler-hours while the harvest ranged from a high of 433 fish in 1971 to 73 fish in 1974. Since 1977, effort has been estimated from the Statewide Harvest Survey and has been measured in angler-days. Effort on Lower Talarik Creek appears to be relatively constant at 600 to 900 angler-days per year with a few excursions outside this range (Table 5). Onsite creel surveys

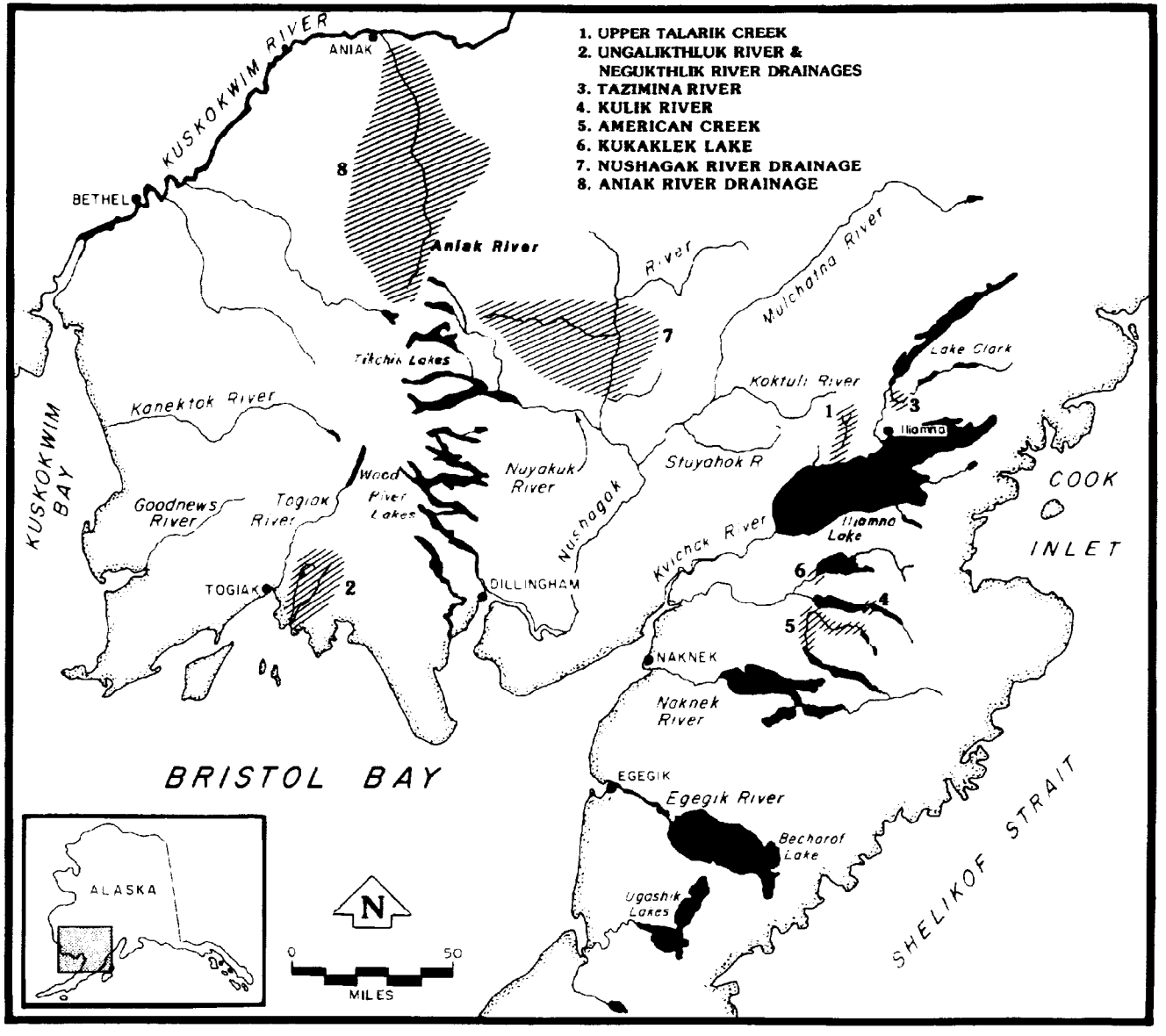


**Figure 15.-Catch-and-release special management areas.**

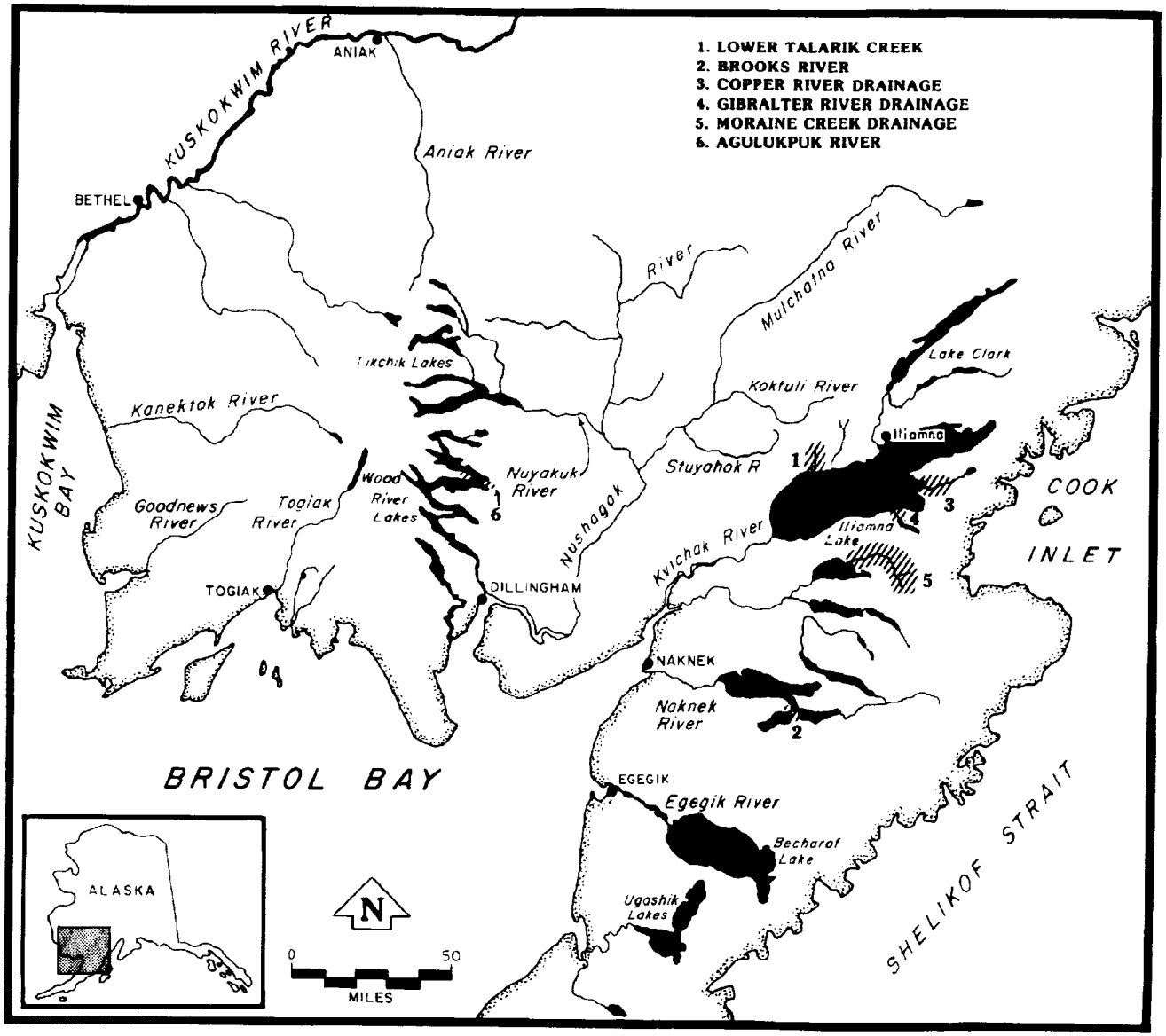


**Figure 16.-Fly fishing catch-and-release special management areas.**

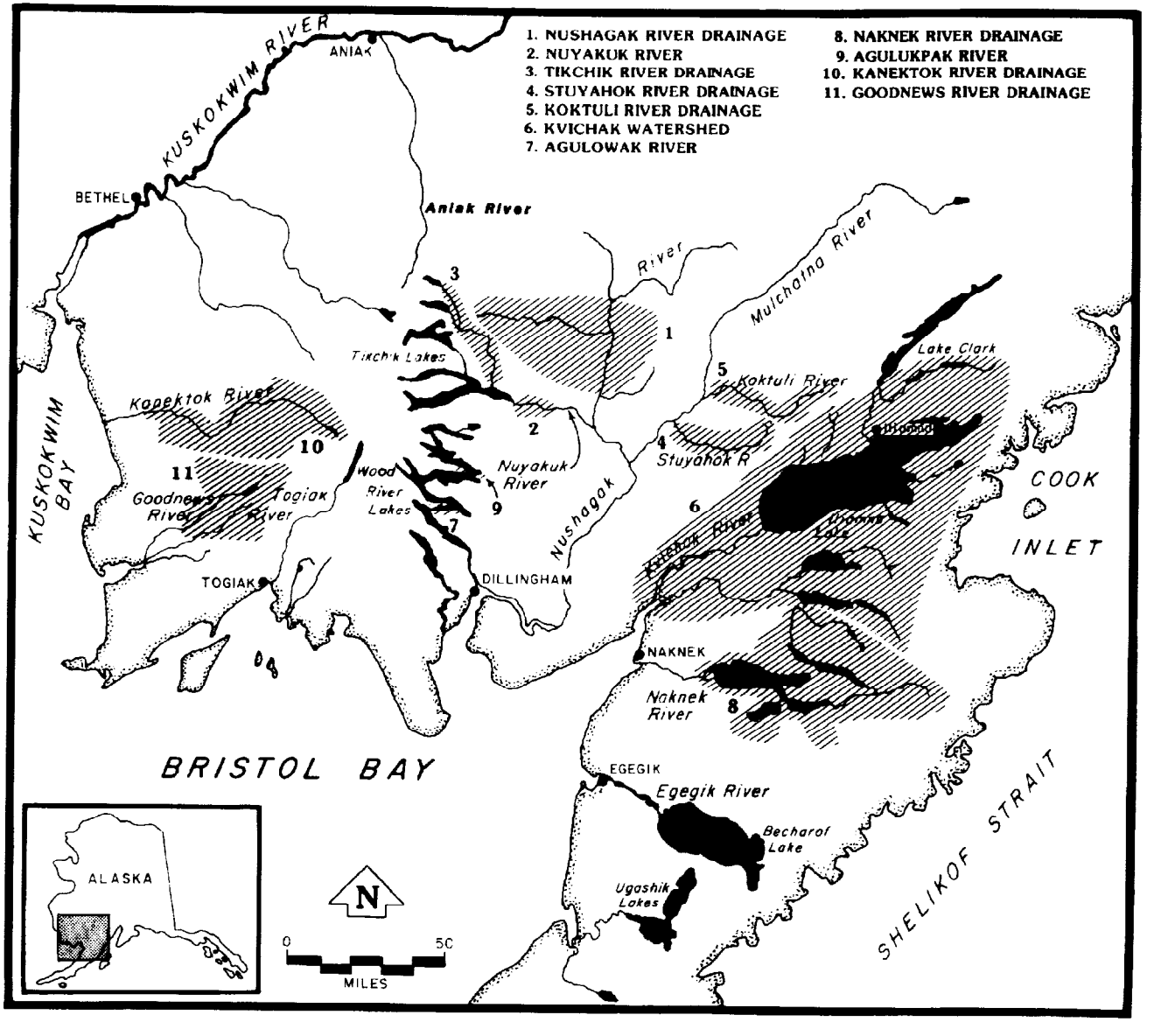


**Figure 17.-Unbaited single-hook artificial lure special management areas.**

**Table 24.-Angler effort, catch, harvest, retention rate, and catch per angler-hour for rainbow trout, Lower Talarik Creek, estimated from onsite creel surveys, 1970-1976, 1986, 1989-1991, 1993-1997.**

| Year | Angler-Hours | Catch | Catch per Hour | Harvest | Percent Retained | Survey Dates |
|---|---|---|---|---|---|---|
| 1970 | 1,315 | 600 | 0.46 | 119 | 20% | 8/26-10/11 |
| 1971 | 2,604 | 2,300 | 0.88 | 433 | 19% | 6/8-9/30 |
| 1972 | 1,718 | 834 | 0.49 | 141 | 17% | 6/8-9/30 |
| 1973 | 1,376 | 780 | 0.57 | 113 | 14% | 6/8-9/30 |
| 1974 | 1,037 | 498 | 0.48 | 73 | 15% | 6/8-9/30 |
| 1975 | 1,048 | 1,648 | 1.57 | 127 | 8% | 6/8-9/30 |
| 1976 | 438 | 843 | 1.92 | 92 | 11% | 6/8-6/15; 9/12-9/23 |
| 1986 | 2,063 | 2,389 | 1.16 | 16 | 1% | 6/8-6/15; 8/15-10/9 |
| 1989 | 1,893 | 2,844 | 1.50 | 4 | 1% | 8/22-9/22 |
| 1990 | 2,086 | 2,910 | 1.40 | 0 | NA[a] | 9/1-9/27 |
| 1991 | 1,729 | 2,363 | 1.37 | 0 | | 8/30-9/25 |
| 1993 | 1,080 | 699 | 0.65 | 0 | | 9/10-9/20 |
| 1994 | 2,462 | 3,273 | 1.33 | 0 | | 9/2-9/29 |
| 1995 | 2,496 | 3,200 | 1.28 | 0 | | 9/1-9/29 |
| 1996 | 1,930 | 1,655 | 0.86 | 0 | | 9/3-9/30 |
| All Years Avg. | 1,685 | 1,789 | 1.06 | 0 | | |
| 1970-1976 Avg. | 1,362 | 1,072 | 0.79 | 157 | | |
| 1993 -1996 Avg. | 1,992 | 2,207 | 1.11 | 0 | | |
| 1997 [b] | 1,210 | 1,794 | 1.48 | 0 | | 9/1-9/15 |

[a] NA = not applicable, Lower Talarik Creek became catch-and-release fishery in 1990.

[b] 1997 Estimates are preliminary. Survey only 2 weeks in length.

conducted during the fall fisheries of 1989, 1990, 1991, and 1993 through 1997 found effort has been at the upper range of, but not significantly different from, the levels observed in the 1970s (Table 24). Note the total estimates of catch and effort in 1997 are due to the short duration of the survey.

Harvests of Lower Talarik Creek rainbow trout have been less than 100 fish annually since 1977 and were virtually nonexistent after 1985 (Table 22). Lower Talarik Creek became a catch-and-release only fishery by regulation in 1990. Catches, estimated from onsite surveys, show an increase from an average 1,072 fish per year in the 1970s to an average 2,207 rainbow trout per year from 1993 through 1996 (Table 24).

## Management

Lower Talarik Creek is managed as a special management area restricted to unbaited artificial fly tackle and catch-and-release of rainbow trout. A spawning season closure provides protection during this critical season. Sport effort, catch, and harvest are estimated via the statewide harvest survey. Subsistence harvests are not well monitored and are the responsibility of the Commercial Fisheries Management and Development Division. 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 are reported by Russell 1977, Minard 1990, Minard et al. 1992, and Dye *Unpublished*.

Lower Talarik Creek's small size, accessibility, and abundant large rainbow trout garnered early regulatory attention. A synopsis for significant regulation changes follow:

- 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 through 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.

The ownership and use of the lands around Lower Talarik Creek have been of particular concern to department management. Although the state owns much of the land in the vicinity of Lower Talarik Creek, there have been Native Allotment claims proposed for some adjacent lands that raised concerns for long-standing public access to this important fishery. The lands under state management are also deserving of attention as Department of Natural Resources, Division of

Lands, considers the best blend of land uses for the area. Resolving land status issues, and preserving public access to the recreational fishery at Lower Talarik Creek, will very likely consume more time in the next several years than will the actual management of the sport fishery.

### Management 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 special management designation; fly-fishing-only catch-and-release.

### 1997 Season

A spring tagging project was initiated this year at Lower Talarik Creek. The main purpose of the study was to evaluate migration and straying assumptions that have been made regarding the 11-year abundance study in the Kvichak River at Igiugig. It may provide an opportunity to assess current spring abundance for comparisons to work conducted in the 1970s. From mid April to the end of May, about 700 rainbow trout were captured using seines and hook-and-line gear. Analysis has not been completed at the time this report is being written but preliminary review of the data suggests that the 1997 abundance of rainbow trout compares favorably with results reported by Russell (1977).

Unlike previous seasons, the 1997 fall creel survey only covered the 2-week period of September 1 to 15 (Table 24). Results suggest sport fishing effort (1,210 angler hours) was similar to levels observed for the recent 5 years, assuming half of the effort usually occurs during half of the season (Table 24). Catch rates were very good with anglers landing a seasonal average of 1.48 fish per hour and the catch of 1,794 rainbow trout appears to be quite good as well. Size composition of the catchable population appeared normal, with many fish over 10 pounds reported to have been landed.

### 1998 Outlook

Sport fishing opportunity at Lower Talarik Creek is expected to slow during the first weeks of the season in June. By late August and on through until freeze-up in early October fishing should be excellent. The number of large fish (in excess of 8 pounds) caught each season appears to be stable, and overall catch rates are high for experienced anglers. The Division of Sport Fish will continue a fishery monitoring program using volunteer staff. No inseason changes to the regulations are anticipated for the 1998 season.

## NAKNEK RIVER

### Fishery Description

The Naknek River supports the largest rainbow trout sport fishery (based on harvest level) in the SWMA. The first significant recreational utilization of Naknek River stocks occurred in the mid-1950s when two 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. Within that time period, civilians discovered the bountiful 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.

The rainbow trout sport fishery takes place in the upper reach of the river upstream from Rapids Camp to the outlet of Naknek Lake and has three periods of activity associated with this fishery: March to April 10, June 8 to June 30, and August 15 to freeze-up in October.

## Historical Performance

Estimates of harvest for rainbow trout from the Naknek River were first available in 1977 from the statewide harvest and participation survey (Table 22) (Mills 1979-1994, Howe et al. 1995-1997). Annual harvest increased from about 600 rainbow trout in 1977 to a peak of 2,900 fish in 1984. Since 1984, harvest of Naknek River rainbow trout has declined to levels first observed in 1977 (Table 22). Harvest alone, however, is not a reliable indicator of fishery performance for rainbow trout fisheries in Southwest Alaska. The combination of effort, catch, harvest, and fish size information derived from onsite surveys provides a much more comprehensive evaluation of fishery performance. From 1978 through 1989, the Division of Sport Fish conducted fall fishery surveys in the upper reach of the Naknek River (Table 25). These data demonstrated a clear and significant increase in effort and catch occurred over the 10-year study period, along with a significant drop in the proportion of retained fish (Minard 1989a). Somewhat alarming was a declining trend in average size of the spawning stock and catchable population. It was apparent from the combination of creel survey and biological data available that the sport fishery was overharvesting the larger, older segment of the population. Comments received from the angling public were consistent with the department's findings.

**Table 25.-Effort, harvest, catch, and catch rate statistics for anglers fishing the upper Naknek River during the period August 15 through October 15, 1978, 1981, 1983, 1984, 1987, 1988, and 1989. Length statistics of harvested rainbow trout during these years are also presented.**

| | Effort | | Catch per | | Proportion | Length (mm) | | |
|---|---|---|---|---|---|---|---|---|
| Year | Angler-Hours | Catch | Hour | Harvest | Retained | Mean | SE | SS[a] |
| 1978 | 1,896 | 847 | 0.45 | 248 | 0.29 | 484 | 20.2 | 55 |
| 1981 | 3,025 | 4,322 | 1.43 | 860 | 0.20 | 444 | 6.2 | 218 |
| 1983 | 6,755 | 4,182 | 0.62 | 1,452 | 0.35 | 430 | 5.7 | 135 |
| 1984 | 4,611 | 3,092 | 0.67 | 570 | 0.18 | 466 | 9.02 | 192 |
| 1987 | 4,450 | 4,779 | 1.07 | 434 | 0.09 | 423 | 9.3 | 81 |
| 1988 | 6,246 | 3,147 | 0.50 | 566 | 0.18 | 377 | 10.6 | 99 |
| 1989 | 7,249 | 7,120 | 0.98 | 407 | 0.06 | 430 | 15.1 | 72 |

[a] Sample size.

Corrective actions in the form of reduced limits as well as size limits and method restrictions were proposed to the Board and adopted in 1990 (Minard 1990). Follow-up assessment work in the spring of 1993 suggested the declining size composition had been arrested, and fall work found early indications of improved recruitment (Dunaway *Unpublished*). In 1995, sampling of the fall population discovered the size composition of the catchable population has been restored to the proportions observed in the early 1980s (Fair *Unpublished*). Recent comments from the public and anglers familiar with the fishery support the department conclusions and generally indicate the population is in very good condition.

## Management

Sport effort, catch, and harvest are estimated via the statewide harvest, catch, and participation surveys (Mills 1979-1994, Howe et al. 1995-1997). Subsistence harvests, considered slight but not well monitored, are the responsibility of the Commercial Fisheries Management and Development Division. 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 have been reported by Minard 1989a, Minard 1990, in 1993 by Dunaway (*Unpublished*), and in 1995 by Fair (*Unpublished*).

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. Department studies conducted in the late 1980s verified the suspected decline. Available data supported by public opinion indicate the stocks have recovered. Current regulations (ADF&G 1997b) still reflect the remedial actions adopted in 1990 and allow for an open water harvest of 1 rainbow trout less than 18 inches in length and a winter season of 5 less than 18 inches in length. The spawning season closure is still in effect from April 10 to June 7, and only single-hook artificial lures may be used in the area above Rapids Camp.

Growing interest in the spring fishery that occurs prior to April 9 has resulted in public requests for more intensive management during this time period. Some anglers support managing portions of the river for quality of experience by advocating restrictions to angler access. Other management suggestions include managing for a particular size composition in the sport catch with emphasis on providing very large fish. Yet other anglers remain convinced that growth of the rainbow trout fishery on the Naknek River requires vigilance and possibly additional restrictions just to maintain the biological integrity of the population. Regardless of the perspective it appears clear that the angling public is extremely interested in maintaining and enhancing this fishery. The department is likely to see a growing demand for more intensive management strategies of this and other rainbow trout fisheries.

## Management Objectives

Naknek River rainbow trout stocks are being managed to restore and maintain the historical age and size composition reported in the early 1980s. Research projects on rainbow trout populations throughout the SWMA are beginning to provide the department with new understanding and may soon allow more precise and quantitative definitions of management objectives for this species.

### 1997 Season

No field data were collected concerning this fishery in 1997. Reports from anglers who offered their thoughts generally indicated a stable or improving fishery. A few complained the fishery was still depressed. Interest in this fishery is high and several proposals for regulation changes were submitted in the spring; some quite far-reaching. Depending upon the outcome of the fall 1997 Board of Fisheries meeting in King Salmon, there may be a need or opportunity to assess the effects of new regulations on this important fishery.

### 1998 Outlook

Sport fishing for rainbow trout is expected to be good to excellent all season. The best fishing can be expected in mid June at the outlet of the lake and in the Rapids area. During this period, trout are drawn to these areas to feed on salmon smolt as they migrate to sea. Fishing in early July with dry flies will be good, and then after a lull in late July, fishing will improve in early August as the trout move into salmon spawning areas to feed on eggs and carcasses. The best fishing for large trout will occur from late September until freeze-up in October. Note the Naknek River upstream from the ADF&G marker at Rapids Camp has been restricted to single-hooks with a point-to-shank gap of 1/2 inch or less until August 1. No inseason adjustments to the fishery are anticipated in 1998.

## ALAGNAK (BRANCH) RIVER

### Fishery Description

The Alagnak River, frequently referred to locally as the Branch River, is located in the eastern portion of the management area and flows into the Kvichak River approximately 40 miles north of King Salmon. The Alagnak River arises in the Katmai National Park and Preserve and has been designated a Wild and Scenic River.

Two large lakes, Kukaklek and Nonvianuk, feed this drainage. Kukaklek Lake is drained by the Alagnak River while 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 2+ rapids that provides a more rigorous boating experience. Below its confluence with the Nonvianuk River, the Alagnak 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, coho and sockeye salmon. In the upper reaches, rainbow trout are the big attraction, with some lake trout at headwater lakes and char and grayling in the river adding diversity to the angling experience. The fisheries are accessed with power boats, particularly the lower 1/2 to 2/3 of the river, while float trips are the most common access in the upper reaches. Six lodges are based along the river, three in the lower 20 miles, one lodge near the outlet of both headwater lakes and one more is located along the midpoint of the river. 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 so quickly. Rainbow trout from the Alagnak River drainage

are similar to fish of the nearby Kvichak and Naknek drainages and became known for their abundance and large size.

## Historical Performance

In terms of angler effort, the Alagnak River is the second most popular fishing destination in southwest Alaska after the Naknek River. Estimates of effort and harvest for rainbow trout from the Alagnak River were first available in 1981 from the statewide harvest and participation survey (Tables 5 and 22). During the seasons of 1981 through 1991 effort was low to moderate and annual estimates ranged from 1,182 to 7,628 angler-days per year. Average annual effort increased suddenly to 12,323 angler-days in 1992 and has remained consistently high ever since. Effort currently averages 12,346 angler-days for the 1992-1996 seasons (Table 5). Annual rainbow trout harvest increased from less than 200 fish per year prior to 1985 to a peak of 824 fish in 1987. Since 1988, harvest of Alagnak River rainbow trout has declined to levels first observed in the early 1980s (Table 22). From 1991 to 1995 the annual catch (fish released plus fish kept) has averaged over 20,000 rainbow trout per year (Table 23). At this level, the Alagnak River has become the most popular rainbow trout fishery in southwest Alaska. Annual harvest of rainbow trout averaged 126 per year from 1992-1996 (Table 22), but is likely selective for large fish.

Harvest alone is not a reliable indicator of fishery performance for rainbow trout fisheries in Southwest Alaska. During the period 1978 through 1989, the Division of Sport Fish conducted fall fishery surveys for seven seasons in the nearby Naknek River. Over the study, data demonstrated a clear and significant increase in effort and catch, yet a significant drop in the proportion of fish kept or harvested (Dunaway 1990c). Similar observations have been made in other fisheries throughout the SWMA. The department has interpreted the phenomenon as an acceptance of catch-and-release as an ethic among anglers, particularly for rainbow trout, and we assume the declining harvest on the Alagnak River can be explained in part by this shift in attitude.

## Management

Sport effort, catch, and harvest are estimated via the statewide harvest, catch, and participation surveys (Mills 1979-1994, Howe et al. 1995-1997). Subsistence harvests, considered slight but not well monitored, are the responsibility of the Commercial Fisheries Management and Development Division. 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 (1989a) and by Dunaway (1990a and 1994). Surveys of the spring sport fisheries were conducted jointly with the NPS and department in 1996 at the outlet of Nonvianuk Lake and at the outlet of Kukaklek Lake in 1997 (Jaenicke 1998, *In prep b*). In 1997 the Biological Research Division of the U. S. Geological Survey, in cooperation with the NPS, began a rainbow trout population study on the Alagnak and Nonvianuk rivers (Eric Knudsen, USGS-BRD, Anchorage, personal communication). Results of this study are not likely to be available for another year.

Located as it is between the Kvichak and Naknek drainages, management of the Alagnak and Nonvianuk rainbow trout fisheries has been much the same as outlined for those 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. During the open water season, regulations have allowed the retention of 1 rainbow trout per day, no size limit.

Comparatively difficult to access, the Alagnak fishery only lately received angling effort in levels capable of affecting the fish populations. Starting in about 1993, coincident with increased fishing effort, department staff began receiving complaints that the rainbow trout stocks in the Alagnak were declining. Data for the Alagnak River rainbow trout fishery prior to 1996 were sparse; results from a sampling trip in 1989 suggested that the size composition and age structure may be depressed. In 1996 a joint ADF&G and National Park Service creel survey was conducted at the outlet of Nonvianuk Lake, in the upper Alagnak River drainage (Jaenicke 1998). Thirty-four anglers were asked to compare their experience in 1996 to experiences in the past with regard to catch rate and average size of the catchable population (Table 3). Many anglers felt both catch rate and size composition had diminished (Jaenicke *Unpublished*). In addition to the survey, NPS staff also collected size and age samples from the catchable population. Results showed the size distribution to be skewed toward small fish, and age composition to be primarily age-4 and –5 fish.

As a result of the 1996 work, an emergency order closing the Alagnak and Nonvianuk rivers to the sport harvest of rainbow trout was issued effective July 1, 1996, and was reissued prior to the June 8 opening in 1997.

### Management Objectives

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

### 1997 Season

In 1997, Emergency Order 2-RT-5-04-97 prohibiting harvest of rainbow trout in the Alagnak and Nonvianuk rivers was issued January 30. The emergency order was issued early in the year to provide plenty of notice to the angling public and guide industry.

Additional sampling was conducted in 1997 (Table 3, Jaenicke *In prep b*). The size composition information collected throughout the drainage does not suggest as depressed a condition as shown in 1996. Study results are not final but the following points remain:

1. Effort has increased substantially in the recent 5-year period.
2. The Alagnak River is the most popular rainbow trout fishery in southwest Alaska with over 20,000 trout being landed per year.
3. Harvests of rainbow trout are estimated to be small, but are likely selective for large fish.
4. Many anglers feel the catch rate and size composition have diminished over time.

In addition to the lake outlet creel surveys on the upper Nonvianuk and Alagnak rivers, a population assessment study was initiated in 1997. The Biological Research Division of the U. S. Geological Survey, in cooperation with the NPS, began a rainbow trout population study that is designed to include the entire length of the two rivers (Eric Knudsen, USGS-BRD, Anchorage, personal communication). Results of this study are not likely to be available for another year or more, but may eventually provide additional insights on these populations.

Notable features of the 1997 season were the extremely low water levels and high water temperatures. The significance of these conditions or likely effects on rainbow trout and other species are not known. In many rivers across the management area, water flows were limited to main river channels and had the apparent effect of concentrating fish. There has been some speculation that concentrating fish in smaller areas may have provided better angling success than might have been experienced in "normal" conditions.

Interest in this fishery is high and several proposals for regulation changes were submitted to the Board of Fisheries; some quite far-reaching. Depending upon the outcome of the fall 1997 Board of Fisheries meeting in King Salmon, there may be a need or opportunity to assess the effects of new regulations on this important fishery.

### 1998 Outlook

The mixed reports of the 1997 fishery suggest similar experiences await 1998 anglers. Spring angling at the outlets of Kukaklek and Nonvianuk lakes should be average. Fall fishing in the braids and along salmon spawning areas is likely to be average as well. We expect the commercial salmon fishery to be conducted in a conservative manner, resulting in strong sockeye and chinook escapements into this river system. Strong salmon escapements translate into large supplies of natural food for trout. This can make angling difficult until late fall after spawning peaks and the supply of salmon eggs and carcasses begins to diminish.

Sport fishing regulations governing the rainbow trout fishery have recently changed. The Alaska Board of Fisheries created a catch-and-release special management area for Alagnak River rainbow trout. From June 8 through October 31 rainbow trout in the Alagnak and Nonvianuk rivers may not be possessed or retained. From November 1 through April 9 fishermen may retain 5 rainbow trout less than 18 inches in length. The bag and possession for Dolly Varden/ char and grayling have been reduced throughout the Bristol Bay area; please check the new regulations before harvesting these species.

## AGULOWAK RIVER

### Fishery Description

The Agulowak River is located north of Dillingham and just inside the southern boundary of the Wood-Tikchik State Park. Though known primarily for its abundant Arctic char stocks, it is also one of the two most popular rainbow trout fisheries in the Central section. As with other fisheries in the SWMA, development of the recreational fishery grew gradually from the 1950s, saw its first commercial lodge facility by the early 1960s, then grew significantly beginning in the early 1970s as more lodges were built and Alaskan fly-out fishing became popular. A unique characteristic of the Agulowak River is the relative ease of access from Bristol Bay's most populous city, Dillingham, and the village of Aleknagik. As a consequence, the Agulowak River supports a much greater rate of local use than more remote waters within the section.

The rainbow trout sport fishery takes place throughout the open water period along the entire 3-mile length of the river. Favored periods for catching rainbow trout are early summer before the sockeye and pink salmon runs begin and after mid-August when the trout feed on salmon eggs and carcasses. There may be limited fishing through the ice at the head of the river in winter.

## Historical Performance

The Agulowak River has not received the level of regulatory attention given to fisheries in the Eastern section, and little historical information is available. Informal investigations of the sport fishery in 1975, 1976, and 1977 suggested increasing sport fishing effort resulting in increased catches and harvests of rainbow trout. A formal creel survey program conducted on the Agulowak River in 1986, 1987, and 1988 (Minard 1989b) estimated angler effort to range from 3,582 to 6,397 angler-hours per year; estimated annual catches of 1,784 to 2,666 rainbow trout; and estimated harvests to range from 72 to 328 rainbow trout per year (Table 26). Analysis of the size and age data collected during the surveys suggested that the size composition of rainbow trout in the Agulowak River was shifting to smaller fish, indicating the sport fishery may have been harvesting too many older aged fish (Minard 1990). These results prompted more restrictive harvest regulations and the fishery is presently in a state of recovery.

## Management

Sport effort, catch, and harvest are estimated via the statewide harvest, catch, and participation survey (Mills 1979-1994, Howe et al. 1995-1997). Subsistence harvests, considered slight but not well monitored, are the responsibility of the Commercial Fisheries Management and Development Division. Onsite surveys yield detailed estimates of angler use and success.

**Table 26.-Estimates of effort, catch, and harvest of rainbow trout from the sport fisheries in the Agulowak and Agulukpak rivers, 1986-1989, 1992 and 1996.**

| | | Survey | Effort | | | Catch | | Harvest | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Location | Dates | (Angler-hrs.) | SE | Catch/hr. | Fish | SE | Fish | SE |
| 1986 | Agulowak | 6/19-8/23 | 3,732 | 533.5 | 0.4779 | 1,784 | 266 | 84 | 15 |
| 1987 | Agulowak | 6/6-9/7 | 6,397 | 501.1 | 0.4039 | 2,584 | 611 | 328 | 113 |
| 1988 | Agulowak | 6/6-9/6 | 3,582 | 360.9 | 0.7443 | 2,666 | 618 | 72 | 31 |
| 1989 | Agulowak | 6/11-9/1 | 4,009 | 303.6 | 0.3712 | 1,488 | 1,193 | 40 | 102 |
| 1986 | Agulukpak | 6/29-8/23 | 1,826 | 208.8 | 0.7243 | 1,322 | 151 | 0 | 0 |
| 1987 | Agulukpak | 6/17-9/16 | 4,265 | 57.5 | 0.8656 | 3,692 | 25 | 2 | 0 |
| 1988 | Agulukpak | 6/14-9/16 | 3,684 | 45.9 | 0.7828 | 2,884 | 48 | 0 | 0 |
| 1989 | Agulukpak | 6/25-9/24 | 4,010 | 29.9 | 0.5274 | 2,115 | 187 | 0 | 0 |
| 1992 | Agulukpak | 8/1-9/22 | 2,759 | 53.6 | 0.6749 | 1,862 | 72 | 0 | 0 |
| 1996 | Agulukpak | 6/23-9/22 | 6,299 | 103.0 | 0.8439 | 5,316 | 113 | 5 | 0 |

Biological information and demographic information are also collected. Significant stock assessment and creel survey results have been reported by Minard (1989b and 1990), and Dunaway (1993).

The following is a regulatory chronology for the Agulowak River:

- 1959. Year-round season and a bag limit of 15 fish per day, only 3 over 20 inches.
- 1962. Ten trout per day only 2 over 20 inches.
- 1972. Five rainbow trout, 1 over 20 inches.
- 1984. Season was split with a June 8 to October 31 bag limit of 2 rainbow trout, 1 over 20 inches per day, and a November 1 through June 7 limit of 5 fish per day, 1 over 20 inches long.
- 1990. Adoption of the Southwest Alaska Rainbow Trout Management Plan. Created the first special regulations for the Agulowak River. In response to conservation concerns raised by the department, summer bag limits were reduced to 1 rainbow trout daily and terminal tackle was limited to single-hook artificial lures.

A stock assessment survey on the Agulowak River in 1992 indicated that restrictive regulations adopted in 1990 were having the desired effect (Dunaway 1993). The project estimated 9,000 to 18,000 rainbow trout over 250 mm (10 inches) in the river and found the population to contain a significantly greater proportion of older fish than was observed in 1988, and size distributions approached those first recorded in the mid 1970s.

### Management Objectives

Agulowak River rainbow trout stocks are being managed to restore and maintain the historical age and size composition reported in the 1980s.

### 1997 Season

No surveys were conducted on the Agulowak River rainbow trout fishery in 1997. Incidental contacts with anglers suggested that fishing was considered excellent. The river has seen increased use by guides.

### 1998 Outlook

Sport fishing for Agulowak River rainbow trout is expected to be good to excellent all season. The best fishing opportunity will likely occur when the spring runoff has passed and water levels begin to drop. Reduction in water levels and the presence of spawning salmon in August make for a very good fishing opportunity. Dry flies as well as single-hook artificial lures are always a good bet on the Agulowak. By late August egg patterns, flesh flies and deeply fished woolly buggers are the preferred baits. This river has continued to fish very well and is relatively easy to access from Dillingham. The bag and possession limit for grayling was reduced to 2 per day. The daily limit for char on this river remains at 2 per day.

## AGULUKPAK RIVER

### Fishery Description

The Agulukpak River is one of the best known rainbow trout fisheries west of the Kvichak River. The river is 2.4 km (1.5 miles) long and drains from Lake Beverly into Lake Nerka in the Wood-Tikchik State Park north of Dillingham. The river's remote location and hazardous rocks in its

lower section discourage boat access and most anglers come to the river via float-equipped aircraft. Development of the Agulukpak River fishery is virtually identical to the development of the Agulowak River, but other than one small cabin, no lodges were ever built close to the river. The river is clear, shallow, about 100 yards wide, and easily waded in its upper section. Its remote location, and abundant rainbow trout, Arctic grayling, and Arctic char populations make the Agulukpak River a premier location for fly fishermen. The sport fishery occurs from spring until freeze-up, mainly in the upper mile of the river.

## Historical Performance

The Agulukpak River has received slightly more attention than the Agulowak River fishery but historical quantitative information remains somewhat scarce. The remote location of the fishery and a tradition of conservative use by many of the visiting anglers served to protect the Agulukpak River rainbow trout population. Informal investigations of the sport fishery during 1976 and 1977 suggested that sport fishing effort, catch, and harvest were increasing. The first definitive work conducted on the Agulukpak River was a creel survey program during the seasons of 1986, 1987, and 1988 (Minard 1989b). Angler effort was estimated to range from 1,826 to 4,265 angler-hours per year; sport catch of rainbow trout ranged from 1,322 to 3,692 fish; and virtually no rainbow trout were harvested during the three seasons sampled (Table 26). The normal distributions of age and length of the fish sampled during the 3-year survey indicated the rainbow trout population was reasonably stable in the Agulukpak River.

## Management

Sport effort, catch, and harvest are estimated via the statewide harvest, catch, and participation survey (Mills 1979-1994, Howe et al. 1995-1997). Subsistence harvests, considered slight but not well monitored, are the responsibility of the Commercial Fisheries Management and Development Division. Onsite surveys yield detailed estimates of angler use and success. Biological information and demographic information were also collected. Significant stock assessment and creel survey results have been reported by Minard (1989b and 1990), Dunaway (1993), and from 1996 by Rogan and Jaenicke (1997).

The following is a regulatory chronology for the Agulukpak River:

- 1959. Year-round season and a bag limit of 15 fish per day, only 3 over 20 inches.
- 1962. Ten trout per day only 2 over 20 inches.
- 1972. Five rainbow trout, 1 over 20 inches.
- 1984. Managed as a catch-and-release fishery with year-round open season. Catch-and-release restriction limited to the upper half of the Agulukpak River.
- 1990. Adoption of the Southwest Alaska Rainbow Trout Management Plan in 1990 resulted in designation of the Agulukpak River as a special management area with regulations for the upper half of the river permitting only fly fishing gear from June 8 until August 31, and permitting the use of single-hook artificial lures from September 1 until October 31. In addition, the harvest of rainbow trout was not permitted in the special management area from June 8 until October 31, while the bag limit from November 1 until June 7 became 5 rainbow trout, 1 over 20 inches.

The designation as a special management area in 1990 served to preserve the traditional character of the sport fishery as well as to protect the stocks of rainbow trout in the face of the increasing effort observed during the surveys of 1986 through 1988.

During the fall of 1992, a rainbow trout stock assessment survey and a limited, 53-day creel survey were conducted on the Agulukpak River to gauge whether significant changes in the stock status or the fishery had occurred since 1988. The 1992 study estimated the population of rainbow trout in the upper half of the Agulukpak River to range between 1,764 and 3,128 fish greater than 340 mm (13 in) in length (Dunaway 1993). A statistical comparison of the age and length data collected during 1987 and 1992 failed to detect any change in the rainbow trout size composition. Results from the 1992 creel survey showed 2,759 angler-hours of effort were spent to catch 1,862 rainbow trout (Table 26). An informal creel survey conducted in 1996 recorded the highest estimates of effort and catch and second highest rate of catch observed in this fishery since surveys were initiated (Table 26, Rogan and Jaenicke 1997).

### Management Objectives

The Agulukpak River rainbow trout fishery is managed to maintain historical age and size composition and a diversity of angling opportunity by maintaining special management designation; fly-fishing-only catch-and-release regulations.

### 1997 Season

No surveys were conducted on the Agulukpak River rainbow trout fishery in 1997. Incidental contacts with anglers suggested that fishing was considered excellent, but dependent on water level and temperature.

### 1998 Outlook

In recent seasons, the recreational fishery for rainbow trout on the Agulukpak River has been excellent. Angler success was often moderate from early spring until mid autumn after the salmon began to spawn. Fall fishing is typically best after the peak of the salmon spawning until freeze-up. Comparison of the 1996 fishery with prior years' data indicate the present system of regulations adequately balances opportunity with stock conservation. No inseason changes are anticipated in 1998. The bag and possession for Dolly Varden/char and grayling have been reduced throughout the Bristol Bay area; please check the new regulations before harvesting these species.

## KANEKTOK RIVER

### Fishery Description

One of the most popular rainbow trout fisheries in the SWMA occurs on the Kanektok River where abundant and brilliantly colored rainbow trout offer excellent angling opportunities. This river is located in the Western section of the management area and drains west into the Kuskokwim Bay near the mouth of the Kuskokwim River (Figure 14). Mainly targeting salmon, the sport fishery grew very quickly since 1980 and subsequent conflicts between commercial and sport anglers drew statewide attention by the late 1980s. Changes in the management of the commercial fishery, and a drop in the level of sport fishing effort on the river, seem to have reduced the friction between the two groups. The river has become popular for float trips as air service from Dillingham has improved and as the river gained a reputation for excellent angling opportunities for abundant resident species as well as salmon. Angling effort is again growing.

## Historical Performance

Estimates of effort and harvest have been generated from the Statewide Harvest Survey since 1983. Sport fishing effort climbed rapidly from 1,517 angler-days in 1983 to a peak of 12,697 in 1988, and then dropped markedly. Sport fishing effort for the period 1989 to 1993 averaged 4,150 angler-days annually (Table 5). Since 1994 effort is again growing and in 1996 exceeded 8,000 angler-days and approached the levels observed in 1987 and 1988. Most effort is directed toward chinook and coho salmon but rainbow trout are an important attraction. The estimates of rainbow trout harvest are quite variable from year to year and averaged 116 rainbow trout per year from 1992 through 1996 (Table 22). The seven onsite creel surveys conducted on the Kanektok River by the department or the U.S. Fish and Wildlife Service targeted the salmon fisheries, and did not encompass enough of the season to produce a useful estimate of the harvest of rainbow trout (Snellgrove *Unpublished*, Alt 1986, Minard 1987c, Minard 1990, Minard and Brookover 1988b, Wagner 1991, Dunaway and Bingham 1992b, Dunaway and Fleischman 1995a). The U. S. Fish and Wildlife Service conducted studies of Kanektok River rainbow trout in 1993 and 1994 (Adams 1996).

## Management

Sport effort, catch, and harvest are estimated via the statewide harvest, catch, and participation survey (Mills 1979-1994, Howe et al. 1995-1997). Subsistence harvests are not well monitored and are managed by the Commercial Fisheries Management and Development Division. 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 Snellgrove (*Unpublished*), Alt (1986), Minard (1987c and 1990), Minard and Brookover (1988b), Wagner (1991), and Adams (1996).

Because of the low effort and harvest, little regulatory or management attention has been devoted to the Kanektok River rainbow trout stocks. The following is a regulatory chronology for the Kanektok rainbow trout fishery:

- 1969. Year-round open season and daily bag limit of 15 fish (including rainbow trout) of which no more than 3 could exceed 20 inches in length.
- 1985. Bag limit reduced to 2 fish per day of any size.
- 1990. Single-hook artificial lures required for the Kanektok River below the wilderness boundary of the Togiak National Wildlife Refuge. Sport fishing prohibited within 300 feet of a legally set subsistence gill net.

There have been no indications that further management actions are necessary, however occasional monitoring of this popular fishery would be prudent. Estimates of stock abundance would be useful in assessing stock status. Unfortunately the cost and difficulties associated with designing a statistically valid project on such a long river have so far confounded biologist's attempts to obtain sound assessments of this population or to measure the likely effects of the sport fishery (Adams 1996). The variety of salmon species which spawn in the river should impart a measure of stability to the population of Kanektok River rainbow trout by allowing it to be less dependent upon the success or failure of a single run of salmon.

### Management Objectives
The Kanektok River rainbow trout fishery is managed to maintain historical age and size composition, and abundance levels such that stocking is not needed to enhance or supplement the wild population.

### 1997 Season
No surveys were conducted on the Kanektok River rainbow trout fishery in 1997. Incidental contacts with anglers provided a large range of opinion on the status of the fishery. Sport fishing effort during the last few seasons has grown steadily from past years according to the U.S. Fish and Wildlife Service staff of the Togiak Refuge. Residents of the community of Quinhagak at the outlet of the Kanektok River, at least two commercial operators who use the river, and a number of private individuals have repeatedly expressed their concern for the growing use of the river and the angling pressure on the rainbow trout stocks. In the last two to three seasons, reports of angling success have ranged from poor to excellent with no apparent consensus of opinion emerging.

### 1998 Outlook
The Kanektok River rainbow trout fishery has been good to excellent in recent years and there are no indications that 1998 should be different. Angling success on the Kanektok River in 1998 may depend most heavily on weather and water conditions. No inseason management actions are anticipated for the 1998 season.

Sport fishing throughout the Kanektok River drainage is now restricted to unbaited single-hook artificial lures the entire year. From June 8 through October 31, rainbow trout in the Kanektok River may not be possessed or retained (catch-and-release only). Bag and possession limits for grayling and char were reduced to 2 and 3, respectively. Anglers are advised to check the 1998 regulation book.

## NORTHWESTERN RAINBOW TROUT FISHERIES
Northwestern section rainbow trout are found in the Aniak, Kisaralik, Kasigluk, and Kwethluk rivers, all of which flow northwesterly into the Kuskokwim River from the Kilbuck Mountains. Until recently, most of the sport effort in this section was limited to the residents of communities along the lower Kuskokwim River. Since 1983, the sport fishery has grown as guides and outfitters from Bristol Bay and within the Kuskokwim drainage offer more services on these and other nearby rivers. The annual harvest of rainbow trout in the Northwestern section has ranged from 892 fish in 1983 to as low as 18 fish in 1988. From 1992-1996 harvest estimates have stabilized somewhat to average 252 fish per year (Table 22).

Rainbow trout in the Northwestern section are at the far extreme of their range in North America and can be characterized as slow growing, with small size at age, and not particularly abundant. The Northwestern section's severe environment is assumed to make its rainbow trout populations very sensitive to changes in climate and food availability. Sustaining a population which demonstrates such slow growth, low productivity, and environmental sensitivity typically requires conservative management strategies.

The Aniak River drainage is the only special management area found in the Northwestern section. Above its confluence with the Doestock River the Aniak River is restricted to unbaited single-hook artificial lures, and catch-and-release for rainbow trout. However, the situation may

change by the 1998 fishing season. Several proposals have been submitted to the Alaska Board of Fisheries to establish special management areas and reduced bag limits for rainbow trout in the upper reaches of the Kisaralik, Kwethluk, and Kasigluk rivers. The proposals appear to have strong local support and will be considered during the December 1997 meeting in Fairbanks. Anglers planning trips to these waters in 1998 should check with the department or new regulation summaries (available in late May 1998) for new regulations on these fisheries.

General growth of sport fishing in the Northwestern section and poor runs of chum salmon in 1993 and 1994 prompted concern from many local residents more accustomed to subsistence fisheries and few outside visitors. These concerns as well as the department's interest in monitoring unstudied "edge" rainbow trout populations have resulted in two exploratory sport fishery projects on the Aniak River - the most popular water in the section. In 1993 Sport Fish Division staff spent 10 days in late July and August observing the sport fishery and collecting biological data from rainbow trout, char and grayling in the middle portion of the Aniak River. These data were a quick snap shot of the resident fish and fisheries and provided little quantitative information.

Another more extensive project was conducted for about 6 weeks in 1996 (Dunaway 1997). The anticipated poor chum salmon run was the major impetus behind the project but the department used it as an opportunity to become familiar with aspects of the area's fisheries and to assess the need and feasibility for quantitative fisheries studies. Though the sport fishery on the Aniak River did not appear to be a threat to resident species populations, there seemed to be general support for additional restrictions on the sport harvest of resident species. The sport fishery did not appear to conflict with the subsistence fisheries. This sport fishery is still small and diffuse, expensive to survey and given its low impact is not likely to warrant a more formal survey in the next 2 to 3 years. In the interim, additional informal visits to the fishery would be beneficial.

As with the Aniak River, angling is growing on the Kisaralik, Kwethluk, and Kasigluk rivers. These rivers are within the huge Yukon-Kuskokwim Delta Wildlife Refuge (YKD). The lower reaches of these rivers support important subsistence fisheries for nearby villages as well as popular recreational fisheries for Bethel based anglers. A lake at the head of the Kisaralik River makes it attractive to rafting enthusiasts who are looking for new waters. Several falls or cascades in its upper reaches make it most suited to individuals with considerable wilderness experience. The accessibility, complex land ownership patterns and subsistence concerns spurred the refuge to complete a management plan for the uplands along this river. In 1997 the USFWS began a study of the Kisaralik River rainbow trout population. The study may take more than one season to complete and interim results of the 1997 work were not immediately available.

Relatively difficult access appears to make this river less appealing to float trip anglers. Most effort occurs in the lower river accessible by motorboat. In 1996 the USFWS floated the river and tagged many rainbow trout. The tagging had not been planned and was not conducted according to a rigorous study design (Ken Harper, USFWS, Fisheries Research, Kenai, personal communication). However the work succeeded in collecting the most extensive and only recent data on this fish population.

Much of the Kisaralik River has been designated as a special management area, catch-and-release only for rainbow trout and restricted to unbaited single-hook artificial lures for all species.

The Kwethluk River above Three Step Mountain and the Kasigluk River are restricted to unbaited single-hook artificial lures for all species. Daily bag and possession limits for rainbow trout are 1 fish 14 inches or less in length.

The department expects interest in the Northwestern section rainbow trout fisheries to grow and these stocks will eventually need additional monitoring and management strategies.

# SECTION VII: OTHER SPECIES FISHERIES

Southwest Alaska offers diverse sport fishing opportunity for a large variety of species that often go unnoticed because of the publicity given the more popular species. Arctic char/Dolly Varden, Arctic grayling, lake trout, and chum salmon, to name four, are species that contribute to the sport fishing pleasures of many anglers who fish the area. Harvest estimates are made annually for these "other species" and trends are followed as for the more popular sport species. Estimates of harvest by species can be found in Appendix A of this report.

The bag and possession for Dolly Varden/char and grayling have been reduced throughout the Bristol Bay and Kuskokwim areas. In addition, the daily bag and possession limits for pike and sheefish were reduced in the Kuskokwim areas; please check the new regulations before harvesting these species. New gear restrictions apply to all, or portions of the Kisaralik, Kasigluk, Kwethluk, Kanektok, and Goodnews rivers; please check your 1998 regulation book for details.

## WOOD RIVER LAKES ARCTIC CHAR

### Fishery Description

The recreational fishery for Arctic char in the Wood River Lakes is the largest fishery for this species in the SWMA. Before 1989, sport fishing effort in the Wood River Lakes averaged about 3,000 angler-days per year but since 1989 has averaged about 8,400 angler-days. Much of the effort is aimed at char and Dolly Varden, and the bulk of the sport harvest for these two species occurs at the mouths of the Agulowak and Agulukpak rivers.

### Historical Performance

Abundance of Arctic char at the Agulowak was first estimated in 1954. Since that time, abundance has been estimated for the years 1971 through 1980. With the exception of 1980, abundance estimates indicated a very stable population of 8,000 to 12,000 Arctic char was present at the mouth of the Agulowak.

Similar, but less extensive, data are available for the Agulukpak population. Abundance there was also stable, between 4,300 to 7,800 fish.

In 1993 a stock assessment project indicated that the Agulowak stock was in a depressed state, numbering 5,000 fish, or about half the number documented a decade ago (Minard and Hasbrouck 1994). This prompted emergency order reduction in bag limits for the 1994 season and subsequently action by the Board of Fisheries at the January 1995 meeting to reduce limits. Bag limits for the Agulowak fishery were dropped from 10 per day to 2 per day and in possession. Additionally, a single-hook artificial lure restriction was adopted for the portion of Lake Aleknagik within a half mile radius of the mouth of the Agulowak River.

Since the Board action, harvests for the Wood River Lake system have remained fairly stable, around 1,200 fish per year. The vast majority of the harvest comes from the Agulowak River stock; the fishery at the Agulukpak is primarily catch-and-release although a liberal limit of 10 fish per day is allowed.

### Management

Sport effort, catch, and harvest are estimated via the statewide harvest survey. Subsistence harvests are not well monitored and are managed by the Commercial Fisheries Management and

Development Division. 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).

Bag and possession limits are generally liberal, 10 fish per day, no size limit; bait is allowed throughout the system except for the Agulowak where bag and possession limits are 2 per day and only single-hook artificial lures may be used (ADF&G 1997b).

### Management Objectives

The management objectives for this fishery are to:

1. Maintain the Agulukpak stock at historic levels and sizes previously documented, and
2. Rebuild the Agulowak stock to previously reported levels observed in the 1980s.

Management objectives for the Agulowak River stock will be addressed by keeping exploitation rates to less than 10% of the available stock size and by minimizing mortality associated with catch-and-release fishing.

### 1997 Season

Sport fishing was reported excellent this season with many anglers remarking about the increased size of char available for capture. Although no formal follow-up work has been done concerning the Agulowak stocks, it appears that the reduced limits, change in gear type, and public education campaign has resulted in some benefit to the stock. Periodic enforcement trips indicated a high degree of compliance with the new restrictions as well as a high degree of acceptance. Management objectives established for this fishery are being met.

### 1998 Outlook

Agulowak River: Fishing is expected to continue to improve for several years. Catch rates are expected to be high in June and July. The daily bag limit remains at 2 fish per day.

Agulukpak River: This river has fished exceptionally well during the last several seasons and is expected to do so again in 1998.

## KUSKOKWIM RIVER CHUM SALMON

### Fishery Description

Kuskokwim River chum salmon stocks are harvested primarily for subsistence and commercial use. Subsistence use of chum salmon has been documented as early as 1922 when sporadic surveys were first conducted (Francisco et al. 1993). The subsistence fishery is subject to few restrictions and most subsistence fishing is accomplished by the use of drift gill nets. Directed commercial harvests started in 1971. The chum salmon fishery was allowed to expand with management consisting of catch monitoring. In 1983, escapement-based management was instituted.

The sport fishery for Kuskokwim chum salmon is a very minor component of the overall harvest. Most of the harvest takes place in tributary streams and other small fisheries targeting chinook salmon. The total sport harvest of chum salmon in the lower Kuskokwim River (Northwestern area) has ranged from 118 to 1,665 fish per year and lately has averaged 429 fish per year (Appendix A2). The Aniak River, a major tributary of the Kuskokwim, supports the largest sport fishery for chum salmon with a peak annual harvest of 1,140 fish estimated in 1989 (Appendix

A2). Annual sport harvest of Aniak River chum salmon is usually much lower than the 1989 estimate, and from 1992 through 1996 averaged 175 fish (Appendix A2).

## Management

In 1983, chum salmon escapement goals were established for several Kuskokwim River tributary streams based on the average observed escapement in those waters since 1960. Basic to this management approach was the assumption that achieving these goals should maintain salmon returns at historic levels, and that observing returns from these escapements would allow for adjustment of the goals to achieve maximum sustained yield (Francisco et al. 1993). The primary indicators have long been escapement enumeration by the Aniak River sonar, remote Kogrukluk River weir, and aerial spawning ground surveys conducted by CFMD. Other state or federal projects designed to assess salmon run strength in the Kuskokwim drainage have been added including test fishing, Bethel sonar, and various weirs on other tributaries. Reduced funding has since terminated some programs, some were abandoned as ineffective, and a couple weir projects were terminated when nearby communities asked for their removal.

Exceptionally poor runs of the Kuskokwim River drainage chum salmon in 1993 and 1994 resulted in extensive restrictions in the sport and commercial fisheries. The sport harvest of chum salmon was prohibited by emergency order in 1993, and in 1994 an emergency order reduced the bag limit to 1 fish per day. In addition, Sport Fish Division visited the Aniak River in late July and August of 1993, observing the sport fishery and collecting biological data from resident species.

In 1996 and 1997, the Bureau of Indian Affairs provided funding for additional enumeration and research projects to address the potential long-term effects of the 1993 and 1994 returns. Counting towers were installed on the Kwethluk and Takotna rivers and a weir on the George River. The projects were operated jointly by the department and local Native organizations. In addition, the department used a new sonar site and new sonar equipment on the Aniak River.

A sport fish project was conducted on the Aniak River for about 6 weeks in 1996 (Dunaway 1997). The anticipated poor chum salmon run was the major impetus behind the project but the department used it as an opportunity to become familiar with the area's fisheries and to assess the need and feasibility for quantitative fisheries studies. Anglers and guides were interviewed in an informal creel survey to obtain data on the duration of fishing time, species targeted, numbers of fish kept and released, and demographic information. Biological data were collected from sport-caught salmon and resident species. Over 70% of the anglers were guided, nonresident men. Use was divided into motor boat, camp or lodge-based anglers in the lower and middle river, and rafting parties accessing the upper river from the Salmon River or other tributaries. The sport fishery on the Aniak River did not appear to be a threat to salmon or resident species populations. The sport fishery did not appear to conflict with the subsistence fisheries. This sport fishery is still small and diffuse, expensive to survey, and given its low impact is not likely to warrant a more formal survey in the next 2 to 3 years. In the interim, additional informal visits to the fishery would be beneficial.

The lower portion of the Kuskokwim River is divided into two commercial fishing districts, District 1 near Bethel and District 2 including the river near the community of Aniak. The Kuskokwim chum salmon subsistence and commercial fisheries continue to be managed for BEGs in several key tributaries. Commercial fishery management actions are usually made after

consultation with the Kuskokwim Working Group. The Working Group includes department representatives, commercial processing representatives, and individuals from communities along the length of the Kuskokwim River representing traditional knowledge, subsistence, commercial, and sport interests. Since 1996, Sport Fish staff from the Dillingham office have increased their participation in the group meetings via teleconferences.

## Management Objectives

Kuskokwim River chum salmon stocks are managed to achieve biological escapements of 30,000 fish past the Kogrukluk weir, and 250,000 fish past the Aniak River sonar counter.

## 1997 Season

The 1997 chum salmon return to the Kuskokwim River was expected to be poor based on parent-year escapement estimates. The one and only commercial opening (6 hours in District W-1), the Bethel test fish project, early Aniak sonar counts and all other escapement monitoring indicated low numbers of returning chum salmon. Restrictions were immediately placed on the commercial fishery June 23. On July 10, Emergency Order No. 2-CS-5-22-97 was issued closing sport fishing including catch-and-release fishing for chum salmon in the Kuskokwim River drainage. This action was part of a comprehensive harvest reduction strategy designed to reduce overall mortality on these stocks. The department issued notice that the fisheries would not be opened until indications from escapement monitoring projects indicated a harvestable surplus was available. The commercial fishery did not resume until August when coho salmon were targeted, and the sport closure remained in effect for the remainder of the year.

The 250,000 chum salmon escapement goal was achieved in the Aniak River, far better than was expected considering the poor parent return of 1993. Most other tributaries in the drainage did not produce as well and the total return to the Kuskokwim was well below average.

## 1998 Outlook

Chum salmon return to the Kuskokwim primarily at 5 and 4 years of age. The parent-year escapements for the 1998 return are the poor returns of 1993 and 1994. As in 1997, the season will be approached cautiously and emergency order restrictions are possible for all 1998 fisheries. New gear restrictions apply to all, or portions of the Kisaralik, Kasigluk, and Kwethluk rivers; please check your 1998 regulation book. Before participating in this fishery, anglers are advised to check with department offices or call 907-842-REGS for recorded inseason regulation changes.

# SECTION VIII: 1997 MANAGEMENT ACTIONS

Eight emergency orders affecting sport fisheries of the SWMA were issued in 1997. Four addressed sport fishing for chinook salmon, one addressed chum salmon, one addressed coho salmon, one addressed Arctic char fisheries and one addressed a rainbow trout sport fishery. The following is a list and brief description of those management actions.

| Emergency Order No. | Explanation |
|---|---|
| 2-RT-5-04-97.<br>Effective: 12:01 a.m.<br>Saturday, January 30, 1997.<br><br>Issued at Dillingham, January 30, 1997. | This emergency order reduces the daily bag and possession limit for rainbow trout in the Alagnak River drainage to catch and release only. All rainbow trout caught in the Alagnak River drainage and all tributaries downstream from the outlet of Nonvianuk Lake, must be released immediately. Effective from June 8, 1997 through October 31, 1997. |
| 2-DV-5-05-97.<br>Effective: 12:01 a.m.<br>Saturday, June 8, 1997.<br><br>Issued at Dillingham, January 30, 1997. | This emergency order reduces the daily bag and possession limit for Arctic char/Dolly Varden in the Iliamna River from 10 per day to catch and release. This emergency order is effective June 8, 1997 and will remain in effect until 11:59 p.m. Wednesday, December 31, 1997. |
| 2-KS-5-03-97.<br>Effective: 12:01 a.m.<br>Monday, February 3, 1997.<br><br>Issued at Dillingham, January 30, 1997. | This emergency order reduces the daily bag and possession limit for chinook salmon in the Nushagak and Mulchatna river drainages from 3 per day and in possession, of which 2 may be over 28 inches in length, to 1 fish, no size limit. |
| 2-KS-5-20-97.<br>Effective: 12:01 a.m.<br>Monday, June 30, 1997.<br><br>Issued at Dillingham, June 29, 1997. | This emergency order eliminates the daily bag and possession limit for chinook salmon in the Nushagak and Mulchatna river drainages: chinook salmon may not be possessed or retained for the remaining portion of the season. This emergency order also prohibits the use of bait in the Nushagak and Mulchatna river drainage for the period June 30 through July 24, 1997. All chinook salmon caught in the Nushagak and Mulchatna river must be released immediately, and the use of bait is prohibited through July 24, 1997. |
| 2-KS-5-19-97.<br>Effective: 12:01 a.m.<br>Monday, June 30, 1997.<br><br>Issued at Dillingham, June 29, 1997. | This emergency order reduces bag and possession limits for chinook salmon in the Togiak River drainage from 3 per day and in possession, of which only 2 may be over 28 inches in length, to 1 fish, no size limit. |

| Emergency Order No. | Explanation |
|---|---|
| 2-CS-5-22-97.<br>Effective: 12:01 a.m.<br>Thursday, July 10, 1997.<br><br>Issued at Dillingham, July 8, 1997. | This emergency order closes sport fishing, including catch and release fishing, for chum salmon in the Kuskokwim River drainage, including tributaries. This closure is for the Kuskokwim River and its tributaries only, and does not affect waters draining into Kuskokwim Bay such as the Kanektok and Goodnews rivers. |
| 2-KS-5-23-97.<br>Effective: 12:01 a.m.<br>Friday, July 11, 1997.<br><br>Issued at Dillingham, July 9, 1997. | This emergency order prohibits the taking of chinook salmon (including catch and release) in the Naknek River from Department markers at Rapids Camp upstream to Department markers located at the outlet of Naknek Lake. This emergency order is effective from 12:01 a.m. Friday, July 11, 1997 to 12:01 a.m. Friday, August 1, 1997 when the drainage-wide spawning season closure becomes effective. |
| 2-SS-5-30-97.<br>Effective: 12:01 a.m.<br>Thursday, August 7, 1997.<br><br>Issued at Dillingham, August 5, 1997. | This emergency order prohibits the taking of coho salmon (including catch and release) in the Nushagak and Mulchatna river drainages from 12:01 a.m. Thursday, August 7, 1997 through 11:59 p.m. Wednesday, December 31, 1997. All coho salmon taken or caught incidentally by sport fishing methods and means must be released. |

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# APPENDIX A

**Appendix A1.-Sport harvest of pink salmon from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 356 | 0 | 34 | 0 | 0 | 0 | 0 | 0 [a] | 31 [a] | 0 |
| Egegik/Becharof | 0 | 77 | 0 | 17 | 0 | 0 | 0 | 249 [a] | 0 [a] | 0 [a] | 0 [a] |
| Naknek R. | 0 | 1,723 | 0 | 818 | 0 | 859 | 0 | 1,584 | 0 | 3,089 | 23 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 [a] | 0 [a] | 0 |
| Bay of Islands | | | | | | | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 12 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 | 0 | 204 | 0 |
| Copper R. | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 0 | 0 | 0 | 748 | 0 | 0 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 | 0 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 0 | 25 | 0 | 0 | 0 |
| Subtotal | 0 | 2,187 | 0 | 869 | 0 | 859 | 0 | 2,843 | 24 | 3,324 | 23 |

-continued-

**Appendix A1.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Egegik/Becharof | 0 [a] | 26 | 0 | 0 | 0 | 0 | 34 | 0 | 139 | 35 |
| Naknek R. | 2,939 | 26 | 512 | 10 | 119 | 9 | 25 | 35 | 86 | 55 |
| Naknek L. | 155 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 0 [a] | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 26 | 97 | 0 | 101 | 0 | 0 | 19 | 0 | 24 |
| Brooks L. | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | | | | 9 | 0 | 0 | 0 [a] | 0 [b] | 2 |
| Kvichak R. | 62 | 101 | 141 | 218 | 119 | 0 | 24 | 0 | 0 | 29 |
| Copper R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 0 [a] | 25 | 94 | 150 | 192 | 60 | 73 | 19 | 317 | 132 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 0 | 25 | 0 | 0 | 0 | 43 | 8 | 0 | 99 | 30 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 990 | 51 | 12 | 122 | 101 | 112 | 102 | 75 | 114 | 101 |
| Subtotal | 4,146 | 280 | 868 | 500 | 641 | 224 | 266 | 148 | 755 | 407 |

-continued-

**Appendix A1.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 0 | 836 | 0 | 258 | 0 | 73 | 0 | 50 | 0 | 175 | 0 |
| Mulchatna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 109 |
| Wood River L. | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 50 | 43 | 0 | 0 |
| Tikchik/Nuyakuk | 0 | 232 | 0 | 60 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 1,099 | 0 | 318 | 0 | 73 | 0 | 112 | 43 | 175 | 109 |
| Western | | | | | | | | | | | |
| Togiak | 0 | 0 | 0 | 112 | 0 | 210 | 10 | 25 | 0 [a] | 58 | 0 [a] |
| Goodnews | | | | | | | 168 | 78 [a] | 0 | 0 [a] | 0 [a] |
| Kanektok | | | | | | | 210 | 195 | 0 | 72 | 18 |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 0 | 0 | 0 | 112 | 0 | 210 | 388 | 298 | 0 | 130 | 18 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 0 | 0 | 0 | 0 | 0 |
| Subtotal | | | | | | | 0 | 0 | 0 | 0 | 0 |
| Eastern | 0 | 2,187 | 0 | 869 | 0 | 859 | 0 | 2,843 | 24 | 3,324 | 23 |
| Central | 0 | 1,099 | 0 | 318 | 0 | 73 | 0 | 112 | 43 | 175 | 109 |
| Western | 0 | 0 | 0 | 112 | 0 | 210 | 388 | 298 | 0 | 130 | 18 |
| Northwestern | | | | | | | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 3,286 | 0 | 1,299 | 0 | 1,142 | 388 | 3,253 | 67 | 3,629 | 150 |

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**Appendix A1.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 31 | 182 | 90 | 11 | 165 | 0 | 38 | 144 | 174 | 104 |
| Mulchatna | 62 | 26 | 0 | 0 | 0 | 0 | 43 | 9 | 20 | 14 |
| Wood River L. | 31 | 104 | 23 | 79 | 119 | 0 | 107 | 0 | 10 | 47 |
| Tikchik/Nuyakuk | 31 | 0 | 0 | 0 | 27 | 0 | 16 | 0 | 10 | 11 |
| Koktuli R. | | | | | 0 | 0 | 0 | 0 [a] | 10 | 2 |
| Other | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 20 | 4 |
| Subtotal | 155 | 312 | 136 | 90 | 311 | 0 | 204 | 153 | 244 | 182 |
| Western | | | | | | | | | | |
| Togiak | 31 [a] | 156 | 0 | 11 | 27 | 0 | 90 | 0 | 10 | 25 |
| Goodnews | 55 [a] | 0 | 43 [a] | 12 | 0 | 17 | 32 | 0 | 19 | 14 |
| Kanektok | 437 | 45 | 145 | 0 | 9 | 0 | 26 | 9 | 49 | 19 |
| Other | 218 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 741 | 201 | 188 | 23 | 36 | 17 | 148 | 9 | 78 | 58 |
| Northwestern | | | | | | | | | | |
| Aniak | 182 [a] | 34 | 29 | 0 | 156 | 10 | 0 | 0 | 0 | 33 |
| Kisaralik | | | | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | | | | 27 | 0 | 51 [a] | 0 [a] | 0 [a] | 16 |
| Other | 0 | 0 | 130 | 12 | 27 | 0 | 0 | 0 | 0 | 5 |
| Subtotal | 182 | 34 | 159 | 12 | 210 | 10 | 51 | 0 | 0 | 54 |
| Eastern | 4,146 | 280 | 868 | 500 | 641 | 224 | 266 | 148 | 755 | 407 |
| Central | 155 | 312 | 136 | 90 | 311 | 0 | 204 | 153 | 244 | 182 |
| Western | 741 | 201 | 188 | 23 | 36 | 17 | 148 | 9 | 78 | 58 |
| Northwestern | 182 | 34 | 159 | 12 | 210 | 10 | 51 | 0 | 0 | 54 |
| Total | 5,224 | 827 | 1,351 | 625 | 1,198 | 251 | 669 | 310 | 1,077 | 701 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix A2.-Sport harvest of chum salmon from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 61 [a] | 104 |
| Egegik/Becharof | 0 | 78 | 0 | 0 | 0 | 0 | 0 | 37 [a] | 0 [a] | 0 [a] | 0 [a] |
| Naknek R. | 78 | 302 | 18 | 86 | 54 | 126 | 31 | 112 | 124 | 387 | 243 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | | | | | | | 0 | 0 | 0 | 0 [a] | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 37 | 0 | 0 | 27 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 108 | 0 | 0 | 287 | 53 | 68 | 219 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 0 | 117 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 | 0 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 10 | 0 | 12 | 0 | 35 |
| Subtotal | 78 | 517 | 27 | 104 | 162 | 126 | 41 | 473 | 189 | 516 | 628 |

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**Appendix A2.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 26 | 0 | 0 | 8 | 0 | 19 | 0 | 28 | 11 |
| Egegik/Becharof | 93 [a] | 26 | 0 | 0 | 8 | 0 | 15 | 0 | 0 | 5 |
| Naknek R. | 371 | 260 | 239 | 398 | 175 | 34 | 36 | 173 | 47 | 93 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 0 [a] | 26 | 0 | 20 | 8 | 0 | 0 | 0 | 0 | 2 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | | | | 0 | 0 | 19 | 40 [a] | 84 [a] | 29 |
| Kvichak R. | 31 | 278 | 81 | 306 | 0 | 17 | 48 | 0 | 37 | 20 |
| Copper R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 31 [a] | 50 | 219 | 227 | 448 | 545 | 282 | 477 | 237 | 398 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 2 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 186 | 260 | 0 | 73 | 30 | 0 | 0 | 120 | 106 | 51 |
| Subtotal | 712 | 976 | 539 | 1,024 | 677 | 596 | 429 | 810 | 539 | 610 |

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**Appendix A2.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 24 | 117 | 64 | 17 | 130 | 293 | 336 | 399 | 72 | 117 | 54 |
| Mulchatna | 46 | 0 | 55 | 9 | 54 | 178 | 126 | 312 | 202 | 321 | 55 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 58 | 0 | 0 |
| Tikchik/Nuyakuk | 0 | 39 | 0 | 0 | 11 | 10 | 0 | 0 | 0 | 0 [a] | 0 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 52 | 0 | 0 | 29 | 55 |
| Subtotal | 70 | 156 | 119 | 26 | 195 | 481 | 514 | 723 | 332 | 467 | 164 |
| Western | | | | | | | | | | | |
| Togiak | 0 | 59 | 36 | 17 | 22 | 168 | 199 | 37 | 14 [a] | 0 | 27 [a] |
| Goodnews | | | | | | | 10 | 130 [a] | 124 | 0 [a] | 84 [a] |
| Kanektok | | | | | | | 315 | 376 | 323 [b] | 316 [b] | 112 [b] |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 0 | 59 | 36 | 17 | 22 | 168 | 524 | 543 | 461 | 316 | 223 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 115 [a] | 26 [a] | 75 [a] | 98 [a] | 70 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 21 | 286 | 25 | 98 | 167 |
| Subtotal | | | | | | | 136 | 312 | 100 | 196 | 237 |
| Eastern | 78 | 517 | 27 | 104 | 162 | 126 | 41 | 473 | 189 | 516 | 628 |
| Central | 70 | 156 | 119 | 26 | 195 | 481 | 514 | 723 | 332 | 467 | 164 |
| Western | 0 | 59 | 36 | 17 | 22 | 168 | 524 | 543 | 461 | 316 | 223 |
| Northwestern | | | | | | | 136 | 312 | 100 | 196 | 237 |
| Total | 148 | 732 | 182 | 147 | 379 | 775 | 1,215 | 2,051 | 1,082 | 1,495 | 1,252 |

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**Appendix A2.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 495 | 884 | 192 | 219 | 501 | 540 | 887 | 441 | 877 | 649 |
| Mulchatna | 124 | 156 | 203 | 55 | 175 | 133 | 64 | 83 | 197 | 130 |
| Wood River L. | 124 | 26 | 24 | 119 | 8 | 33 | 7 | 0 | 28 | 15 |
| Tikchik/Nuyakuk | 62 | 26 | 60 | 27 | 23 | 0 | 29 | 11 | 0 | 13 |
| Koktuli R. | | | | | 15 | 0 | 10 | 18 [a] | 31 | 15 |
| Other | 31 | 26 | 0 | 0 | 0 | 26 | 77 | 10 | 38 | 30 |
| Subtotal | 836 | 1,118 | 479 | 420 | 722 | 732 | 1,074 | 563 | 1,171 | 852 |
| Western | | | | | | | | | | |
| Togiak | 155 [a] | 130 | 24 | 37 | 8 | 17 | 153 | 105 | 64 | 69 |
| Goodnews | 18 [a] | 0 | 72 [a] | 189 | 0 | 156 | 15 | 0 | 0 | 34 |
| Kanektok | 618 | 537 | 202 | 80 | 251 | 183 | 156 | 213 | 200 | 201 |
| Other | 73 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 5 |
| Subtotal | 864 | 693 | 298 | 306 | 259 | 356 | 324 | 318 | 287 | 309 |
| Northwestern | | | | | | | | | | |
| Aniak | 91 [a] | 1,140 | 159 | 169 | 304 | 101 | 231 | 127 | 110 | 175 |
| Kisaralik | | | | | | | 58 | 0 [a] | 0 [a] | 19 |
| Kwethluk | | | | | 30 | 0 | 15 [a] | 90 [a] | 56 [a] | 38 |
| Other | 36 | 525 | 259 | 80 | 183 | 17 | 803 | 9 | 9 | 204 |
| Subtotal | 127 | 1,665 | 418 | 249 | 517 | 118 | 1,107 | 226 | 175 | 429 |
| Eastern | 712 | 976 | 539 | 1,024 | 677 | 596 | 429 | 120 | 539 | 472 |
| Central | 836 | 1,118 | 479 | 420 | 722 | 732 | 1,074 | 563 | 1,171 | 852 |
| Western | 864 | 693 | 298 | 306 | 259 | 356 | 324 | 318 | 287 | 309 |
| Northwestern | 127 | 1,665 | 418 | 249 | 517 | 118 | 1,107 | 226 | 175 | 429 |
| Total | 2,539 | 4,452 | 1,734 | 1,999 | 2,175 | 1,802 | 2,934 | 1,227 | 2,172 | 2,062 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

[b] Estimates from onsite creel survey.

**Appendix A3.-Sport harvest of lake trout from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 14 | 45 | 9 | 9 | 11 | 10 | 10 | 37 | 52 [a] | 3 [a] | 172 |
| Egegik/Becharof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 [a] | 0 [a] | 0 [a] | 21 [a] |
| Naknek R. | 34 | 27 | 9 | 164 | 65 | 42 | 136 | 187 | 52 | 159 | 21 |
| Naknek L. | 23 | 0 | 18 | 155 | 130 | 84 | 105 | 25 | 17 [a] | 40 | 236 |
| Bay of Islands | | | | | | | 52 | 312 | 121 | 76 [a] | 150 |
| Brooks R. | 11 | 9 | 9 | 17 | 11 | 0 | 31 | 12 | 0 | 0 | 43 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 104 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 0 | 0 | 0 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 0 | 0 | 0 | 0 | 0 | 1,257 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 122 | 118 | 518 | 172 | 410 | 430 | 273 | 786 | 59 | 714 | 137 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 | 46 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 94 | 112 | 548 | 144 | 422 |
| Subtotal | 204 | 199 | 563 | 517 | 627 | 566 | 701 | 1,545 | 968 | 2,393 | 1,248 |

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**Appendix A3.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 114 | 33 | 17 | 39 | 72 | 59 | 66 | 64 | 60 |
| Egegik/Becharof | 0 [a] | 10 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 2 |
| Naknek R. | 36 | 10 | 33 | 17 | 8 | 28 | 44 | 0 | 112 | 38 |
| Naknek L. | 109 [a] | 0 | 11 | 17 | 39 | 29 | 48 | 27 | 0 | 29 |
| Bay of Islands | 73 [a] | 42 | 11 | 68 | 39 | 40 | 15 | 10 | 63 | 33 |
| Brooks R. | 18 | 10 | 11 | 0 | 0 | 9 | 0 | 0 | 0 | 2 |
| Brooks L. | | | 535 | 85 | 116 | 28 | 169 | 140 | 74 | 105 |
| American Cr. | 0 [a] | 10 | 11 | 0 [a] | 8 | 0 | 0 | 0 | 0 | 2 |
| King Salmon R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 36 | 30 | 0 | 14 | 0 | 0 | 69 | 0 | 46 | 23 |
| Copper R. | 0 [a] | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 73 [a] | 20 | 74 | 14 | 8 | 83 | 15 | 0 | 9 | 23 |
| Newhalen R. | 0 | 20 | 21 | 127 | 39 | 20 | 143 | 29 | 0 | 46 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 18 [a] | 485 | 402 | 113 | 247 | 219 | 437 | 219 | 126 | 250 |
| Lake Iliamna | 18 | 30 | 42 | 0 | 46 | 156 | 194 | 0 | 18 | 83 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 199 | 238 | 93 | 110 | 294 | 207 | 271 | 32 | 120 | 185 |
| Subtotal | 580 | 1,029 | 1,277 | 582 | 883 | 900 | 1,464 | 523 | 632 | 880 |

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**Appendix A3.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 46 |
| Mulchatna | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 29 | 88 | 92 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 |
| Tikchik L. | 28 | 45 | 45 | 69 | 194 | 10 | 21 | 87 | 58 | 0 [a] | 275 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 1,259 | 37 | 0 | 58 | 367 |
| Subtotal | 28 | 45 | 72 | 69 | 194 | 10 | 1,322 | 149 | 87 | 146 | 780 |
| Western | | | | | | | | | | | |
| Togiak | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] |
| Goodnews | | | | | | | 0 | 0 [a] | 17 | 0 [a] | 14 [a] |
| Kanektok | | | | | | | 0 | 117 | 0 | 9 | 14 |
| Other | | | | | | | 0 | 52 | 0 | 0 | |
| Subtotal | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 169 | 17 | 9 | 28 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 0 | 0 | 0 | 1,101 | 0 |
| Subtotal | | | | | | | 0 | 0 | 0 | 1,101 | 0 |
| Eastern | 204 | 199 | 563 | 517 | 627 | 566 | 701 | 1,545 | 968 | 2,393 | 1,248 |
| Central | 28 | 45 | 72 | 69 | 194 | 10 | 1,322 | 149 | 87 | 146 | 780 |
| Western | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 169 | 17 | 9 | 28 |
| Northwestern | | | | | | | 0 | 0 | 0 | 1,101 | 0 |
| Total | 232 | 244 | 635 | 603 | 821 | 576 | 2,023 | 1,863 | 1,072 | 3,649 | 2,056 |

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**Appendix A3.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 0 | 42 | 0 | 0 | 8 | 31 | 107 | 7 | 45 | 40 |
| Mulchatna | 437 | 0 | 11 | 0 | 0 | 0 | 156 | 9 | 0 | 33 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 51 | 22 | 0 | 0 | 15 |
| Tikchik L. | 327 | 437 | 176 | 86 | 31 | 192 | 55 | 76 | 207 | 112 |
| Koktuli R. | | | | | 0 | 0 | 0 | 0 [a] | 0 | 0 |
| Other | 127 | 133 | 99 | 69 | 23 | 37 | 0 | 131 | 74 | 53 |
| Subtotal | 891 | 612 | 286 | 155 | 62 | 311 | 340 | 223 | 326 | 252 |
| Western | | | | | | | | | | |
| Togiak | 0 [a] | 10 | 0 | 0 | 39 | 0 | 0 | 0 | 18 | 11 |
| Goodnews | 0 [a] | 38 | 0 [a] | 0 | 0 | 9 | 22 | 20 | 9 | 12 |
| Kanektok | 0 | 959 | 0 | 0 | 0 | 0 | 18 | 80 | 27 | 25 |
| Other | 0 | 328 | 18 | 0 | 15 | 0 | 0 | 0 | 0 | 3 |
| Subtotal | 0 | 1,335 | 18 | 0 | 54 | 9 | 40 | 100 | 54 | 51 |
| Northwestern | | | | | | | | | | |
| Aniak | 36 [a] | 63 | 18 | 0 | 47 | 0 | 231 | 61 | 9 | 70 |
| Kisaralik | | | | | | | 0 | 0 [a] | 28 [a] | 9 |
| Kwethluk | | | | | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 |
| Other | 0 | 55 | 18 | 215 | 309 | 160 | 0 | 29 | 53 | 110 |
| Subtotal | 36 | 118 | 36 | 215 | 356 | 160 | 231 | 90 | 90 | 185 |
| Eastern | 580 | 1,029 | 1,277 | 582 | 883 | 900 | 1,464 | 523 | 632 | 880 |
| Central | 891 | 612 | 286 | 155 | 62 | 311 | 340 | 223 | 326 | 252 |
| Western | 0 | 1,335 | 18 | 0 | 54 | 9 | 40 | 100 | 54 | 51 |
| Northwestern | 36 | 118 | 36 | 215 | 356 | 160 | 231 | 90 | 90 | 185 |
| Total | 1,507 | 3,094 | 1,617 | 952 | 1,355 | 1,380 | 2,075 | 936 | 1,102 | 1,370 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix A4.-Sport harvest of Dolly Varden/Arctic char from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 51 | 389 | 200 | 164 | 270 | 304 | 73 | 486 | 329 [a] | 84 [a] | 493 |
| Egegik/Becharof | 76 | 289 | 18 | 129 | 162 | 31 | 136 | 324 [a] | 121 [a] | 260 [a] | 43 [a] |
| Naknek R. | 195 | 127 | 527 | 1,679 | 1,609 | 786 | 808 | 2,831 | 416 | 1,506 | 13 [b] |
| Naknek L. | 9 | 36 | 18 | 43 | 140 | 94 | 42 | 200 | 17 [a] | 459 | 43 |
| Bay of Islands | | | | | | | 84 | 125 | 1,561 | 76 [a] | 21 |
| Brooks R. | 71 | 90 | 0 | 9 | 0 | 0 | 27 [b] | 0 | 17 | 0 | 21 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 10 [a] | 0 [a] | 191 [a] | 0 [a] | 64 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 165 | 154 | 55 | 60 | 43 | 42 | 21 | 137 | 59 | 0 | 46 |
| Copper R. | 6 | 9 | 18 | 43 | 22 | 10 | 10 | 0 [a] | 0 [a] | 0 [a] | 46 [a] |
| Alagnak R. | | | | | 86 | 0 | 21 | 75 | 0 | 170 | 412 |
| Newhalen R. | 85 | 163 | 182 | 405 | 54 | 241 | 199 | 262 | 711 | 204 | 366 |
| L Talarik Cr. | 6 | 9 | 9 | 69 | 65 | 0 | 10 | 0 [a] | 0 | 0 [a] | 0 [b] |
| Lake Clark | 25 | 9 | 136 | 77 | 173 | 859 | 126 | 37 | 15 | 0 | 46 |
| Lake Iliamna | | | | | | | 31 [a] | 623 [a] | 341 [a] | 204 | 92 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | 5 | | | | | | 218 | 710 | 1,625 | 197 | 893 |
| Subtotal | 694 | 1,275 | 1,163 | 2,678 | 2,624 | 2,367 | 1,816 | 5,810 | 5,403 | 3,160 | 2,599 |

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**Appendix A4.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 200 [a] | 104 | 164 | 165 | 41 | 248 | 275 | 77 | 90 | 146 |
| Egegik/Becharof | 346 [a] | 52 | 207 | 166 | 180 | 171 | 193 | 0 | 210 | 151 |
| Naknek R. | 101 [b] | 51 [b] | 939 | 580 | 721 | 568 | 401 | 356 | 746 | 558 |
| Naknek L. | 128 [a] | 145 | 0 | 179 | 0 | 19 | 47 | 117 | 0 | 37 |
| Bay of Islands | 54 [a] | 42 | 11 | 41 | 66 | 28 | 9 | 11 | 51 | 33 |
| Brooks R. | 18 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | 11 | 0 | 8 | 0 | 0 | 0 | 0 | 2 |
| American Cr. | 0 [a] | 42 | 22 | 442 [a] | 8 | 44 | 199 | 96 | 142 | 98 |
| King Salmon R. | | | | | 33 | 10 | 0 | 10 [a] | 101 [a] | 31 |
| Kvichak R. | 18 | 71 | 63 | 84 | 180 | 89 | 187 | 19 | 20 | 99 |
| Copper R. | 0 [a] | 20 | 0 | 118 | 16 | 9 | 57 | 0 | 0 | 16 |
| Alagnak R. | 36 [a] | 30 | 21 | 84 | 139 | 54 | 18 | 192 | 266 | 134 |
| Newhalen R. | 127 | 91 | 106 | 355 | 131 | 190 | 145 | 198 | 142 | 161 |
| L Talarik Cr. | 36 [a] | 10 [b] | 0 [b] | 84 | 82 | 0 | 0 | 0 | 0 | 16 |
| Lake Clark | 18 [a] | 202 | 42 | 51 | 82 | 86 | 203 | 43 | 39 | 91 |
| Lake Iliamna | 18 | 30 | 63 | 51 | 98 | 106 | 100 | 22 | 20 | 69 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 63 | 115 [a] | 0 [a] | 36 |
| Moraine Cr. | | | | | 0 | 0 | 18 | 0 | 0 | 4 |
| Other | 327 | 217 | 183 | 932 | 386 | 593 | 629 | 378 | 243 | 446 |
| Subtotal | 1,427 | 1,127 | 1,832 | 3,332 | 2,171 | 2,215 | 2,544 | 1,634 | 2,070 | 2,127 |

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**Appendix A4.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 23 | 45 | 136 | 206 | 151 | 231 | 346 | 274 | 159 | 29 | 138 |
| Mulchatna | 102 | 217 | 100 | 52 | 119 | 52 | 325 | 137 | 72 | 117 | 46 |
| Wood River L. | 435 | 905 | 685 | 646 | 529 | 1,048 | 2,108 | 1,559 | 882 | 526 | 2,335 |
| Tikchik L. | 34 | 217 | 145 | 232 | 713 | 272 | 147 | 349 | 130 | 0 [a] | 321 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 104 | 1,675 | 185 | 29 | 29 | 642 |
| Subtotal | 594 | 1,384 | 1,066 | 1,136 | 1,512 | 1,707 | 4,601 | 2,504 | 1,272 | 701 | 3,482 |
| Western | | | | | | | | | | | |
| Togiak | 133 | 72 | 236 | 560 | 345 | 671 | 1,007 | 758 [b] | 178 [b] | 1,133 [b] | 547 [b] |
| Goodnews | | | | | | | 147 | 195 [a] | 780 | 0 [a] | 306 [a] |
| Kanektok | | | | | | | 1,406 | 1,116 | 815 | 656 [b] | 752 |
| Other | | | | | | | 0 | 62 | 70 | 0 | |
| Subtotal | 133 | 72 | 236 | 560 | 345 | 671 | 2,560 | 2,131 | 1,843 | 1,789 | 1,605 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 105 [a] | 91 [a] | 69 [a] | 245 [a] | 56 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 1,227 | 130 | 35 | 98 | 237 |
| Subtotal | | | | | | | 1,332 | 221 | 104 | 343 | 293 |
| Eastern | 694 | 1,275 | 1,163 | 2,678 | 2,624 | 2,367 | 1,816 | 5,810 | 5,403 | 3,160 | 2,599 |
| Central | 594 | 1,384 | 1,066 | 1,136 | 1,512 | 1,707 | 4,601 | 2,504 | 1,272 | 701 | 3,482 |
| Western | 133 | 72 | 236 | 560 | 345 | 671 | 2,560 | 2,131 | 1,843 | 1,789 | 1,605 |
| Northwestern | | | | | | | 1,332 | 221 | 104 | 343 | 293 |
| Total | 1,421 | 2,731 | 2,465 | 4,374 | 4,481 | 4,745 | 10,309 | 10,666 | 8,622 | 5,993 | 7,979 |

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**Appendix A4.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 36 | 31 | 77 | 144 | 254 | 270 | 272 | 273 | 571 | 328 |
| Mulchatna | 291 | 41 | 165 | 131 | 172 | 200 | 121 | 232 | 245 | 194 |
| Wood River L. | 564 | 2,348 | 1,362 | 1,724 | 1,818 | 1,288 | 1,373 | 1,289 | 1,199 | 1,393 |
| Tikchik L. | 200 | 218 | 77 | 170 | 344 | 376 | 122 | 70 | 109 | 204 |
| Koktuli R. | | | | | 57 | 9 | 9 | 48 [a] | 129 | 50 |
| Other | 36 | 145 | 638 | 39 | 41 | 47 | 93 | 248 | 90 | 104 |
| Subtotal | 1,127 | 2,783 | 2,319 | 2,208 | 2,686 | 2,190 | 1,990 | 2,160 | 2,343 | 2,274 |
| Western | | | | | | | | | | |
| Togiak | 146 [b] | 218 | 88 | 78 | 66 | 117 | 137 | 99 | 318 | 147 |
| Goodnews | 291 [a] | 530 | 18 [a] | 605 | 82 | 343 | 132 | 158 | 240 | 191 |
| Kanektok | 2,146 | 1,073 | 1,020 | 389 | 66 | 378 | 233 | 212 | 474 | 273 |
| Other | 327 | 288 | 0 [a] | 0 | 41 | 0 | 0 | 0 | 10 | 10 |
| Subtotal | 2,910 | 2,109 | 1,126 | 1,072 | 255 | 838 | 502 | 469 | 1,042 | 621 |
| Northwestern | | | | | | | | | | |
| Aniak | 764 [a] | 808 | 598 | 547 | 115 | 260 | 496 | 481 | 159 | 302 |
| Kisaralik | | | | | | | 117 | 22 [a] | 238 [a] | 126 |
| Kwethluk | | | | | 57 | 97 | 134 [a] | 98 [a] | 223 [a] | 122 |
| Other | 0 | 655 | 89 | 476 | 433 | 334 | 187 | 201 | 260 | 283 |
| Subtotal | 764 | 1,463 | 687 | 1,023 | 605 | 691 | 934 | 802 | 880 | 782 |
| Eastern | 1,427 | 1,127 | 1,832 | 3,332 | 2,171 | 2,215 | 2,544 | 1,634 | 2,070 | 2,127 |
| Central | 1,127 | 2,783 | 2,319 | 2,208 | 2,686 | 2,190 | 1,990 | 2,160 | 2,343 | 2,274 |
| Western | 2,910 | 2,109 | 1,126 | 1,072 | 255 | 838 | 502 | 469 | 1,042 | 621 |
| Northwestern | 764 | 1,463 | 687 | 1,023 | 605 | 691 | 934 | 802 | 880 | 782 |
| Total | 6,228 | 7,482 | 5,964 | 7,635 | 5,717 | 5,934 | 5,970 | 5,065 | 6,335 | 5,804 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

[b] Estimates from onsite creel survey.

**Appendix A5.-Sport harvest of Arctic grayling from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 141 | 72 | 145 | 215 | 195 | 142 | 168 | 237 | 87 [a] | 122 [a] | 278 |
| Egegik/Becharof | 59 | 81 | 55 | 43 | 140 | 105 | 94 | 249 [a] | 87 [a] | 0 [a] | 21 [a] |
| Naknek R. | 484 | 398 | 300 | 1,128 | 799 | 796 | 1,007 | 1,297 | 347 | 474 | 213 [b] |
| Naknek L. | 17 | 0 | 18 | 0 | 0 | 105 | 10 | 12 | 0 | 153 | 21 |
| Bay of Islands | | | | | | | 0 | 0 | 0 | 0 [a] | 0 |
| Brooks R. | 50 | 63 | 73 | 26 | 43 | 0 | 21 | 12 | 69 | 0 | 21 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 139 [a] | 0 [a] | 21 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 361 | 579 | 136 | 207 | 162 | 136 | 63 | 87 | 311 | 68 | 504 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 73 | 31 | 0 [a] | 15 [a] | 0 [a] | 92 [a] |
| Alagnak R. | | | | | 119 | 52 | 94 | 436 | 518 | 578 | 138 |
| Newhalen R. | 88 | 172 | 164 | 207 | 54 | 576 | 252 | 536 | 681 | 102 | 641 |
| L Talarik Cr. | 60 | 36 | 18 | 86 | 65 | 63 | 10 | 0 [a] | 0 | 9 [b] | 19 [b] |
| Lake Clark | 275 | 606 | 373 | 301 | 626 | 377 | 713 | 698 | 726 | 1,801 | 641 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 | 46 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | 118 | | | | 115 | 361 | 429 | 0 | 681 |
| Subtotal | 1,535 | 2,007 | 1,400 | 2,213 | 2,203 | 2,425 | 2,578 | 3,925 | 3,409 | 3,307 | 3,337 |

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**Appendix A5.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 18 [a] | 41 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 2 |
| Egegik/Becharof | 18 [a] | 93 | 120 | 117 | 143 | 37 | 72 | 26 | 19 | 59 |
| Naknek R. | 157 [b] | 128 [b] | 197 | 337 | 316 | 501 | 240 | 185 | 140 | 276 |
| Naknek L. | 73 [a] | 10 | 11 | 13 | 0 | 0 | 10 | 0 | 0 | 2 |
| Bay of Islands | 0 [a] | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 3 |
| Brooks R. | 36 | 42 | 11 | 52 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 42 | 11 | 13 [a] | 0 | 0 | 0 | 0 | 19 | 4 |
| King Salmon R. | | | | | 0 | 9 | 0 | 0 [a] | 0 [a] | 2 |
| Kvichak R. | 36 | 141 | 127 | 122 | 180 | 139 | 225 | 148 | 84 | 155 |
| Copper R. | 18 [a] | 20 | 0 | 15 | 0 | 50 | 10 | 0 | 0 | 12 |
| Alagnak R. | 73 [a] | 222 | 106 | 184 | 180 | 171 | 113 | 104 | 178 | 149 |
| Newhalen R. | 218 | 171 | 85 | 291 | 263 | 185 | 224 | 399 | 259 | 266 |
| L Talarik Cr. | 18 [a] | 0 [b] | 0 | 31 | 23 | 0 | 41 | 70 | 28 | 32 |
| Lake Clark | 54 [a] | 313 | 402 | 168 | 548 | 568 | 568 | 270 | 262 | 443 |
| Lake Iliamna | 0 | 30 | 42 | 0 | 8 | 101 | 609 | 9 | 57 | 157 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 76 | 200 | 62 [a] | 41 [a] | 76 |
| Moraine Cr. | | | | | 0 | 0 | 8 | 0 | 0 | 2 |
| Other | 127 | 195 | 401 | 469 | 340 | 244 | 440 | 50 | 366 | 288 |
| Subtotal | 846 | 1,448 | 1,524 | 1,812 | 2,001 | 2,098 | 2,770 | 1,323 | 1,453 | 1,929 |

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**Appendix A5.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 34 | 72 | 345 | 95 | 238 | 283 | 273 | 312 | 116 | 409 | 92 |
| Mulchatna | 59 | 443 | 227 | 103 | 324 | 1,373 | 462 | 461 | 347 | 438 | 870 |
| Wood River L. | 201 | 199 | 527 | 525 | 259 | 587 | 692 | 237 | 159 | 58 | 92 |
| Tikchik L. | 108 | 199 | 318 | 775 | 400 | 84 | 776 | 274 | 347 | 175 [a] | 92 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 260 | 2,097 | 374 | 58 | 380 | 2,107 |
| Subtotal | 402 | 913 | 1,417 | 1,498 | 1,221 | 2,587 | 4,300 | 1,658 | 1,027 | 1,460 | 3,253 |
| Western | | | | | | | | | | | |
| Togiak | 26 | 18 | 200 | 241 | 43 | 31 | 315 | 150 | 0 [a] | 0 | 46 [a] |
| Goodnews | | | | | | | 178 | 104 [a] | 416 | 0 [a] | 14 [a] |
| Kanektok | | | | | | | 231 | 169 | 87 | 213 | 244 |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 26 | 18 | 200 | 241 | 43 | 31 | 724 | 423 | 503 | 213 | 304 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 63 [a] | 234 [a] | 35 [a] | 318 [a] | 111 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 1,364 | 26 | 746 | 195 | 237 |
| Subtotal | | | | | | | 1,427 | 260 | 781 | 513 | 348 |
| Eastern | 1,535 | 2,007 | 1,400 | 2,213 | 2,203 | 2,425 | 2,578 | 3,925 | 3,409 | 3,307 | 3,337 |
| Central | 402 | 913 | 1,417 | 1,498 | 1,221 | 2,587 | 4,300 | 1,658 | 1,027 | 1,460 | 3,253 |
| Western | 26 | 18 | 200 | 241 | 43 | 31 | 724 | 423 | 503 | 213 | 304 |
| Northwestern | | | | | | | 1,427 | 260 | 781 | 513 | 348 |
| Total | 1,963 | 2,938 | 3,017 | 3,952 | 3,467 | 5,043 | 9,029 | 6,266 | 5,720 | 5,493 | 7,242 |

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**Appendix A5.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 673 | 72 | 307 | 170 | 624 | 316 | 941 | 579 | 614 | 615 |
| Mulchatna | 1,037 | 260 | 285 | 425 | 210 | 762 | 314 | 604 | 580 | 494 |
| Wood River L. | 164 | 104 | 220 | 524 | 143 | 212 | 345 | 218 | 9 | 185 |
| Tikchik L. | 91 | 93 | 296 | 1,473 | 218 | 650 | 112 | 266 | 278 | 305 |
| Koktuli R. | | | | | 45 | 101 | 398 | 34 [a] | 197 | 155 |
| Other | 200 | 287 | 604 | 312 | 136 | 69 | 610 | 237 | 188 | 248 |
| Subtotal | 2,165 | 816 | 1,712 | 2,904 | 1,376 | 2,110 | 2,720 | 1,938 | 1,866 | 2,002 |
| Western | | | | | | | | | | |
| Togiak | 109 [a] | 62 | 0 | 0 | 23 | 65 | 20 | 26 | 28 | 32 |
| Goodnews | 200 [a] | 198 | 53 [a] | 122 | 0 | 17 | 0 | 14 | 47 | 16 |
| Kanektok | 164 | 58 | 123 | 54 | 23 | 25 | 0 | 0 | 0 | 10 |
| Other | 255 | 0 | 0 | 0 | 128 | 0 | 0 | 0 | 0 | 26 |
| Subtotal | 728 | 318 | 176 | 176 | 174 | 107 | 20 | 40 | 75 | 83 |
| Northwestern | | | | | | | | | | |
| Aniak | 273 [a] | 909 | 422 [a] | 1,085 | 121 | 288 | 116 | 53 | 103 | 136 |
| Kisaralik | | | | | | | 69 | 0 [a] | 121 [a] | 63 |
| Kwethluk | | | | | 75 | 47 | 49 [a] | 88 [a] | 28 [a] | 57 |
| Other | 200 | 734 | 71 | 773 | 295 | 208 | 227 | 333 | 75 | 228 |
| Subtotal | 473 | 1,643 | 493 | 1,858 | 491 | 543 | 461 | 474 | 327 | 459 |
| Eastern | 846 | 1,448 | 1,524 | 1,812 | 2,001 | 2,098 | 2,770 | 1,323 | 1,453 | 1,929 |
| Central | 2,165 | 816 | 1,712 | 2,904 | 1,376 | 2,110 | 2,720 | 1,938 | 1,866 | 2,002 |
| Western | 728 | 318 | 176 | 176 | 174 | 107 | 20 | 40 | 75 | 83 |
| Northwestern | 473 | 1,643 | 493 | 1,858 | 491 | 543 | 461 | 474 | 327 | 459 |
| Total | 4,212 | 4,225 | 3,905 | 6,750 | 4,042 | 4,858 | 5,971 | 3,775 | 3,721 | 4,473 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

[b] Estimates from onsite creel survey.

**Appendix A6.-Sport harvest of whitefish from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 21 |
| Egegik/Becharof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Naknek R. | 5 | 25 | 0 | 17 | 43 | 0 | 10 | 12 | 0 | 122 | 43 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 21 |
| Bay of Islands | | | | | | | 0 | 0 | 0 | 0 [a] | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 0 | 0 | 0 | 25 | 0 | 34 | 46 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 3 | 0 | 0 | 0 | 140 | 168 | 168 | 75 | 805 | 680 | 0 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 | 0 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 0 | 0 | 350 | 34 | 0 |
| Subtotal | 8 | 25 | 0 | 17 | 183 | 168 | 178 | 137 | 1,155 | 870 | 152 |

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**Appendix A6.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 2 |
| Egegik/Becharof | 0 [a] | 0 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 6 |
| Naknek R. | 18 | 20 | 17 | 40 | 55 | 0 | 0 | 0 | 0 | 11 |
| Naknek L. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 10 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 18 | 10 | 0 | 0 | 46 | 0 | 39 | 9 | 0 | 19 |
| Copper R. | 0 [a] | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 0 [a] | 10 | 17 | 0 | 0 | 16 | 14 | 9 | 20 | 12 |
| Newhalen R. | 0 | 10 | 67 | 0 | 0 | 0 | 0 | 64 | 10 | 15 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 18 [a] | 10 | 501 | 136 | 166 | 26 | 19 | 101 | 10 | 64 |
| Lake Iliamna | 0 | 10 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 2 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 18 | 0 | 33 | 0 | 9 | 44 | 87 | 83 | 0 | 45 |
| Subtotal | 72 | 90 | 635 | 176 | 276 | 95 | 198 | 266 | 40 | 175 |

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**Appendix A6.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 0 |
| Mulchatna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 |
| Tikchik L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 125 | 0 | 0 [a] | 0 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 137 | 0 | 88 | 46 |
| Western | | | | | | | | | | | |
| Togiak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] |
| Goodnews | | | | | | | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Kanektok | | | | | | | 0 | 13 | 0 | 0 | 0 |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 198 | 0 | 175 | 0 | 49 |
| Subtotal | | | | | | | 198 | 0 | 175 | 0 | 49 |
| Eastern | 8 | 25 | 0 | 17 | 183 | 168 | 178 | 137 | 1,155 | 870 | 152 |
| Central | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 137 | 0 | 88 | 46 |
| Western | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 |
| Northwestern | | | | | | | 198 | 0 | 175 | 0 | 49 |
| Total | 8 | 25 | 0 | 17 | 183 | 168 | 376 | 287 | 1,330 | 958 | 247 |

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**Appendix A6.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 36 | 20 | 208 | 140 | 74 | 174 | 177 | 119 | 9 | 111 |
| Mulchatna | 18 | 31 | 87 | 0 | 18 | 87 | 0 | 0 | 0 | 21 |
| Wood River L. | 0 | 20 | 521 | 0 | 0 | 35 | 24 | 0 | 0 | 12 |
| Tikchik L. | 0 | 10 | 0 | 0 | 9 | 0 | 0 | 0 | 9 | 4 |
| Koktuli R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Other | 0 | 0 | 17 | 260 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 54 | 81 | 833 | 400 | 101 | 296 | 201 | 119 | 18 | 147 |
| Western | | | | | | | | | | |
| Togiak | 0 [a] | 20 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 2 |
| Goodnews | 0 [a] | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kanektok | 18 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 18 | 20 | 0 | 24 | 0 | 0 | 10 | 0 | 0 | 2 |
| Northwestern | | | | | | | | | | |
| Aniak | 55 [a] | 10 | 0 | 0 | 0 | 0 | 97 | 0 | 20 | 23 |
| Kisaralik | | | | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | | | | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 |
| Other | 18 | 30 | 70 | 134 | 258 | 166 | 0 | 0 | 0 | 85 |
| Subtotal | 73 | 40 | 70 | 134 | 258 | 166 | 97 | 0 | 20 | 108 |
| Eastern | 72 | 90 | 635 | 176 | 276 | 95 | 198 | 266 | 40 | 175 |
| Central | 54 | 81 | 833 | 400 | 101 | 296 | 201 | 119 | 18 | 147 |
| Western | 18 | 20 | 0 | 24 | 0 | 0 | 10 | 0 | 0 | 2 |
| Northwestern | 73 | 40 | 70 | 134 | 258 | 166 | 97 | 0 | 20 | 108 |
| Total | 217 | 231 | 1,538 | 734 | 635 | 557 | 506 | 385 | 78 | 432 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix A7.-Sport harvest of northern pike from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 [a] | 0 [a] | 64 |
| Egegik/Becharof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 18 [a] | 0 [a] |
| Naknek R. | 15 | 18 | 36 | 0 | 86 | 21 | 42 | 137 | 225 | 171 | 64 |
| Naknek L. | 12 | 9 | 9 | 26 | 22 | 63 | 21 | 0 | 17 [a] | 0 | 21 |
| Bay of Islands | | | | | | | 10 | 62 | 35 | 15 [a] | 64 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 68 | 0 |
| Copper R. | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 12 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 0 | 42 | 21 | 224 | 0 | 34 | 0 |
| Newhalen R. | 0 | 18 | 45 | 34 | 22 | 115 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 43 | 54 | 127 | 43 | 162 | 409 | 84 | 87 | 104 | 0 | 46 |
| Lake Iliamna | | | | | | | 157 [a] | 0 [a] | 0 [a] | 68 | 229 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 0 | 1,409 | 0 | 18 | 43 |
| Subtotal | 70 | 99 | 235 | 103 | 292 | 650 | 335 | 1,968 | 413 | 392 | 531 |

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**Appendix A7.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 31 | 11 | 0 | 17 | 19 | 278 | 0 | 85 | 80 |
| Egegik/Becharof | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Naknek R. | 18 | 62 | 175 | 0 | 68 | 0 | 350 | 106 | 88 | 122 |
| Naknek L. | 0 [a] | 10 | 0 | 62 | 68 | 0 | 27 | 0 | 29 | 25 |
| Bay of Islands | 0 [a] | 41 | 22 | 31 | 60 | 75 | 54 | 59 | 93 | 68 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 [a] | 0 | 8 | 0 | 0 | 0 | 2 |
| King Salmon R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 0 | 50 | 0 | 65 | 60 | 17 | 118 | 33 | 54 | 56 |
| Copper R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 | 20 |
| Alagnak R. | 0 [a] | 20 | 63 | 98 | 145 | 0 | 9 | 118 | 162 | 87 |
| Newhalen R. | 0 | 0 | 0 | 33 | 0 | 0 | 9 | 0 | 88 | 19 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 [a] | 40 | 85 | 196 | 162 | 247 | 128 | 19 | 109 | 133 |
| Lake Iliamna | 18 | 0 | 32 | 0 | 51 | 0 | 0 | 45 | 47 | 29 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 18 | 102 | 0 | 227 | 274 | 27 | 108 | 19 | 19 | 89 |
| Subtotal | 54 | 356 | 388 | 712 | 905 | 393 | 1,081 | 499 | 774 | 730 |

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**Appendix A7.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 5 | 63 | 9 | 26 | 43 | 42 | 178 | 50 | 202 | 58 | 595 |
| Mulchatna | 25 | 0 | 18 | 0 | 22 | 31 | 252 | 87 | 43 | 146 | 46 |
| Wood River L. | 3 | 18 | 100 | 95 | 0 | 0 | 315 | 12 | 14 | 0 | 916 |
| Tikchik L. | 8 | 199 | 0 | 52 | 76 | 0 | 73 | 125 | 14 | 0 [a] | 0 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 241 | 100 | 0 | 88 | 92 |
| Subtotal | 41 | 280 | 127 | 173 | 141 | 73 | 1,059 | 374 | 273 | 292 | 1,649 |
| Western | | | | | | | | | | | |
| Togiak | 12 | 0 | 0 | 0 | 0 | 84 | 0 | 25 | 0 [a] | 29 | 0 [a] |
| Goodnews | | | | | | | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Kanektok | | | | | | | 0 | 0 | 0 | 0 | 0 |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 12 | 0 | 0 | 0 | 0 | 84 | 0 | 25 | 0 | 29 | 0 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 42 [a] | 78 [a] | 17 [a] | 98 [a] | 125 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 1,322 | 403 | 277 | 24 | 126 |
| Subtotal | | | | | | | 1,364 | 481 | 294 | 122 | 251 |
| Eastern | 70 | 99 | 235 | 103 | 292 | 650 | 335 | 1,968 | 413 | 392 | 531 |
| Central | 41 | 280 | 127 | 173 | 141 | 73 | 1,059 | 374 | 273 | 292 | 1,649 |
| Western | 12 | 0 | 0 | 0 | 0 | 84 | 0 | 25 | 0 | 29 | 0 |
| Northwestern | | | | | | | 1,364 | 481 | 294 | 122 | 251 |
| Total | 123 | 379 | 362 | 276 | 433 | 807 | 2,758 | 2,848 | 980 | 835 | 2,431 |

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**Appendix A7.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 127 | 343 | 110 | 604 | 393 | 508 | 591 | 521 | 208 | 444 |
| Mulchatna | 91 | 31 | 44 | 14 | 26 | 74 | 9 | 21 | 168 | 60 |
| Wood River L. | 36 | 374 | 99 | 503 | 333 | 139 | 126 | 373 | 212 | 237 |
| Tikchik L. | 18 | 62 | 0 | 72 | 9 | 9 | 0 | 45 | 29 | 18 |
| Koktuli R. | | | | | 0 | 0 | 9 | 0 [a] | 0 | 2 |
| Other | 36 | 93 | 77 | 57 | 0 | 0 | 55 | 70 | 111 | 47 |
| Subtotal | 308 | 903 | 330 | 1,250 | 761 | 730 | 790 | 1,030 | 728 | 808 |
| Western | | | | | | | | | | |
| Togiak | 18 [a] | 0 | 44 | 0 | 9 | 17 | 0 | 0 | 0 | 5 |
| Goodnews | 0 [a] | 0 | 0 [a] | 0 | 0 | 0 | 54 | 0 | 0 | 11 |
| Kanektok | 18 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 36 | 23 | 44 | 0 | 9 | 17 | 54 | 0 | 0 | 16 |
| Northwestern | | | | | | | | | | |
| Aniak | 127 [a] | 70 | 18 | 244 | 43 | 0 | 54 | 77 | 10 | 37 |
| Kisaralik | | | | | | | 0 | 29 [a] | 88 [a] | 39 |
| Kwethluk | | | | | 60 | 329 | 90 [a] | 39 [a] | 0 [a] | 104 |
| Other | 36 | 781 | 124 | 294 | 182 | 170 | 358 | 129 | 158 | 199 |
| Subtotal | 163 | 851 | 142 | 538 | 285 | 499 | 502 | 274 | 256 | 363 |
| Eastern | 54 | 356 | 388 | 712 | 905 | 393 | 1,081 | 499 | 774 | 730 |
| Central | 308 | 903 | 330 | 1,250 | 761 | 730 | 790 | 1,030 | 728 | 808 |
| Western | 36 | 23 | 44 | 0 | 9 | 17 | 54 | 0 | 0 | 16 |
| Northwestern | 163 | 851 | 142 | 538 | 285 | 499 | 502 | 274 | 256 | 363 |
| Total | 561 | 2,133 | 904 | 2,500 | 1,960 | 1,639 | 2,427 | 1,803 | 1,758 | 1,917 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix A8.-Sport harvest of burbot from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Egegik/Becharof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] |
| Naknek R. | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 76 | 0 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 [a] | 0 | 0 |
| Bay of Islands | | | | | | | 0 | 0 | 0 | 0 [a] | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 0 | 0 | 227 | 0 | 0 | 0 | 0 | 112 | 105 | 204 | 0 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 | 0 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 0 | 0 | 700 | 0 | 0 |
| Subtotal | 0 | 0 | 227 | 0 | 0 | 0 | 0 | 124 | 805 | 204 | 0 |

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**Appendix A8.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Egegik/Becharof | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Naknek R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Naknek L. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 18 [a] | 0 | 100 | 53 | 0 | 0 | 0 | 0 | 18 | 4 |
| Lake Iliamna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 2 |
| Subtotal | 18 | 0 | 100 | 53 | 0 | 0 | 10 | 0 | 18 | 6 |

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**Appendix A8.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mulchatna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tikchik L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 0 | 0 | 0 | 29 | 0 |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 |
| Western | | | | | | | | | | | |
| Togiak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] |
| Goodnews | | | | | | | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Kanektok | | | | | | | 0 | 0 | 0 | 0 | 0 |
| Other | | | | | | | 0 | 0 | 0 | 0 | |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 70 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 189 | 0 | 35 | 122 | 14 |
| Subtotal | | | | | | | 189 | 0 | 35 | 122 | 84 |
| Eastern | 0 | 0 | 227 | 0 | 0 | 0 | 0 | 124 | 805 | 204 | 0 |
| Central | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 |
| Western | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northwestern | | | | | | | 189 | 0 | 35 | 122 | 84 |
| Total | 0 | 0 | 227 | 0 | 0 | 0 | 189 | 124 | 840 | 355 | 84 |

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**Appendix A8.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mulchatna | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tikchik L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Koktuli R. | | | | | 0 | 0 | 0 | 0 [a] | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Western | | | | | | | | | | |
| Togiak | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Goodnews | 0 [a] | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kanektok | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northwestern | | | | | | | | | | |
| Aniak | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kisaralik | | | | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | | | | 0 | 107 | 0 [a] | 0 [a] | 0 [a] | 21 |
| Other | 91 | 0 | 1,125 | 40 | 169 | 107 | 10 | 0 | 0 | 57 |
| Subtotal | 91 | 0 | 1,125 | 40 | 169 | 214 | 10 | 0 | 0 | 79 |
| Eastern | 18 | 0 | 100 | 53 | 0 | 0 | 10 | 0 | 18 | 6 |
| Central | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Western | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northwestern | 91 | 0 | 1,125 | 40 | 169 | 214 | 10 | 0 | 0 | 79 |
| Total | 109 | 0 | 1,242 | 93 | 169 | 214 | 20 | 0 | 18 | 84 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix A9.-Sport harvest of smelt from the waters of Southwest Alaska by fishery, 1977-1996.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | | |
| Ugashik | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Egegik/Becharof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 873 [a] | 175 [a] | 0 [a] | 0 [a] |
| Naknek R. | 6,434 | 1,077 | 65,238 | 30,764 | 5,778 | 14,547 | 3,902 | 6,986 | 7,420 | 1,284 | 21 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 |
| Bay of Islands | | | | | | | 0 | 0 | 0 | 0 [a] | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | | | | | | | | | |
| American Cr. | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| King Salmon R. | | | | | | | | | | | |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Alagnak R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 | 0 |
| Kulik R. | | | | | | | | | | | |
| Tazimina R. | | | | | | | | | | | |
| Moraine Cr. | | | | | | | | | | | |
| Other | | | | | | | 0 | 0 | 8,750 | 0 | 21 |
| Subtotal | 6,434 | 1,077 | 65,238 | 30,764 | 5,778 | 14,547 | 3,902 | 7,859 | 16,345 | 1,284 | 42 |

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**Appendix A9.-Page 2 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | | | | |
| Ugashik | 0 [a] | 0 | 0 | 530 | 0 | 0 | 0 | 0 | 0 | 0 |
| Egegik/Becharof | 0 [a] | 0 | 1,724 | 398 | 541 | 0 | 3,828 | 633 | 0 | 1,000 |
| Naknek R. | 30,321 | 4,456 | 1,448 | 14,321 | 14,235 | 2,704 | 8,653 | 2,128 | 0 | 5,544 |
| Naknek L. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kulik R. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 30,321 | 4,456 | 3,172 | 15,249 | 14,776 | 2,704 | 12,481 | 2,761 | 0 | 6,544 |

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**Appendix A9.-Page 3 of 4.**

| Drainage | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | | |
| Nushagak | 5,630 | 757 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 |
| Mulchatna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tikchik L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 [a] |
| Koktuli R. | | | | | | | | | | | |
| Other | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 5,630 | 757 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 |
| Western | | | | | | | | | | | |
| Togiak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 [a] | 0 | 0 [a] |
| Goodnews | | | | | | | 0 | 0 [a] | 0 | 0 [a] | 0 [a] |
| Kanektok | | | | | | | 0 | 0 | 0 | 0 | 0 |
| Other | | | | | 0 | | 0 | 0 | 0 | 0 | |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northwestern | | | | | | | | | | | |
| Aniak | | | | | | | 0 [a] | 0 [a] | 0 [a] | 0 [a] | 0 [a] |
| Kisaralik | | | | | | | | | | | |
| Kwethluk | | | | | | | | | | | |
| Other | | | | | | | 0 | 0 | 1,750 | 0 | 0 |
| Subtotal | | | | | | | 0 | 0 | 1,750 | 0 | 0 |
| Eastern | 6,434 | 1,077 | 65,238 | 30,764 | 5,778 | 14,547 | 3,902 | 7,859 | 16,345 | 1,284 | 42 |
| Central | 5,630 | 757 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 |
| Western | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northwestern | | | | | | | 0 | 0 | 1,750 | 0 | 0 |
| Total | 12,064 | 1,834 | 65,238 | 30,764 | 5,778 | 14,547 | 3,902 | 7,859 | 18,095 | 1,284 | 88 |

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**Appendix A9.-Page 4 of 4.**

| Drainage | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | | | | | | | | | | |
| Nushagak | 0 | 14,980 | 1,736 | 2,946 | 4,976 | 0 | 5,157 | 1,584 | 0 | 2,343 |
| Mulchatna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood River L. | 31 | 20,568 | 521 | 2,970 | 1,190 | 2,446 | 3,232 | 2,280 | 0 | 1,830 |
| Tikchik L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Koktuli R. | | | | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Other | 0 | 13,712 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 10 |
| Subtotal | 31 | 49,260 | 2,257 | 5,916 | 6,166 | 2,494 | 8,389 | 3,864 | 0 | 4,183 |
| Western | | | | | | | | | | |
| Togiak | 0 [a] | 2,571 | 0 | 0 | 0 | 0 | 653 | 887 | 525 | 413 |
| Goodnews | 0 [a] | 0 [a] | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kanektok | 248 | 0 | 211 | 0 | 0 | 0 | 0 | 633 | 0 | 127 |
| Other | 0 | 189 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 248 | 2,760 | 211 | 0 | 0 | 0 | 653 | 1,520 | 525 | 540 |
| Northwestern | | | | | | | | | | |
| Aniak | 0 [a] | 0 | 0 | 0 | 0 | 0 | 2,292 | 0 | 0 | 458 |
| Kisaralik | | | | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | | | | 0 | 1,211 | 0 [a] | 0 [a] | 0 [a] | 242 |
| Other | 0 | 1,135 | 0 | 0 | 1,136 | 1,049 | 0 | 0 | 0 | 437 |
| Subtotal | 0 | 1,135 | 0 | 0 | 1,136 | 2,260 | 2,292 | 0 | 0 | 1,138 |
| Eastern | 30,321 | 4,456 | 3,172 | 15,249 | 14,776 | 2,704 | 12,481 | 2,761 | 0 | 6,544 |
| Central | 31 | 49,260 | 2,257 | 5,916 | 6,166 | 2,494 | 8,389 | 3,864 | 0 | 4,183 |
| Western | 248 | 2,760 | 211 | 0 | 0 | 0 | 653 | 1,520 | 525 | 540 |
| Northwestern | 0 | 1,135 | 0 | 0 | 1,136 | 2,260 | 2,292 | 0 | 0 | 1,138 |
| Total | 30,600 | 57,611 | 5,640 | 21,165 | 22,078 | 7,458 | 23,815 | 8,145 | 525 | 12,404 |

Source: Mills 1979-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

# APPENDIX B

**Appendix B1.-Sport catch of chinook salmon from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 846 | 862 | 1,115 | 164 | 170 | 471 | 556 |
| Egegik/Becharof | 0 | 67 | 341 | 130 | 18 | 49 | 121 |
| Naknek R. | 4,178 | 4,499 | 6,519 | 5,014 | 6,211 | 3,274 | 5,103 |
| Naknek L. | 9 | 87 | 0 | 10 | 9 | 0 | 21 |
| Bay of Islands | 18 | 42 | 37 | 76 | 54 | 29 | 48 |
| Brooks R. | 0 | 391 | 18 | 58 | 119 | 0 | 117 |
| Brooks L. | 0 | 0 | 20 | 0 | 9 | 0 | 6 |
| American Cr. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | 430 | 38 | 317 | 327 [a] | 88 [a] | 240 |
| Kvichak R. | 100 | 56 | 1,477 | 139 | 677 | 138 | 497 |
| Copper R. | 89 | 0 | 0 | 0 | 9 | 69 | 16 |
| Alagnak R. | 3,224 | 7,636 | 14,097 | 1,884 | 3,916 | 2,303 | 5,967 |
| Newhalen R. | 22 | 8 | 0 | 39 | 18 | 29 | 19 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 11 | 17 | 64 | 80 | 0 | 0 | 32 |
| Kulik R. | | 0 | 0 | 76 | 0 | 0 | 15 |
| Tazimina R. | | 0 | 0 | 30 | 0 [a] | 0 [a] | 6 |
| Moraine Cr. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 1,082 | 366 | 983 | 451 | 437 | 352 | 518 |
| Subtotal | 9,579 | 14,461 | 24,709 | 8,468 | 11,974 | 6,802 | 13,283 |
| Central | | | | | | | |
| Nushagak | 8,762 | 16,806 | 21,965 | 11,476 | 12,945 | 7,181 | 14,075 |
| Mulchatna | 4,944 | 3,025 | 4,035 | 1,950 | 1,797 | 736 | 2,309 |
| Wood River L. | 253 | 416 | 565 | 475 | 245 | 40 | 348 |
| Tikchik L. | 101 | 469 | 217 | 219 | 263 | 20 | 238 |
| Koktuli R. | | 518 | 222 | 20 | 179 [a] | 565 | 301 |
| Other | 527 | 475 | 528 | 521 | 1,124 | 476 | 625 |
| Subtotal | 14,587 | 21,709 | 27,532 | 14,661 | 16,553 | 9,018 | 17,895 |
| Western | | | | | | | |
| Togiak | 1,044 | 1,137 | 2,035 | 1,368 | 2,100 | 1,010 | 1,530 |
| Goodnews | 68 | 47 | 469 | 230 | 279 | 1,126 | 430 |
| Kanektok | 1,742 | 3,153 | 5,109 | 1,483 | 3,226 | 6,354 | 3,865 |
| Other | 0 | 0 | 0 | 0 | 0 | 10 | 2 |
| Subtotal | 2,854 | 4,337 | 7,613 | 3,081 | 5,605 | 8,500 | 5,827 |
| Northwestern | | | | | | | |
| Aniak | 222 | 827 | 1,273 | 573 | 2,729 | 3,375 | 1,755 |
| Kisaralik | | | | 196 | 155 [a] | 450 [a] | 267 |
| Kwethluk | | 47 | 47 | 57 [a] | 0 [a] | 275 [a] | 85 |
| Other | 316 | 428 | 1,923 | 340 | 424 | 1,003 | 824 |
| Subtotal | 538 | 1,302 | 3,243 | 1,166 | 3,308 | 5,103 | 2,824 |
| Total | 27,558 | 41,809 | 63,097 | 27,376 | 37,440 | 29,423 | 39,829 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B2.-Sport catch of coho salmon from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 592 | 1,166 | 837 | 1,586 | 891 | 1,302 | 1,156 |
| Egegik/Becharof | 581 | 842 | 275 | 590 | 546 | 735 | 598 |
| Naknek R. | 2,032 | 2,745 | 2,187 | 3,188 | 3,692 | 7,228 | 3,808 |
| Naknek L. | 32 | 283 | 67 | 111 | 418 | 0 | 176 |
| Bay of Islands | 11 | 40 | 19 | 0 | 0 | 0 | 12 |
| Brooks R. | 86 | 429 | 549 | 136 | 1,061 | 100 | 455 |
| Brooks L. | 86 | 40 | 153 | 30 | 212 | 40 | 95 |
| American Cr. | 0 [a] | 0 | 17 | 0 | 0 | 0 | 3 |
| King Salmon R. | | 40 | 506 | 0 | 312 [a] | 596 [a] | 291 |
| Kvichak R. | 908 | 518 | 863 | 939 | 701 | 611 | 726 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 1,283 | 2,964 | 2,358 | 2,088 | 1,578 | 8,166 | 3,431 |
| Newhalen R. | 499 | 405 | 1,066 | 683 | 890 | 20 | 613 |
| L Talarik Cr. | 0 | 24 | 210 | 29 | 77 | 60 | 80 |
| Lake Clark | 102 | 81 | 382 | 0 | 110 | 0 | 115 |
| Lake Iliamna | 114 | 49 | 145 | 72 | 500 | 10 | 155 |
| Kulik R. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 1,145 | 1,012 | 2,018 | 1,358 | 969 | 1,612 | 1,394 |
| Subtotal | 7,471 | 10,638 | 11,652 | 10,810 | 11,957 | 20,480 | 13,107 |
| Central | | | | | | | |
| Nushagak | 863 | 1,029 | 1,154 | 1,735 | 2,296 | 7,810 | 2,805 |
| Mulchatna | 579 | 470 | 368 | 458 | 826 | 1,902 | 805 |
| Wood River L. | 831 | 1,036 | 549 | 1,036 | 1,195 | 1,221 | 1,007 |
| Tikchik L. | 22 | 32 | 176 | 180 | 0 | 2,105 | 499 |
| Koktuli R. | | 0 | 0 | 82 | 0 [a] | 734 | 163 |
| Other | 252 | 678 | 351 | 680 | 423 | 1,898 | 806 |
| Subtotal | 2,547 | 3,245 | 2,598 | 4,171 | 4,740 | 15,670 | 6,085 |
| Western | | | | | | | |
| Togiak | 547 | 996 | 727 | 1,408 | 1,268 | 5,392 | 1,958 |
| Goodnews | 1,176 | 1,571 | 499 | 456 | 761 | 1,375 | 932 |
| Kanektok | 2,404 | 3,174 | 3,741 | 1,322 | 3,602 | 5,084 | 3,385 |
| Other | 405 | 0 | 0 | 0 | 0 | 377 | 75 |
| Subtotal | 4,532 | 5,741 | 4,967 | 3,186 | 5,631 | 12,228 | 6,351 |
| Northwestern | | | | | | | |
| Aniak | 1,432 | 575 | 753 | 852 | 2,246 | 3,746 | 1,634 |
| Kisaralik | | | | 492 | 274 [a] | 2,135 [a] | 967 |
| Kwethluk | | 1,790 | 566 | 525 [a] | 208 [a] | 1,727 [a] | 963 |
| Other | 307 | 1,391 | 2,152 | 596 | 1,428 | 2,504 | 1,614 |
| Subtotal | 1,739 | 3,756 | 3,471 | 2,465 | 4,156 | 10,112 | 4,792 |
| Total | 16,289 | 23,380 | 22,688 | 20,632 | 26,484 | 58,490 | 30,335 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B3.-Sport catch of sockeye salmon from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 403 | 625 | 566 | 1,020 | 325 | 1,861 | 879 |
| Egegik/Becharof | 336 | 1,323 | 695 | 239 | 1,134 | 1,353 | 949 |
| Naknek R. | 2,314 | 1,471 | 3,029 | 1,539 | 2,949 | 1,900 | 2,178 |
| Naknek L. | 1,210 | 764 | 868 | 467 | 408 | 518 | 605 |
| Bay of Islands | 144 | 419 | 0 | 87 | 89 | 144 | 148 |
| Brooks R. | 3,552 | 5,515 | 10,504 | 1,921 | 3,699 | 6,581 | 5,644 |
| Brooks L. | 490 | 304 | 442 | 271 | 720 | 241 | 396 |
| American Cr. | 0 [a] | 33 | 642 | 577 | 525 | 530 | 461 |
| King Salmon R. | | 0 | 506 | 9 | 67 [a] | 78 [a] | 132 |
| Kvichak R. | 3,451 | 4,685 | 8,961 | 7,886 | 6,906 | 4,974 | 6,682 |
| Copper R. | 1,720 | 1,512 | 7,566 | 3,167 | 2,004 | 1,437 | 3,137 |
| Alagnak R. | 2,724 | 6,443 | 24,650 | 2,751 | 7,821 | 6,241 | 9,581 |
| Newhalen R. | 24,842 | 16,117 | 21,928 | 15,283 | 15,324 | 9,618 | 15,654 |
| L Talarik Cr. | 287 | 427 | 746 | 559 | 125 | 954 | 562 |
| Lake Clark | 829 | 1,693 | 820 | 1,088 | 1,990 | 313 | 1,181 |
| Lake Iliamna | 2,171 | 2,877 | 7,405 | 2,272 | 3,148 | 2,370 | 3,614 |
| Kulik R. | | 131 | 165 | 357 | 45 | 631 | 266 |
| Tazimina R. | | 1,151 | 116 | 418 | 31 [a] | 12 [a] | 346 |
| Moraine Cr. | | 164 | 287 | 218 | 134 | 494 | 259 |
| Other | 2,044 | 2,292 | 5,792 | 4,794 | 2,279 | 4,379 | 3,907 |
| Subtotal | 46,517 | 47,946 | 95,688 | 44,923 | 49,723 | 44,629 | 56,582 |
| Central | | | | | | | |
| Nushagak | 2,720 | 1,693 | 2,122 | 1,202 | 865 | 3,905 | 1,957 |
| Mulchatna | 1,350 | 1,446 | 1,898 | 607 | 1,211 | 2,862 | 1,605 |
| Wood River L. | 6,080 | 3,590 | 6,394 | 3,000 | 1,836 | 7,299 | 4,424 |
| Tikchik L. | 1,480 | 1,537 | 6,286 | 475 | 267 | 651 | 1,843 |
| Koktuli | | 781 | 980 | 479 | 385 [a] | 2,499 | 1,025 |
| Other | 550 | 148 | 1,255 | 550 | 283 | 2,137 | 875 |
| Subtotal | 12,180 | 9,195 | 18,935 | 6,313 | 4,847 | 19,353 | 11,729 |
| Western | | | | | | | |
| Togiak | 640 | 140 | 429 | 193 | 499 | 2,271 | 706 |
| Goodnews | 2,003 | 90 | 321 | 207 | 380 | 1,119 | 423 |
| Kanektok | 1,147 | 1,290 | 1,887 | 3,622 | 733 | 2,157 | 1,938 |
| Other | 0 | 0 | 78 | 0 | 0 | 0 | 16 |
| Subtotal | 3,790 | 1,520 | 2,715 | 4,022 | 1,612 | 5,547 | 3,083 |
| Northwestern | | | | | | | |
| Aniak | 151 | 74 | 79 | 87 | 166 | 150 | 111 |
| Kisaralik | | | | 452 | 0 [a] | 0 [a] | 151 |
| Kwethluk | | 58 | 19 | 0 [a] | 0 [a] | 248 [a] | 65 |
| Other | 0 | 246 | 377 | 316 | 85 | 480 | 301 |
| Subtotal | 151 | 378 | 475 | 855 | 251 | 878 | 567 |
| Total | 62,638 | 59,039 | 117,813 | 56,113 | 56,433 | 70,407 | 71,961 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B4.-Sport catch of pink salmon from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 0 | 183 | 0 | 32 | 0 | 297 | 102 |
| Egegik/Becharof | 0 | 18 | 0 | 358 | 169 | 1,173 | 344 |
| Naknek R. | 10 | 1,814 | 104 | 738 | 214 | 1,634 | 901 |
| Naknek L. | 0 | 256 | 0 | 0 | 0 | 0 | 51 |
| Bay of Islands | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 101 | 0 | 65 | 469 | 50 | 137 |
| Brooks L. | 0 | 0 | 0 | 16 | 0 | 0 | 3 |
| American Cr. | 0 [a] | 0 | 9 | 0 | 0 | 0 | 2 |
| King Salmon R. | | 9 | 0 | 43 | 0 [a] | 0 [a] | 10 |
| Kvichak R. | 300 | 1,081 | 9 | 1,708 | 66 | 1,999 | 973 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 409 | 13,016 | 786 | 975 | 45 | 8,387 | 4,642 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 0 | 0 | 302 | 51 | 0 | 212 | 113 |
| Kulik R. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 2,045 | 1,145 | 557 | 450 | 1,032 | 795 | 796 |
| Subtotal | 2,764 | 17,623 | 1,767 | 4,436 | 1,995 | 14,547 | 8,074 |
| Central | | | | | | | |
| Nushagak | 348 | 2,629 | 211 | 356 | 341 | 2,008 | 1,109 |
| Mulchatna | 0 | 46 | 43 | 231 | 26 | 119 | 93 |
| Wood River L. | 202 | 1,301 | 29 | 909 | 38 | 198 | 495 |
| Tikchik L. | 0 | 348 | 0 | 49 | 66 | 569 | 206 |
| Koktuli R. | 0 | 0 | 0 | 32 | 0 [a] | 218 | 50 |
| Other | 90 | 0 | 36 | 220 | 0 | 30 | 57 |
| Subtotal | 640 | 4,324 | 319 | 1,797 | 471 | 3,142 | 2,011 |
| Western | | | | | | | |
| Togiak | 11 | 568 | 43 | 365 | 333 | 508 | 363 |
| Goodnews | 173 | 431 | 269 | 528 | 28 | 681 | 387 |
| Kanektok | 544 | 6,971 | 482 | 2,598 | 150 | 1,731 | 2,386 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 728 | 7,970 | 794 | 3,491 | 511 | 2,920 | 3,137 |
| Northwestern | | | | | | | |
| Aniak | 0 | 998 | 364 | 388 | 116 | 287 | 431 |
| Kisaralik | | | | 98 | 0 [a] | 88 [a] | 62 |
| Kwethluk | | 101 | 0 | 154 [a] | 0 [a] | 48 [a] | 61 |
| Other | 12 | 761 | 0 | 32 | 9 | 184 | 197 |
| Subtotal | 12 | 1,860 | 364 | 672 | 125 | 607 | 726 |
| Total | 4,144 | 31,777 | 3,244 | 10,396 | 3,102 | 21,216 | 13,947 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B5.-Sport catch of chum salmon from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 50 | 395 | 100 | 92 | 22 | 1,303 | 382 |
| Egegik/Becharof | 30 | 84 | 0 | 147 | 197 | 413 | 168 |
| Naknek R. | 567 | 517 | 249 | 926 | 950 | 629 | 654 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 20 | 304 | 0 | 0 | 0 | 0 | 61 |
| Brooks R. | 0 | 23 | 0 | 19 | 0 | 0 | 8 |
| Brooks L. | 0 | 0 | 8 | 0 | 0 | 0 | 2 |
| American Cr. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | 0 | 0 | 29 | 350 [a] | 567 [a] | 189 |
| Kvichak R. | 1,180 | 516 | 573 | 759 | 175 | 523 | 509 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 5,811 | 11,677 | 10,320 | 4,636 | 9,978 | 12,785 | 9,879 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 0 | 38 | 83 | 10 | 0 | 92 | 45 |
| Kulik R. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | 0 | 17 | 0 | 0 [a] | 0 [a] | 3 |
| Moraine Cr. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 220 | 570 | 899 | 110 | 1,170 | 2,161 | 982 |
| Subtotal | 7,878 | 14,124 | 12,249 | 6,728 | 12,842 | 18,473 | 12,883 |
| Central | | | | | | | |
| Nushagak | 1,662 | 6,544 | 3,651 | 7,005 | 3,581 | 9,339 | 6,024 |
| Mulchatna | 457 | 2,050 | 2,275 | 2,223 | 1,251 | 3,816 | 2,323 |
| Wood River L. | 310 | 410 | 297 | 133 | 40 | 676 | 311 |
| Tikchik L. | 46 | 850 | 28 | 327 | 120 | 199 | 305 |
| Koktuli R. | | 296 | 440 | 538 | 18 [a] | 1,104 | 479 |
| Other | 401 | 45 | 429 | 1,636 | 285 | 769 | 633 |
| Subtotal | 2,876 | 10,195 | 7,120 | 11,862 | 5,295 | 15,903 | 10,075 |
| Western | | | | | | | |
| Togiak | 493 | 395 | 906 | 1,419 | 2,064 | 4,489 | 1,855 |
| Goodnews | 527 | 402 | 924 | 381 | 315 | 351 | 475 |
| Kanektok | 1,382 | 3,994 | 4,849 | 6,386 | 5,049 | 8,155 | 5,687 |
| Other | 0 | 0 | 191 | 0 | 0 | 614 | 161 |
| Subtotal | 2,402 | 4,791 | 6,870 | 8,186 | 7,428 | 13,609 | 8,177 |
| Northwestern | | | | | | | |
| Aniak | 656 | 1,670 | 2,412 | 1,342 | 2,785 | 3,888 | 2,419 |
| Kisaralik | | | | 1,123 | 44 [a] | 1,832 [a] | 1,000 |
| Kwethluk | | 91 | 221 | 183 [a] | 90 [a] | 930 [a] | 303 |
| Other | 577 | 760 | 926 | 978 | 709 | 1,141 | 903 |
| Subtotal | 1,233 | 2,521 | 3,559 | 3,626 | 3,628 | 7,791 | 4,225 |
| Total | 14,389 | 31,631 | 29,798 | 30,402 | 29,193 | 55,776 | 35,360 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B6.-Sport catch of lake trout from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 222 | 170 | 131 | 121 | 114 | 592 | 226 |
| Egegik/Becharof | 0 | 8 | 9 | 0 | 17 | 0 | 7 |
| Naknek R. | 154 | 93 | 97 | 396 | 74 | 409 | 214 |
| Naknek L. | 205 | 116 | 160 | 140 | 168 | 55 | 128 |
| Bay of Islands | 358 | 648 | 730 | 392 | 241 | 357 | 474 |
| Brooks R. | 0 | 23 | 224 | 117 | 112 | 0 | 95 |
| Brooks L. | 819 | 609 | 654 | 919 | 583 | 951 | 743 |
| American Cr. | 0 [a] | 139 | 230 | 165 | 10 | 185 | 146 |
| King Salmon R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 113 | 108 | 202 | 376 | 38 | 137 | 172 |
| Copper R. | 0 | 0 | 0 | 66 | 0 | 18 | 17 |
| Alagnak R. | 495 | 147 | 460 | 119 | 404 | 216 | 269 |
| Newhalen R. | 353 | 324 | 699 | 610 | 260 | 65 | 392 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 904 | 1,619 | 2,121 | 2,472 | 721 | 216 | 1,430 |
| Lake Iliamna | 155 | 409 | 811 | 720 | 88 | 152 | 436 |
| Kulik R. | | 8 | 424 | 132 | 133 | 219 | 183 |
| Tazimina R. | | 8 | 18 | 550 | 0 [a] | 0 [a] | 115 |
| Moraine Cr. | | 23 | 19 | 221 | 7 | 36 | 61 |
| Other | 1,266 | 2,475 | 2,984 | 3,181 | 559 | 856 | 2,011 |
| Subtotal | 5,044 | 6,927 | 9,973 | 10,697 | 3,529 | 4,464 | 7,118 |
| Central | | | | | | | |
| Nushagak | 34 | 231 | 144 | 184 | 17 | 161 | 147 |
| Mulchatna | 0 | 23 | 0 | 204 | 9 | 9 | 49 |
| Wood River L. | 0 | 15 | 106 | 44 | 0 | 9 | 35 |
| Tikchik L. | 2,043 | 1,072 | 1,764 | 3,305 | 1,089 | 1,160 | 1,678 |
| Koktuli R. | | 0 | 0 | 0 | 0 [a] | 0 | 0 |
| Other | 292 | 108 | 37 | 308 | 424 | 135 | 202 |
| Subtotal | 2,369 | 1,449 | 2,051 | 4,045 | 1,539 | 1,474 | 2,112 |
| Western | | | | | | | |
| Togiak | 137 | 162 | 0 | 148 | 198 | 89 | 119 |
| Goodnews | 388 | 15 | 294 | 382 | 38 | 283 | 202 |
| Kanektok | 0 | 46 | 18 | 972 | 90 | 182 | 262 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 525 | 223 | 312 | 1,502 | 326 | 554 | 583 |
| Northwestern | | | | | | | |
| Aniak | 0 | 555 | 10 | 0 | 163 | 54 | 156 |
| Kisaralik | | | | 59 | 0 [a] | 111 [a] | 57 |
| Kwethluk | | 0 | 0 | 0 [a] | 0 [a] | 0 [a] | 0 |
| Other | 517 | 810 | 340 | 294 | 152 | 53 | 330 |
| Subtotal | 517 | 1,365 | 350 | 353 | 315 | 218 | 520 |
| Total | 8,455 | 9,964 | 12,686 | 16,597 | 5,709 | 6,710 | 10,333 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B7.-Sport catch of Dolly Varden/Arctic char from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 1,711 | 499 | 3,288 | 3,951 | 1,309 | 2,420 | 2,293 |
| Egegik/Becharof | 359 | 5,260 | 3,723 | 1,604 | 1,339 | 831 | 2,551 |
| Naknek R. | 1,076 | 3,490 | 4,727 | 2,409 | 2,437 | 2,865 | 3,186 |
| Naknek L. | 469 | 33 | 1,238 | 1,205 | 616 | 1,034 | 825 |
| Bay of Islands | 290 | 729 | 232 | 172 | 76 | 521 | 346 |
| Brooks R. | 14 | 172 | 1,166 | 716 | 200 | 766 | 604 |
| Brooks L. | 0 | 459 | 78 | 27 | 77 | 20 | 132 |
| American Cr. | 2,305 [a] | 4,654 | 9,855 | 4,158 | 5,704 | 2,024 | 5,279 |
| King Salmon R. | | 107 | 19 | 206 | 198 [a] | 142 [a] | 134 |
| Kvichak R. | 676 | 426 | 572 | 810 | 358 | 622 | 558 |
| Copper R. | 1,351 | 598 | 1,048 | 332 | 471 | 486 | 587 |
| Alagnak R. | 1,250 | 1,802 | 2,527 | 935 | 1,855 | 3,247 | 2,073 |
| Newhalen R. | 1,030 | 1,147 | 1,658 | 1,672 | 1,607 | 791 | 1,375 |
| L Talarik Cr. | 220 | 115 | 465 | 0 | 0 | 49 | 126 |
| Lake Clark | 659 | 533 | 484 | 688 | 385 | 137 | 445 |
| Lake Iliamna | 321 | 844 | 982 | 1,721 | 356 | 783 | 937 |
| Kulik R. | | 860 | 0 | 334 | 0 | 39 | 247 |
| Tazimina R. | | 238 | 336 | 476 | 426 [a] | 176 [a] | 330 |
| Moraine Cr. | | 90 | 132 | 318 | 19 | 40 | 120 |
| Other | 6,264 | 3,910 | 11,196 | 7,872 | 7,484 | 4,945 | 7,081 |
| Subtotal | 17,995 | 25,966 | 43,726 | 29,606 | 24,917 | 21,938 | 29,231 |
| Central | | | | | | | |
| Nushagak | 5,825 | 4,736 | 7,632 | 3,771 | 3,351 | 8,422 | 5,582 |
| Mulchatna | 940 | 639 | 923 | 717 | 1,376 | 1,354 | 1,002 |
| Wood River L. | 15,764 | 16,222 | 13,787 | 13,960 | 13,445 | 11,444 | 13,772 |
| Tikchik L. | 2,259 | 2,384 | 5,867 | 3,854 | 2,013 | 2,453 | 3,314 |
| Koktuli R. | | 672 | 44 | 404 | 299 [a] | 963 | 476 |
| Other | 1,019 | 458 | 1,091 | 1,297 | 965 | 1,691 | 1,100 |
| Subtotal | 25,807 | 25,111 | 29,344 | 24,003 | 21,449 | 26,327 | 25,247 |
| Western | | | | | | | |
| Togiak | 823 | 1,008 | 1,030 | 3,368 | 3,156 | 3,049 | 2,322 |
| Goodnews | 9,936 | 5,694 | 8,156 | 3,156 | 2,336 | 4,352 | 4,739 |
| Kanektok | 10,757 | 3,990 | 10,136 | 8,270 | 6,231 | 13,954 | 8,516 |
| Other | 0 | 0 | 395 | 0 | 0 | 69 | 93 |
| Subtotal | 21,516 | 10,692 | 19,717 | 14,794 | 11,723 | 21,424 | 15,670 |
| Northwestern | | | | | | | |
| Aniak | 3,514 | 3,736 | 9,340 | 3,115 | 3,454 | 4,883 | 4,906 |
| Kisaralik | | | | 2,283 | 1,667 [a] | 1,367 [a] | 1,772 |
| Kwethluk | | 57 | 349 | 251 [a] | 131 [a] | 919 [a] | 341 |
| Other | 1,873 | 2,179 | 6,024 | 908 | 3,167 | 2,133 | 2,882 |
| Subtotal | 5,387 | 5,972 | 15,713 | 6,557 | 8,419 | 9,302 | 9,193 |
| Total | 70,705 | 67,741 | 108,500 | 74,960 | 66,508 | 78,991 | 79,340 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B8.-Sport catch of Arctic grayling from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 337 | 518 | 568 | 889 | 1,263 | 2,968 | 1,241 |
| Egegik/Becharof | 637 | 1,082 | 1,265 | 740 | 1,118 | 347 | 910 |
| Naknek R. | 2,479 | 2,630 | 4,158 | 3,212 | 1,974 | 2,278 | 2,850 |
| Naknek L. | 104 | 113 | 280 | 429 | 0 | 93 | 183 |
| Bay of Islands | 143 | 150 | 54 | 57 | 0 | 0 | 52 |
| Brooks R. | 299 | 977 | 1,227 | 2,081 | 734 | 1,191 | 1,242 |
| Brooks L. | 0 | 75 | 9 | 0 | 9 | 0 | 19 |
| American Cr. | 39 [a] | 286 | 177 | 418 | 0 | 814 | 339 |
| King Salmon R. | | 30 | 37 | 0 | 122 [a] | 19 [a] | 42 |
| Kvichak R. | 5,205 | 4,643 | 4,729 | 7,497 | 2,180 | 3,575 | 4,525 |
| Copper R. | 77 | 240 | 420 | 398 | 461 | 347 | 373 |
| Alagnak R. | 7,563 | 5,673 | 11,280 | 7,608 | 7,235 | 7,952 | 7,950 |
| Newhalen R. | 3,905 | 3,020 | 4,636 | 4,477 | 4,554 | 3,983 | 4,134 |
| L Talarik Cr. | 949 | 301 | 846 | 296 | 395 | 224 | 412 |
| Lake Clark | 4,379 | 3,404 | 4,435 | 4,993 | 2,371 | 3,121 | 3,665 |
| Lake Iliamna | 15 | 346 | 594 | 2,364 | 497 | 703 | 901 |
| Kulik R. | | 0 | 0 | 0 | 0 | 94 | 19 |
| Tazimina R. | | 3,088 | 2,740 | 3,180 | 1,273 [a] | 722 [a] | 2,201 |
| Moraine Cr. | | 248 | 897 | 655 | 307 | 487 | 519 |
| Other | 10,787 | 3,871 | 5,634 | 4,835 | 2,159 | 4,112 | 4,122 |
| Subtotal | 36,918 | 30,695 | 43,986 | 44,129 | 26,652 | 33,030 | 35,698 |
| Central | | | | | | | |
| Nushagak | 9,147 | 7,243 | 12,746 | 6,988 | 7,672 | 17,154 | 10,361 |
| Mulchatna | 2,067 | 2,772 | 4,325 | 2,821 | 5,504 | 5,299 | 4,144 |
| Wood River L. | 9,785 | 3,818 | 7,498 | 5,765 | 8,017 | 6,240 | 6,268 |
| Tikchik L. | 3,611 | 5,131 | 11,013 | 6,476 | 3,902 | 10,042 | 7,313 |
| Koktuli R. | | 594 | 2,211 | 1,685 | 1,246 [a] | 3,430 | 1,833 |
| Other | 6,712 | 3,140 | 2,284 | 4,087 | 4,165 | 4,891 | 3,713 |
| Subtotal | 31,322 | 22,698 | 40,077 | 27,822 | 30,506 | 47,056 | 33,632 |
| Western | | | | | | | |
| Togiak | 156 | 579 | 1,452 | 1,323 | 873 | 1,528 | 1,151 |
| Goodnews | 461 | 609 | 851 | 1,813 | 544 | 941 | 952 |
| Kanektok | 3,092 | 391 | 2,727 | 1,599 | 1,128 | 2,960 | 1,761 |
| Other | 0 | 0 | 109 | 0 | 0 | 0 | 22 |
| Subtotal | 3,709 | 1,579 | 5,139 | 4,735 | 2,545 | 5,429 | 3,885 |
| Northwestern | | | | | | | |
| Aniak | 4,841 | 3,855 | 5,580 | 2,022 | 2,266 | 5,102 | 3,765 |
| Kisaralik | | | | 1,920 | 70 [a] | 1,300 [a] | 1,097 |
| Kwethluk | 0 | 120 | 165 | 212 [a] | 132 [a] | 1,065 [a] | 339 |
| Other | 2,236 | 3,293 | 5,948 | 1,123 | 4,119 | 2,973 | 3,491 |
| Subtotal | 7,077 | 7,268 | 11,693 | 5,277 | 6,587 | 10,440 | 8,253 |
| Total | 79,026 | 62,240 | 100,895 | 81,963 | 66,290 | 95,955 | 81,469 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B9.-Sport catch of whitefish from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 0 | 9 | 0 | 48 | 0 | 0 | 11 |
| Egegik/Becharof | 0 | 0 | 0 | 29 | 0 | 0 | 6 |
| Naknek R. | 40 | 64 | 505 | 0 | 137 | 0 | 141 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 0 | 8 | 0 | 0 | 9 | 3 |
| Brooks L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 9 | 0 | 0 | 0 | 2 |
| King Salmon R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 0 | 138 | 152 | 165 | 27 | 49 | 106 |
| Copper R. | 0 | 9 | 0 | 0 | 9 | 0 | 4 |
| Alagnak R. | 0 | 9 | 221 | 24 | 92 | 274 | 124 |
| Newhalen R. | 306 | 37 | 0 | 97 | 64 | 98 | 59 |
| L Talarik Cr. | 68 | 46 | 0 | 0 | 0 | 0 | 9 |
| Lake Clark | 986 | 175 | 151 | 19 | 247 | 10 | 120 |
| Lake Iliamna | 170 | 28 | 25 | 0 | 0 | 0 | 11 |
| Kulik R. | | 0 | 8 | 0 | 0 | 10 | 4 |
| Tazimina R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | 0 | 31 | 0 | 0 | 0 | 6 |
| Other | 0 | 18 | 60 | 118 | 83 | 39 | 64 |
| Subtotal | 1,610 | 533 | 1,170 | 500 | 659 | 489 | 670 |
| Central | | | | | | | |
| Nushagak | 279 | 662 | 412 | 594 | 198 | 357 | 445 |
| Mulchatna | 0 | 83 | 87 | 0 | 0 | 0 | 34 |
| Wood River L. | 70 | 18 | 43 | 85 | 18 | 20 | 37 |
| Tikchik L. | 0 | 46 | 17 | 7 | 0 | 35 | 21 |
| Koktuli R. | | 0 | 0 | 0 | 0 [a] | 20 | 4 |
| Other | 175 | 0 | 9 | 10 | 0 | 0 | 4 |
| Subtotal | 524 | 809 | 568 | 696 | 216 | 432 | 544 |
| Western | | | | | | | |
| Togiak | 0 | 0 | 0 | 10 | 0 | 196 | 41 |
| Goodnews | 0 | 9 | 16 | 7 | 0 | 0 | 6 |
| Kanektok | 61 | 0 | 102 | 52 | 36 | 80 | 54 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 61 | 9 | 118 | 69 | 36 | 276 | 102 |
| Northwestern | | | | | | | |
| Aniak | 134 | 0 | 0 | 329 | 27 | 20 | 75 |
| Kisaralik | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | 0 | 0 | 0 [a] | 0 [a] | 10 [a] | 2 |
| Other | 134 | 285 | 190 | 26 | 0 | 27 | 106 |
| Subtotal | 268 | 285 | 190 | 355 | 27 | 57 | 183 |
| Total | 2,463 | 1,636 | 2,046 | 1,620 | 938 | 1,254 | 1,499 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B10.-Sport catch of northern pike from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 62 | 60 | 880 | 938 | 150 | 586 | 523 |
| Egegik/Becharof | 0 | 51 | 0 | 0 | 0 | 39 | 18 |
| Naknek R. | 31 | 325 | 252 | 2,084 | 160 | 393 | 643 |
| Naknek L. | 289 | 342 | 160 | 134 | 50 | 372 | 212 |
| Bay of Islands | 227 | 1,093 | 2,663 | 869 | 547 | 1,380 | 1,310 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | 0 | 17 | 0 | 0 | 0 | 78 | 19 |
| American Cr. | 0 [a] | 0 | 169 | 0 | 0 | 231 | 80 |
| King Salmon R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 408 | 649 | 366 | 767 | 490 | 346 | 524 |
| Copper R. | 0 | 51 | 228 | 0 | 100 | 0 | 76 |
| Alagnak R. | 342 | 846 | 347 | 83 | 241 | 1,213 | 546 |
| Newhalen R. | 33 | 17 | 0 | 9 | 111 | 88 | 45 |
| L Talarik Cr. | 228 | 0 | 0 | 0 | 11 | 0 | 2 |
| Lake Clark | 1,516 | 777 | 1,116 | 1,992 | 502 | 409 | 959 |
| Lake Iliamna | 33 | 342 | 1,134 | 65 | 387 | 120 | 410 |
| Kulik R. | | 0 | 0 | 37 | 0 | 0 | 7 |
| Tazimina R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 768 | 1,124 | 981 | 812 | 708 | 546 | 834 |
| Subtotal | 3,937 | 5,694 | 8,296 | 7,790 | 3,457 | 5,801 | 6,208 |
| Central | | | | | | | |
| Nushagak | 2,071 | 5,970 | 3,551 | 1,831 | 2,325 | 2,836 | 3,303 |
| Mulchatna | 216 | 512 | 227 | 453 | 318 | 188 | 340 |
| Wood River L. | 4,457 | 5,134 | 1,447 | 1,787 | 3,216 | 3,043 | 2,925 |
| Tikchik L. | 475 | 461 | 162 | 571 | 965 | 724 | 577 |
| Koktuli R. | | 154 | 0 | 90 | 0 [a] | 181 | 85 |
| Other | 1,553 | 514 | 9 | 551 | 436 | 858 | 474 |
| Subtotal | 8,772 | 12,745 | 5,396 | 5,283 | 7,260 | 7,830 | 7,703 |
| Western | | | | | | | |
| Togiak | 0 | 26 | 193 | 138 | 238 | 38 | 127 |
| Goodnews | 0 | 0 | 0 | 54 | 0 | 0 | 11 |
| Kanektok | 0 | 145 | 56 | 0 | 0 | 0 | 40 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 171 | 249 | 192 | 238 | 38 | 178 |
| Northwestern | | | | | | | |
| Aniak | 1,448 | 794 | 45 | 698 | 623 | 399 | 512 |
| Kisaralik | | | | 18 | 69 [a] | 423 [a] | 170 |
| Kwethluk | | 231 | 526 | 358 [a] | 805 [a] | 317 [a] | 447 |
| Other | 976 | 1,634 | 1,088 | 905 | 853 | 1,136 | 1,123 |
| Subtotal | 2,424 | 2,659 | 1,659 | 1,979 | 2,350 | 2,275 | 2,184 |
| Total | 15,133 | 21,269 | 15,600 | 15,244 | 13,305 | 15,944 | 16,272 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B11.-Sport catch of burbot from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Egegik/Becharof | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Naknek R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 53 | 0 | 107 | 0 | 0 | 18 | 25 |
| Lake Iliamna | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kulik R. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 10 | 0 | 0 | 2 |
| Subtotal | 53 | 0 | 107 | 10 | 0 | 18 | 27 |
| Central | | | | | | | |
| Nushagak | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mulchatna | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood River L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tikchik L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Koktuli R. | | 0 | 0 | 0 | 0 [a] | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Western | | | | | | | |
| Togiak | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Goodnews | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kanektok | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northwestern | | | | | | | |
| Aniak | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kisaralik | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | 0 | 107 | 0 [a] | 0 [a] | 0 [a] | 21 |
| Other | 50 | 169 | 107 | 10 | 0 | 0 | 57 |
| Subtotal | 50 | 169 | 214 | 10 | 0 | 0 | 79 |
| Total | 103 | 169 | 321 | 20 | 0 | 18 | 106 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.

**Appendix B12.-Sport catch of smelt from the waters of Southwest Alaska by fishery, 1991-1996.**

| Drainage | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 5-Year Average |
|---|---|---|---|---|---|---|---|
| Eastern | | | | | | | |
| Ugashik | 530 | 97 | 0 | 0 | 0 | 0 | 19 |
| Egegik/Becharof | 398 | 541 | 0 | 3,828 | 633 | 0 | 1,000 |
| Naknek R. | 14,321 | 15,609 | 2,769 | 8,664 | 2,128 | 0 | 5,834 |
| Naknek L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bay of Islands | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brooks L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| American Cr. | 0 [a] | 0 | 0 | 0 | 0 | 0 | 0 |
| King Salmon R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Kvichak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alagnak R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newhalen R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L Talarik Cr. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Clark | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lake Iliamna | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kulik R. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Tazimina R. | | 0 | 0 | 0 | 0 [a] | 0 [a] | 0 |
| Moraine Cr. | | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 22 | 0 | 0 | 0 | 4 |
| Subtotal | 15,249 | 16,247 | 2,791 | 12,492 | 2,761 | 0 | 6,858 |
| Central | | | | | | | |
| Nushagak | 2,946 | 4,997 | 0 | 6,303 | 1,584 | 0 | 2,577 |
| Mulchatna | 0 | 541 | 0 | 0 | 0 | 0 | 108 |
| Wood River L. | 2,970 | 1,623 | 2,446 | 3,301 | 2,280 | 0 | 1,930 |
| Tikchik L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Koktuli R. | | 0 | 0 | 0 | 0 [a] | 0 | 0 |
| Other | 0 | 0 | 48 | 0 | 0 | 0 | 10 |
| Subtotal | 5,916 | 7,161 | 2,494 | 9,604 | 3,864 | 0 | 4,625 |
| Western | | | | | | | |
| Togiak | 0 | 0 | 0 | 653 | 887 | 525 | 413 |
| Goodnews | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kanektok | 0 | 0 | 0 | 0 | 633 | 0 | 127 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 0 | 0 | 0 | 653 | 1,520 | 525 | 540 |
| Northwestern | | | | | | | |
| Aniak | 0 | 0 | 0 | 2,292 | 0 | 0 | 458 |
| Kisaralik | | | | 0 | 0 [a] | 0 [a] | 0 |
| Kwethluk | | 0 | 1,211 | 0 [a] | 0 [a] | 0 [a] | 242 |
| Other | 0 | 1,136 | 1,049 | 0 | 0 | 0 | 437 |
| Subtotal | 0 | 1,136 | 2,260 | 2,292 | 0 | 0 | 1,138 |
| Total | 21,165 | 24,544 | 7,545 | 25,041 | 8,145 | 525 | 13,160 |

Source: Mills 1992-1994, Howe et al. 1995-1997. Unless otherwise noted, these are published estimates for sites that garnered 12 or more responses in the Statewide Harvest Survey. 1996 data are preliminary.

[a] Unpublished estimates from Statewide Harvest Survey for sites with less than 12 responses.