
# YUKON RIVER CHINOOK SALMON STOCK STATUS AND DEVELOPMENT OF MANAGEMENT/ACTION PLAN OPTIONS

A Report to the Alaska Board of Fisheries

By:

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## SECTION I

## Yukon River Chinook Salmon Stock Status

### *Synopsis*

In response to the guidelines established in the *Sustainable Salmon Fisheries Policy*, the BOF classified the Yukon River chinook salmon stock as a yield concern at the September 2000 work session. The Yukon River chinook salmon stock meets the definition of a yield concern based on low commercial harvest levels since 1998 and the anticipation of another year of low harvest in 2001. Spawning escapement assessments tend to vary each year depending on location, but it appears that only in 1998 and 2000 escapement levels may not have been met despite the use of specific management measures. Although the Canadian rebuilding step escapement goal was not met in 1999, escapements to the Alaska portion of the Yukon River appear to have been generally attained.

### *Escapement*

Chinook salmon biological escapement goals (BEGs) within the Alaskan portion of the Yukon River drainage are based on aerial surveys. The rebuilding step escapement goal for the Yukon River in Canada is based on a mark-recapture population estimate of chinook salmon passing into Canada minus total Canadian harvests. Minimum aerial survey escapement goals have been established in the East and West Fork Andreasfky, Anvik, North and South Fork Nulato, Gisasa, Chena and Salcha Rivers within the Alaska portion of the Yukon River drainage and there is a rebuilding step escapement goal of 28,000 chinook for the Canadian mainstem Yukon River. Since 1995, escapement data from selected tributaries indicate that spawning escapement goals for lower river stocks (Yukon River below the upper Koyukuk River) have generally been achieved until recently. Escapement goals for middle river stocks (primarily Tanana River drainage) were achieved except for 1998 and 2000. The 2000 season is considered the only one that, despite the use of specific management measures, escapement goals were generally not achieved for the entire drainage, except for the Anvik and Salcha Rivers.

1995

- Aerial Survey escapement goals in Alaska generally achieved.
- Canadian stabilization escapement goal was exceeded.
- Parent-year escapements appeared fair.

1996

- Aerial Survey escapement goals in Alaska generally achieved except for lower river stocks.
- Canadian rebuilding step escapement goal was achieved.
- Parent-year escapements appeared fair.

1997

- Aerial Survey escapement goals in Alaska readily achieved.
- Canadian rebuilding step escapement goal was achieved.

- Parent-year escapements appeared fair.

1998

- Aerial Survey escapement goals in Alaska generally not achieved.
- Canadian rebuilding step escapement goal was not achieved.
- Specific management actions were taken to reduce harvests. Further reductions in harvests may have resulted in the achievement of escapement goals.
- Parent-year escapements appeared good.

1999

- Aerial Survey escapement goals in Alaska generally achieved.
- Canadian rebuilding step escapement goal was not achieved.
- Specific management actions were taken to reduce harvests. Further reductions in harvests may have resulted in the achievement of escapement goals.
- Parent-year escapements appeared good.

2000

- Aerial Survey escapement goals in Alaska generally not achieved.
- Canadian rebuilding step escapement goal was not achieved.
- Specific management actions were taken to reduce harvests. Further reductions in harvests may not have allowed goals to be achieved.
- Parent-year escapements appeared good.

### *Harvest*

An average of 51,603 chinook salmon are harvested annually for subsistence purposes. The commercial guideline harvest range (GHR) for chinook salmon in the Alaska portion is 67,350 – 129,150. Commercial harvest of chinook salmon remained in the upper half of the GHR until 1998 when it fell below the lower end of the GHR. The 1999 commercial harvest of 69,563 chinook salmon was at the low end of the GHR. The 2000 commercial harvest of 8,518 chinook salmon was the lowest harvest since 1937. Specific management measures were taken in 1998, 1999, and 2000 to maintain escapements for chinook salmon within the bounds of the established aerial survey goals and the rebuilding step escapement goal for the Yukon River in Canada

1995

- Subsistence harvest was average (50,258 chinook salmon).
- 122,728 chinook salmon harvested commercially. Exceeded upper end of GHR.

1996

- Subsistence harvest was average (43,827 chinook salmon).
- 89,671 chinook salmon harvested commercially. Near midpoint of GHR.

1997

- Subsistence harvest was average (57,060 chinook salmon).
- 112,841 chinook salmon harvested commercially. Upper half of GHR.

1998

- Subsistence harvest was average (54,171 chinook salmon).
- 43,618 chinook salmon harvested commercially. Lowest commercial harvest since 1952.

1999

- Subsistence harvest was average (52,699 chinook salmon).
- 69,563 chinook salmon harvested commercially. Second lowest commercial harvest since 1975.
-

2000

- Specific management actions reduced subsistence harvest opportunity.
- 8,518 chinook salmon harvested commercially. Lowest commercial harvest since 1937.

## *Outlook*

Overall, the year 2001 chinook salmon run is anticipated to be weak to below average in strength for the fourth year in a row. Typically the majority of chinook salmon returning to the Yukon River are 6-year-old fish, though 5- and 7-year-old fish usually make up a significant contribution to the run. Parent year escapements in 1995 were judged to be above average in magnitude. However, parent year escapements for 1998, 1999, and 2000 runs were also judged to be above average in magnitude. The returns from these parent years displayed below-average trends in survival. Causes for the observed drop in productivity are still largely unknown, as are the duration and exact magnitude of current production levels. Given the uncertainties associated with recent declines in productivity, it is uncertain if the run will support a commercial harvest and potentially require reductions in subsistence harvest opportunity.

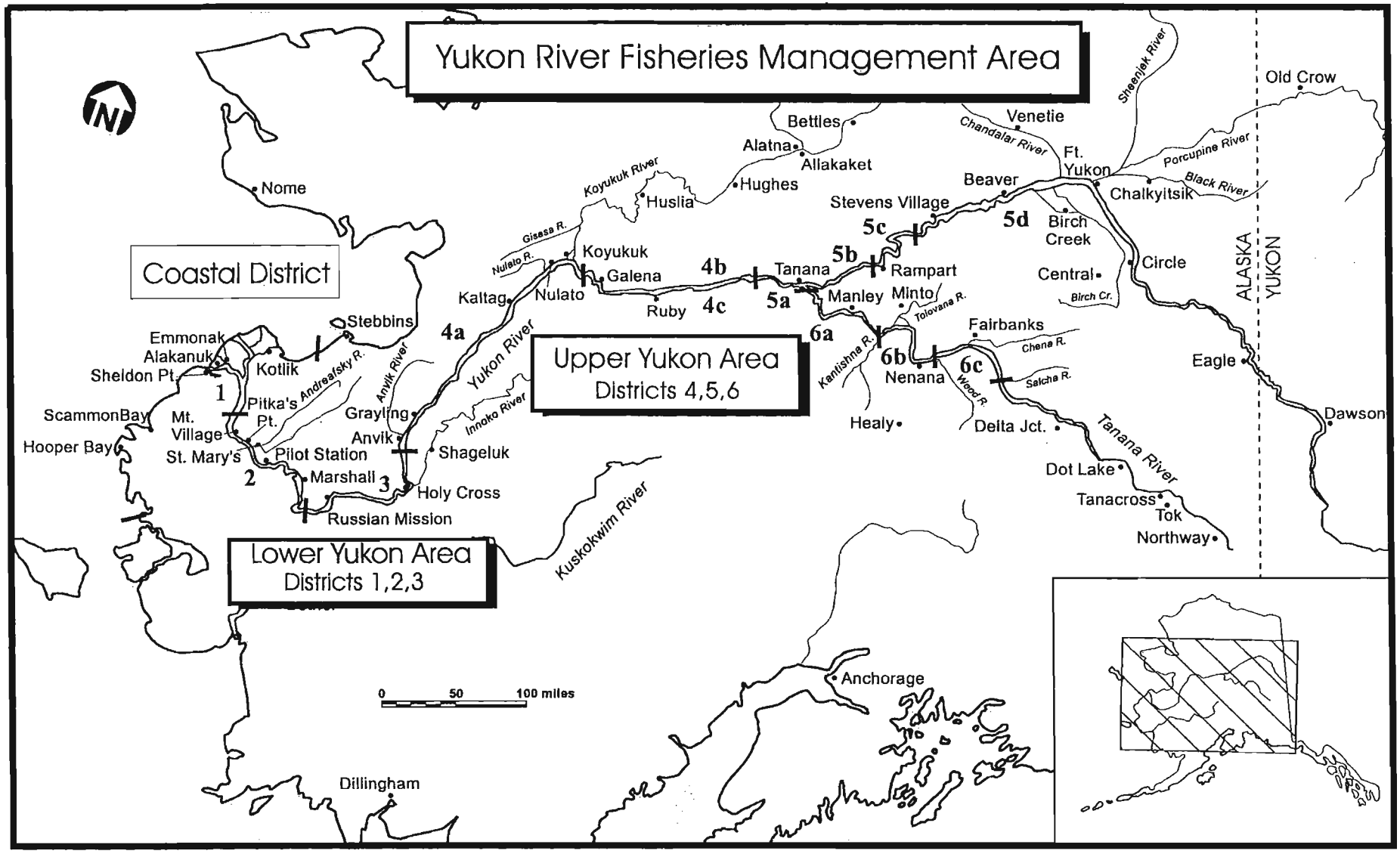



Figure 1. Map of the Alaska portion of the Yukon River drainage showing communities and fishing districts.

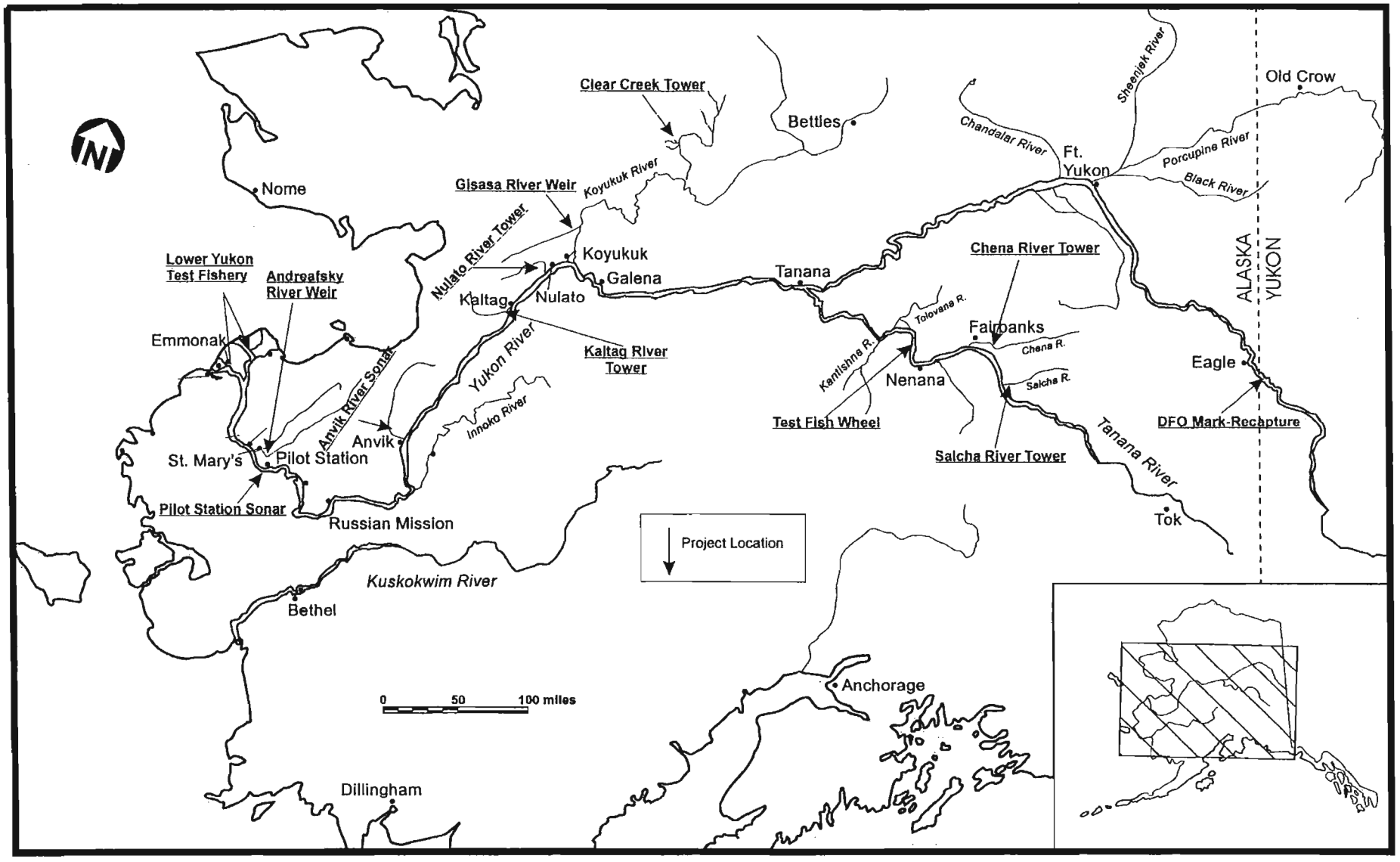



Figure 2. Select summer season monitoring projects, Yukon River drainage, 2000.

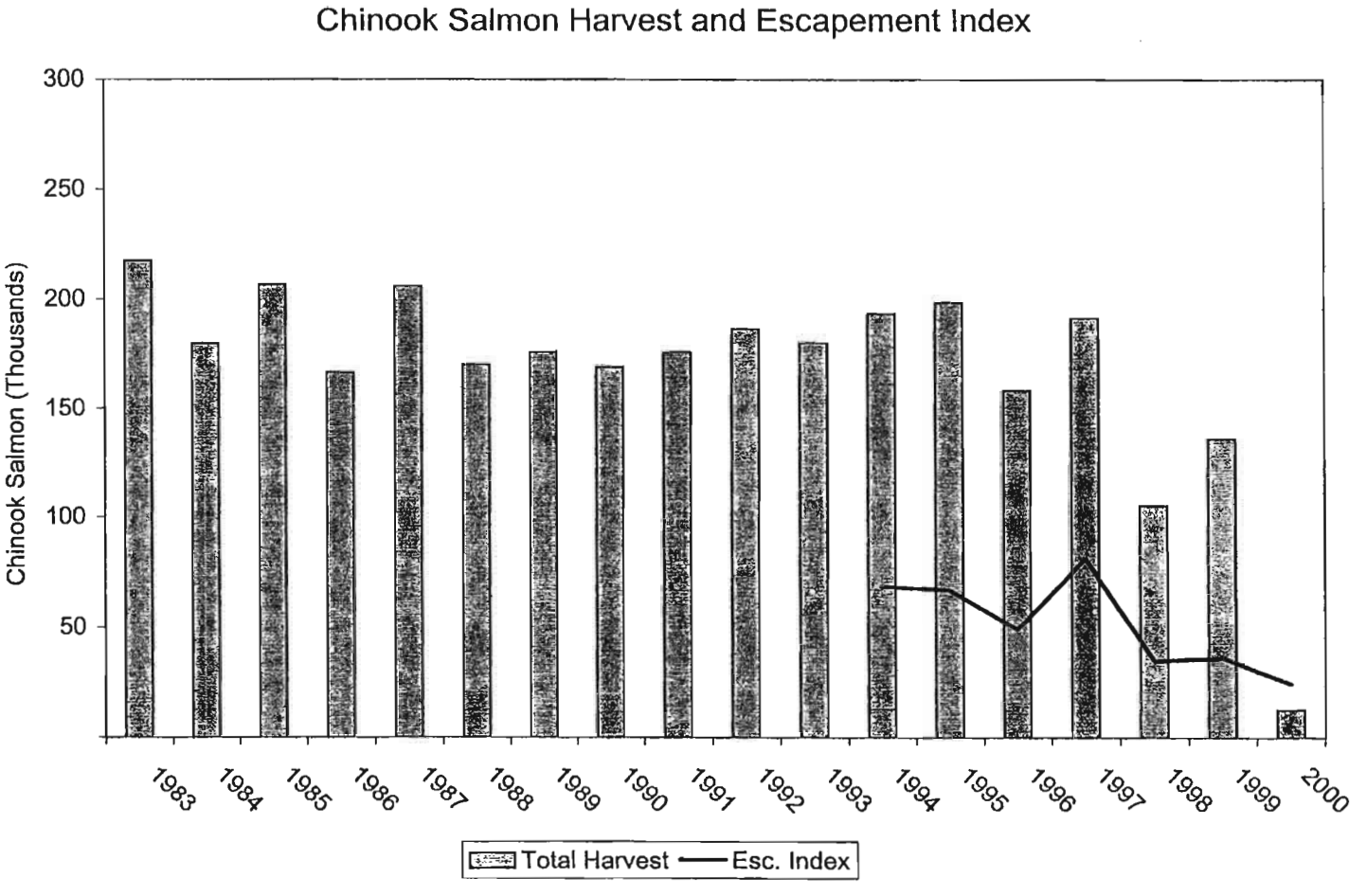



Figure 3. Chinook salmon harvest and escapement index, 1983-2000. [a,b,c]

[a] Escapement index is East Fork Andreafsky River weir, Nulato River tower, and Gisasa River weir counts, and Chena and Salcha River population estimates and Canadian mainstem spawning escapement estimates combined.

[b] The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.

[c] 2000 harvest and escapement index data is preliminary.

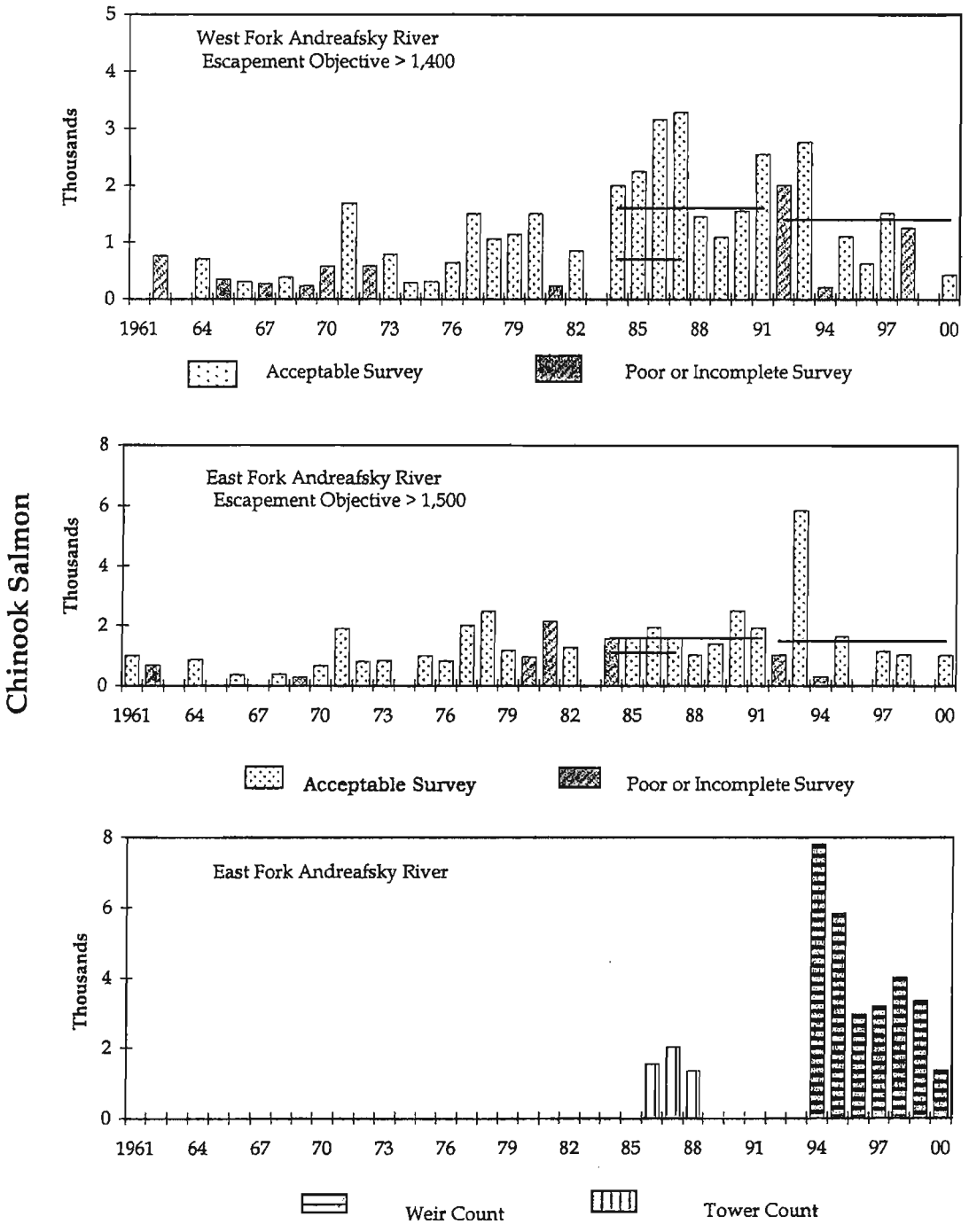



Figure 4. Chinook salmon escapement data for selected spawning areas in the Alaskan 'portion of the Yukon River drainage, 1961-2000. Data are aerial survey observations unless noted otherwise. Horizontal lines represent interim escapement goal objectives or ranges. Note that the scale of the vertical axis differs between projects.

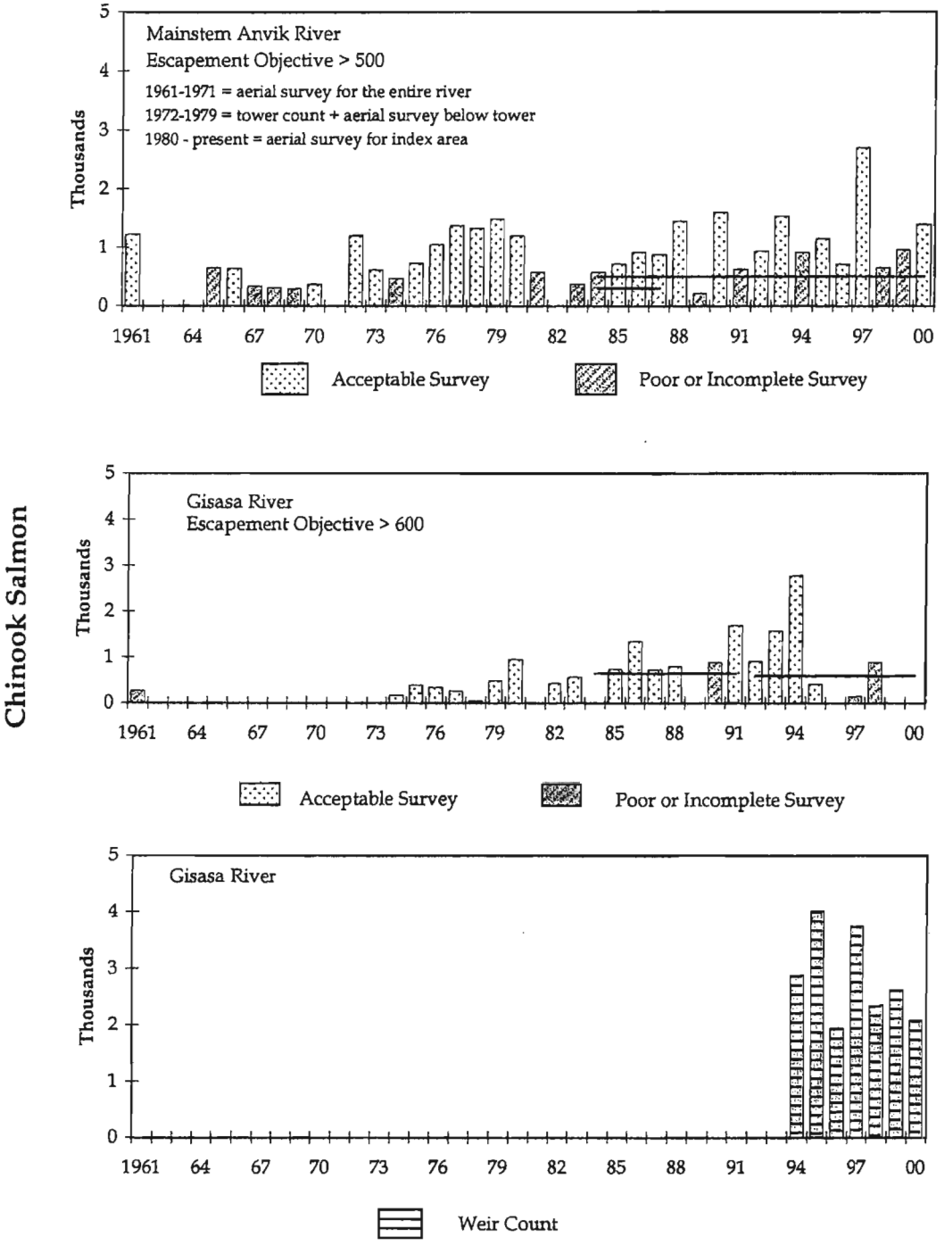



Figure 4 (page 2 of 4).

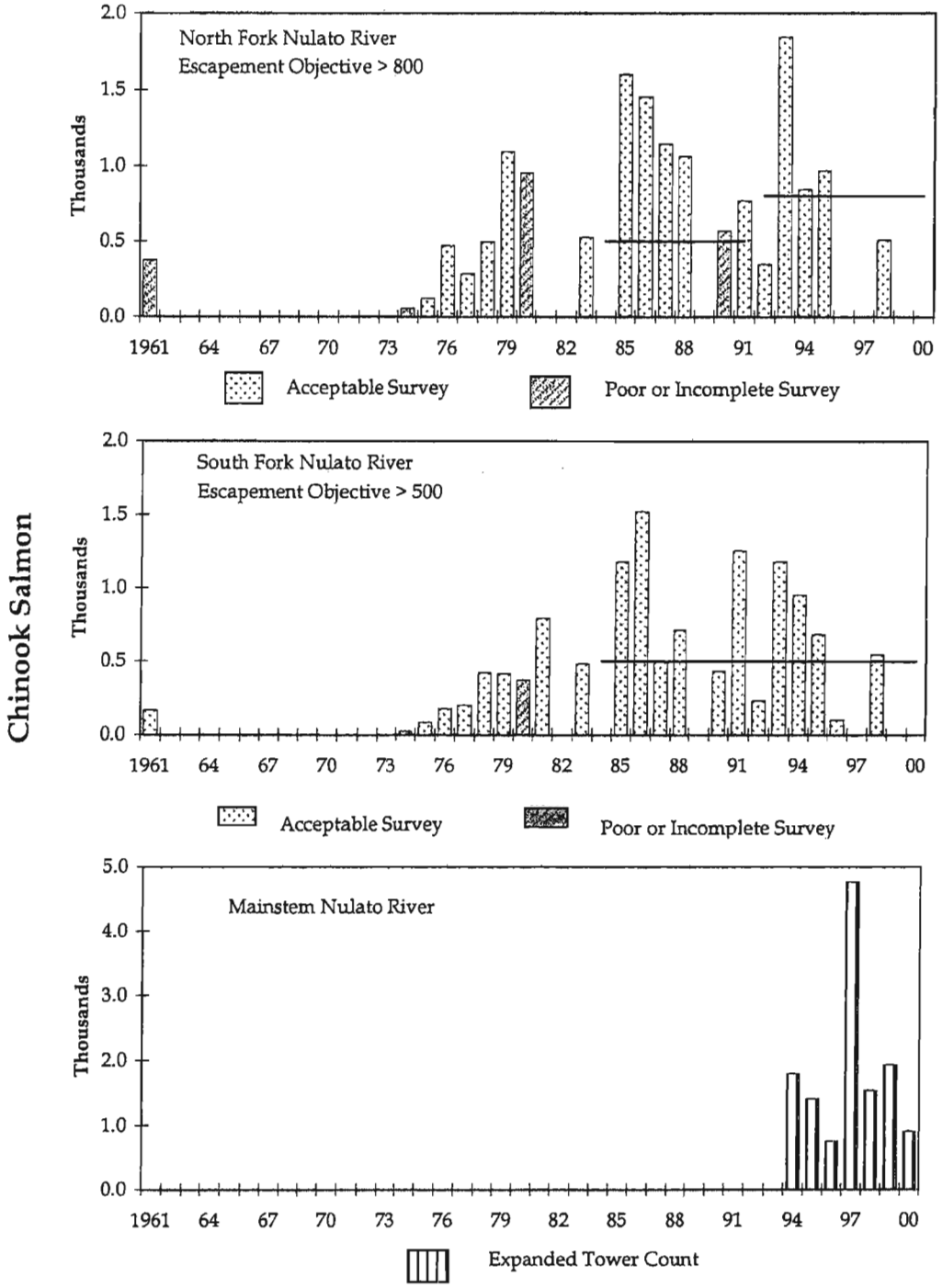
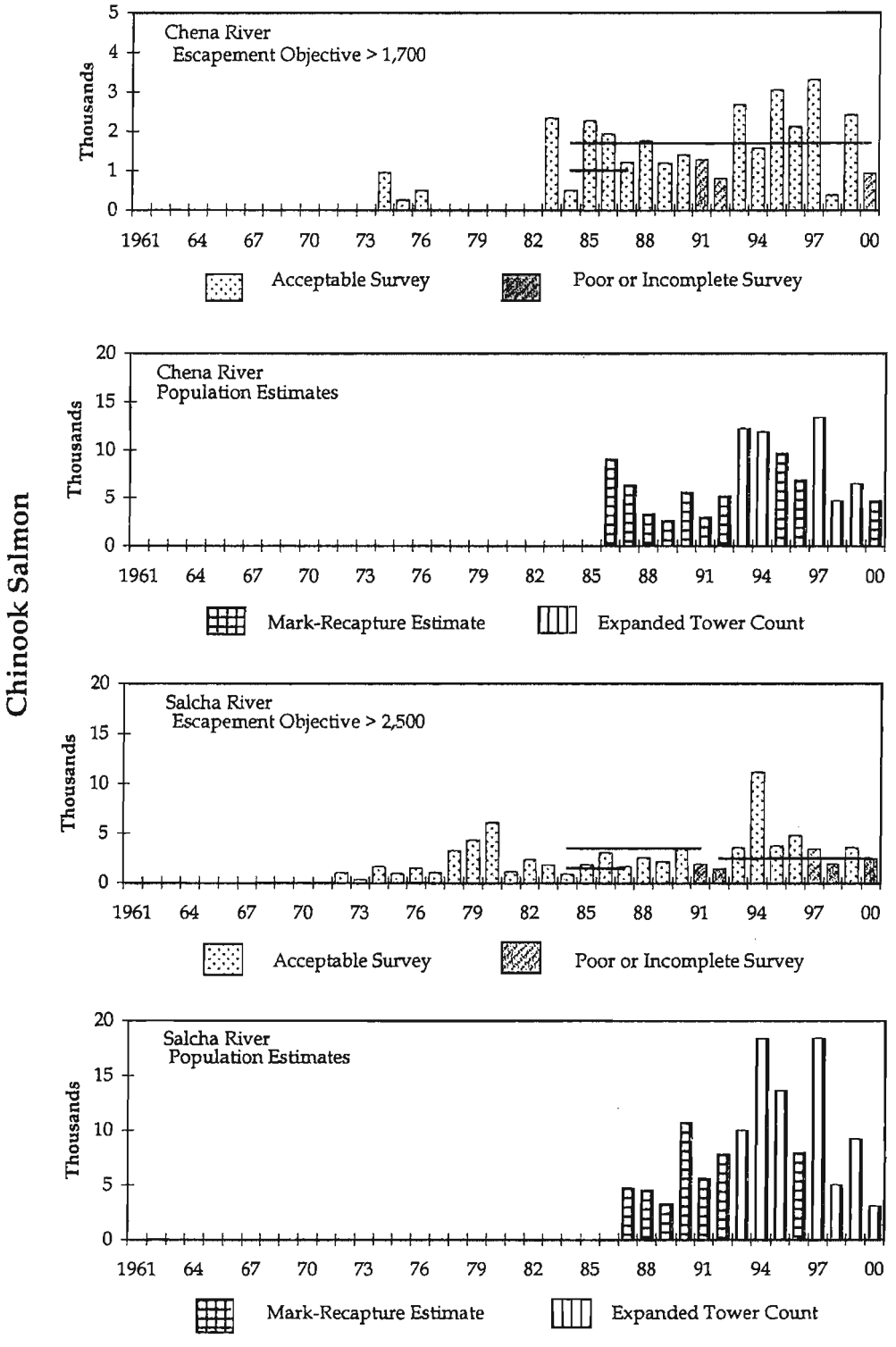



Figure 4 (page 3 of 4).

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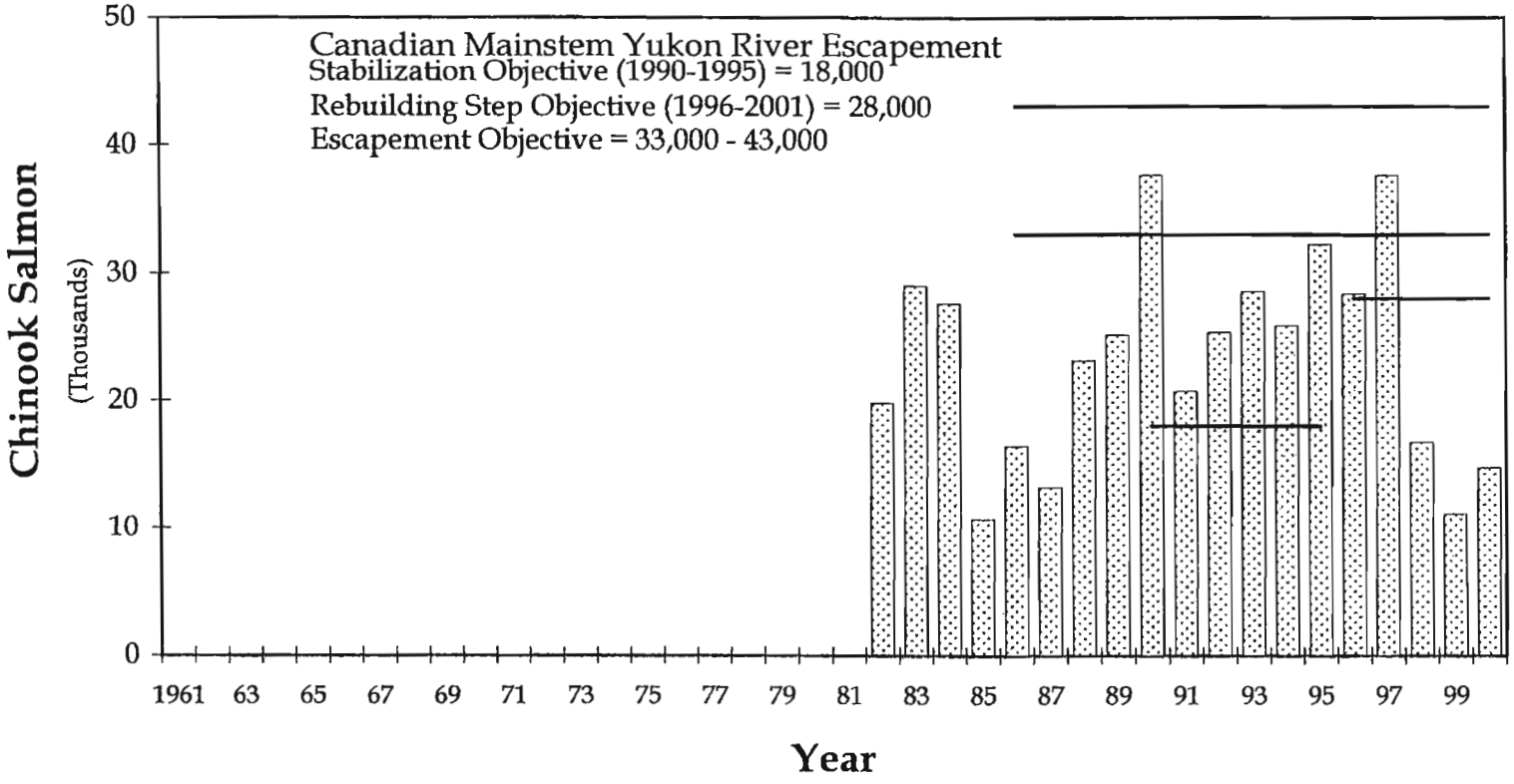


Figure 5. Estimated total chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982-2000. Horizontal lines represent the interim escapement goal range of 33,000-43,000 salmon, the stabilization objective of 18,000 salmon and the rebuilding step objective of 28,000 salmon.

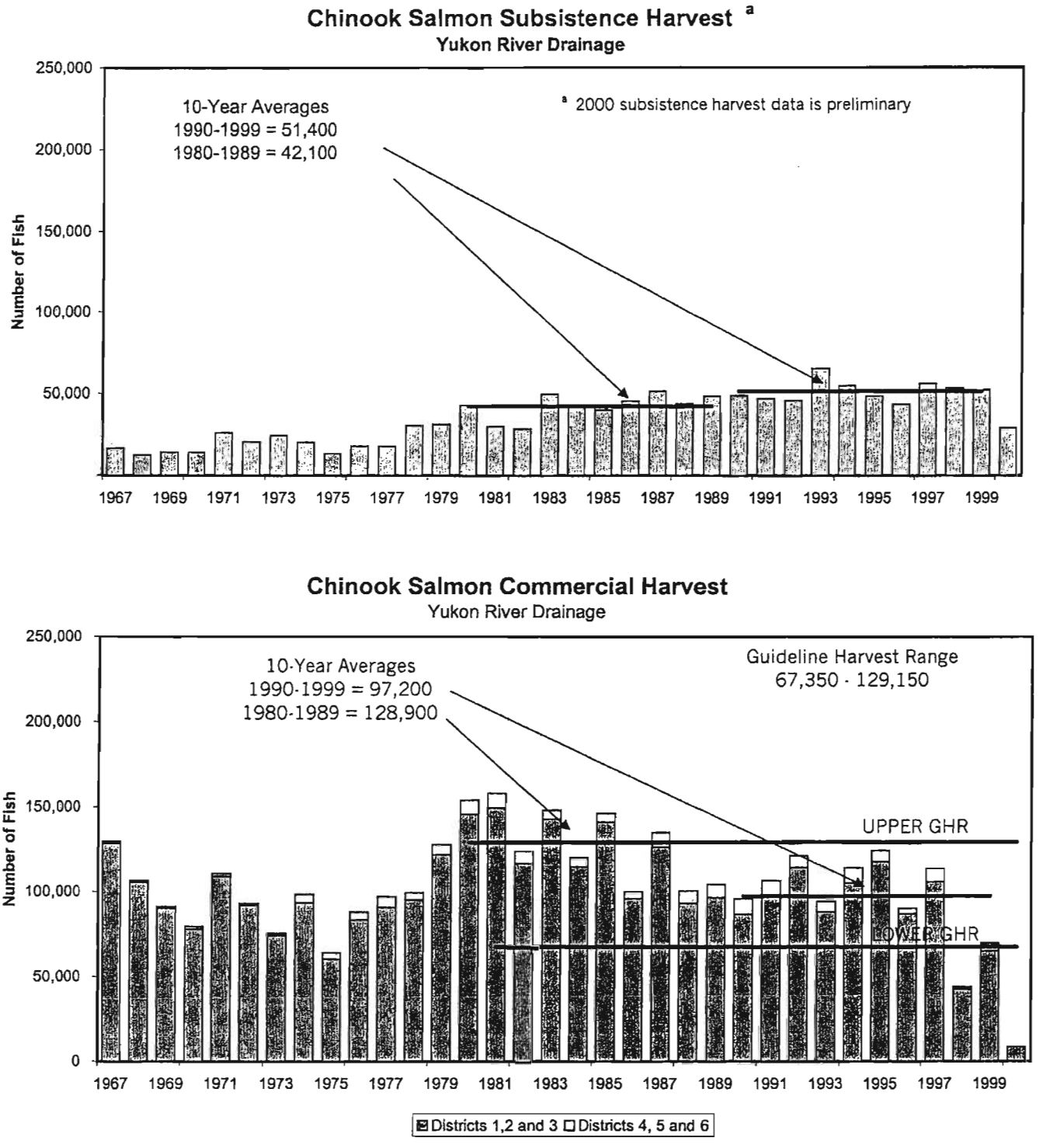


Figure 6. Subsistence and commercial harvest of chinook salmon, Yukon Area, 1967-2000.

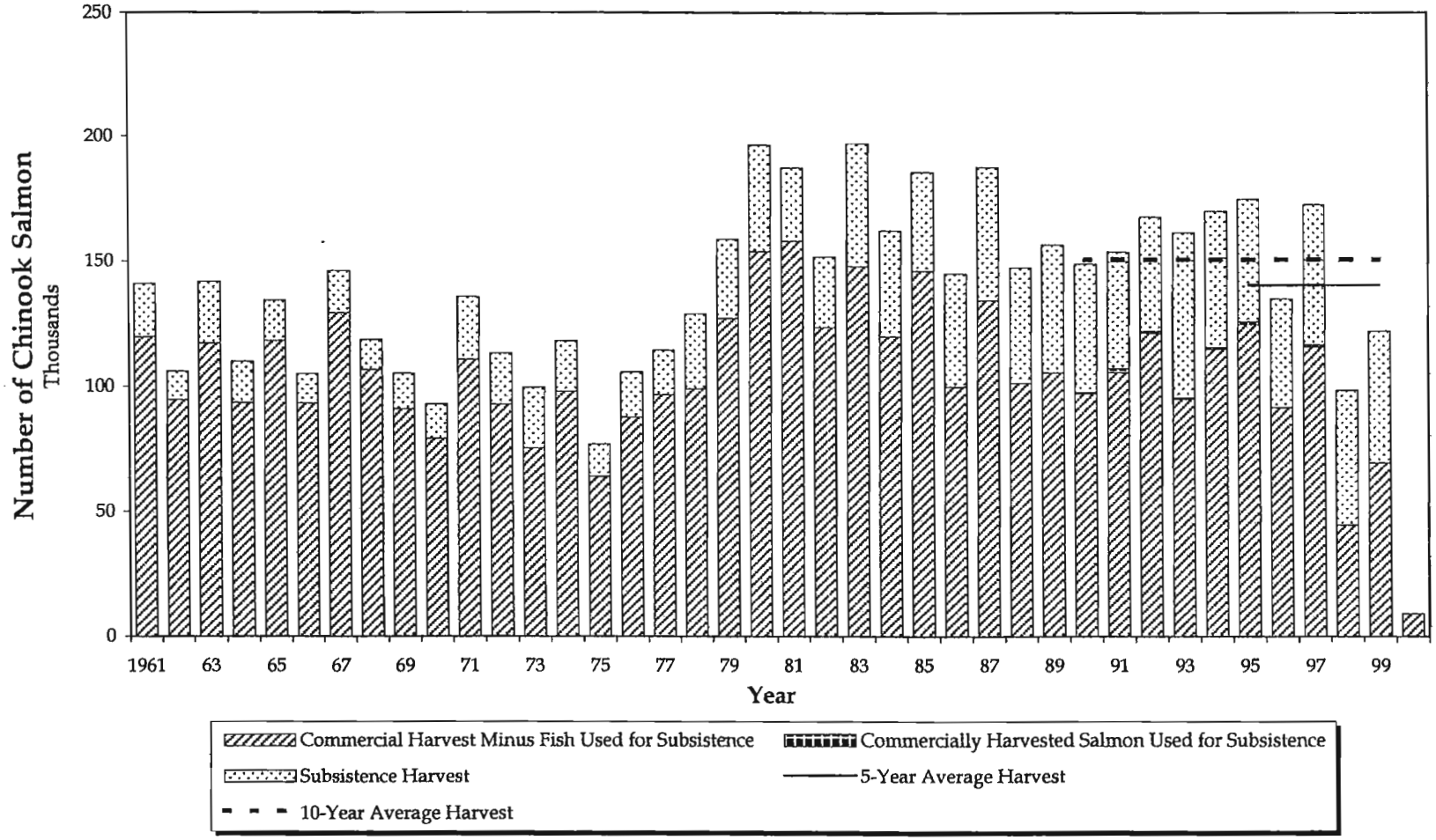


**Figure 7. Alaskan harvest of chinook salmon, Yukon River, 1961-2000. The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.**

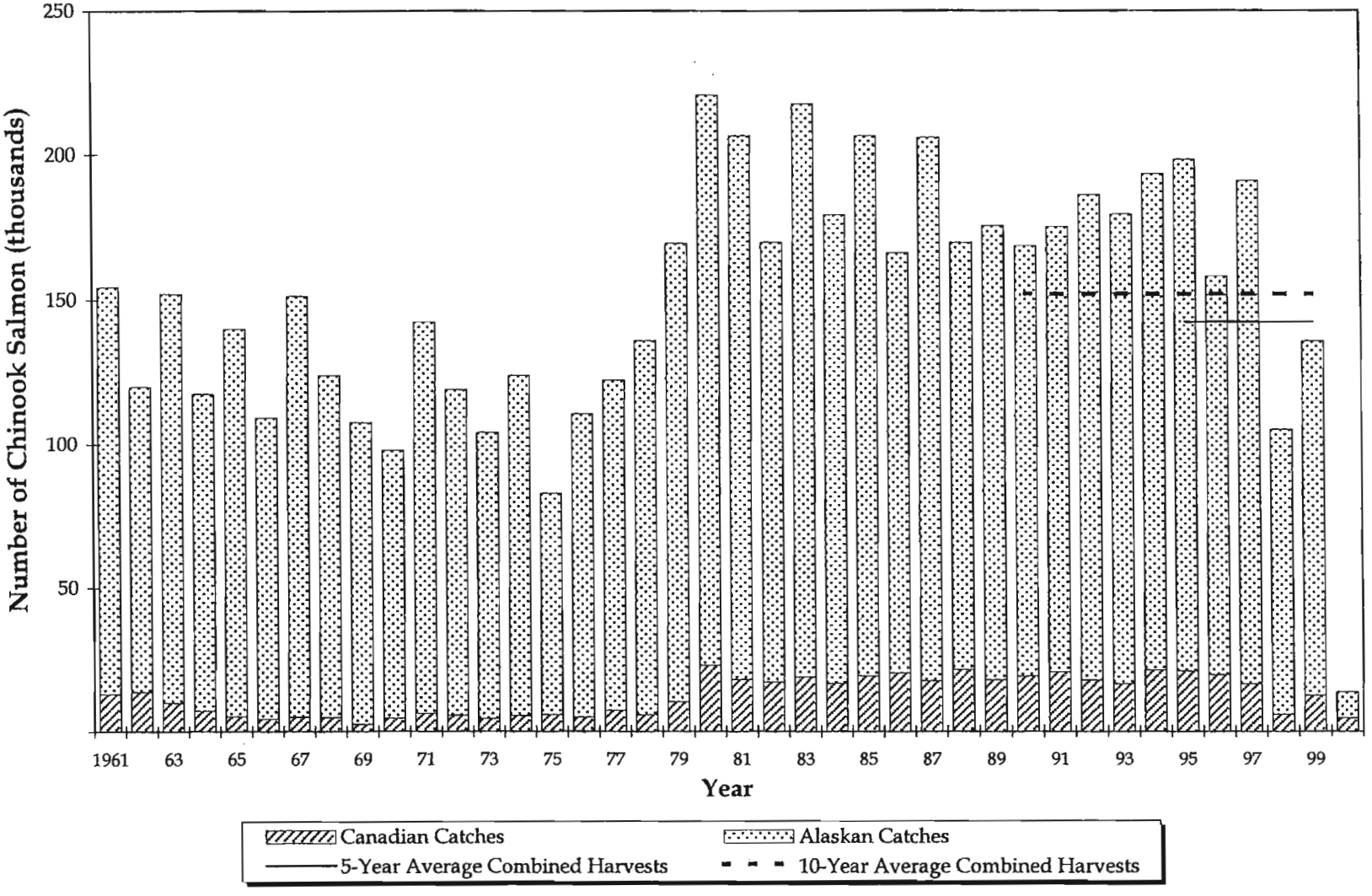


**Figure 8. Total utilization of chinook salmon, Yukon River, 1961-2000. The 2000 Alaskan harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.**

Table 1. Assessment of Yukon River chinook salmon escapements, 1995-2000.

| Location | 1995-1999 Average Estimate or Goal | 1995 Estimate | 1995 Assessment Made Goal or Average? | 1996 Estimate | 1996 Assessment Made Goal or Average? | 1997 Estimate | 1997 Assessment Made Goal or Average? | 1998 Estimate | 1998 Assessment Made Goal or Average? | 1999 Estimate | 1999 Assessment Made Goal or Average? | 2000 Estimate | 2000 Assessment Made Goal or Average? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **E.F. Andreafsky River** | | | | | | | | | | | | | |
| Weir | 3,868 (Estimate) | **5,841** | **Above avg.** | 2,955 | Below avg. | 3,186 | Below avg. | **4,011** | **Above avg.** | 3,347 | Below avg. | 1,380 | Below avg. |
| Aerial Survey | > 1,500 (Goal) | **1,635** | **YES** | Not Flown | Unknown | 1,140 | NO | 1,027 | NO | Incomplete | Unknown | 1,018 | NO |
| **W.F. Andreafsky River** | | | | | | | | | | | | | |
| Aerial Survey | > 1,400 (Goal) | 1,108 | NO | 624 | NO | **1,510** | **YES** | 1,249 (Incomplete) | Unknown | 870 (Incomplete) | Unknown | 427 | NO |
| **Anvik River** | | | | | | | | | | | | | |
| Aerial survey, Index | > 500 (Goal) | **1,147** | **YES** | **709** | **YES** | **2,690** | **YES** | **648** | **YES** | **950 (Incomplete)** | **YES** | **1,394** | **YES** |
| **Nulato River** | | | | | | | | | | | | | |
| Tower | 2,081 (Estimate) | 1,412 | Below avg. | 756 | Below avg. | **4,766** | **Above avg.** | 1,536 | Below avg. | 1,932 | **Average** | 908 | Below avg. |
| Aerial Survey | > 1,300 (Goal) | **1,649** | **YES** | Incomplete | Unknown | Not Flown | Unknown | 1,053 | NO | Not Flown | Unknown | Not Flown | Unknown |
| **Gisasa River** | | | | | | | | | | | | | |
| Weir | 2,945 (Estimate) | **4,023** | **Above avg.** | 1,952 | Below avg. | **3,764** | **Above avg.** | 2,356 | Below avg. | **2,631** | **Average** | 2,089 | Below avg. |
| Aerial Survey | > 600 (Goal) | 410 | NO | Not Flown | Unknown | Incomplete | Unknown | **889** | **YES** | Not Flown | Unknown | Not Flown | Unknown |
| **Chena River** | | | | | | | | | | | | | |
| Tower, Mark/Recap | 8,227 (Estimate) | **9,680** | **Above avg.** | 6,833 | Below avg. | **13,390** | **Above avg.** | 4,745 | Below avg. | **6,485** | Below avg. | 4,707 | Below avg. |
| Aerial survey, Index | > 1,700 (Goal) | **3,039** | **YES** | **2,112** | **YES** | **3,303** | **YES** | Incomplete | Unknown | **2,137** | **YES** | 934 | NO |
| **Salcha River** | | | | | | | | | | | | | |
| Tower, Mark/Recap | 10,868 (Estimate) | **13,643** | **Above avg.** | 7,958 | Below avg. | **18,396** | **Above avg.** | 5,027 | Below avg. | **9,198** | Below avg. | 3,108 | Below avg. |
| Aerial survey, Index | > 2,500 (Goal) | **3,734** | **YES** | **4,800** | **YES** | **3,457** | **YES** | Incomplete | Unknown | **3,570** | **YES** | **2,478 (Incomplete)** | **YES** |
| **Canada Border Passage** | | | | | | | | | | | | | |
| Mark/Recap | 39,981 (Estimate) | **52,353** | **Above avg.** | **47,955** | **Above avg.** | **53,400** | **Above avg.** | 22,588 | Below avg. | 23,608 | Below avg. | 18,360 | Below avg. |
| **Canada Spawning Escapement** | | | | | | | | | | | | | |
| 18,000 (Goal) 1995 | 28,000 (Goal) 1996-2000 | **32,262** | **YES** | **28,409** | **YES** | **37,683** | **YES** | 16,750 | NO | 11,153 | NO | 14,798 | NO |

Table 2. Yukon River drainage salmon spawning escapement goals for selected species and streams, 2000.

| Stream | Escapement Goals [a] Chinook | Summer Chum | Fall Chum | Coho |
|---|---|---|---|---|
| Andreafsky River | | | | |
| East Fork | > 1,500 | > 109,000 | | |
| West Fork | > 1,400 | > 116,000 | | |
| Anvik River | | | | |
| Aerial | | | | |
| Mainstem (entire drainage) | > 1,300 | | | |
| Yellow River to McDonald Creek | > 500 | | | |
| Sonar | | > 500,000 [D] | | |
| Nulato River | | | | |
| North Fork | > 800 | > 53,000 | | |
| South Fork | > 500 | | | |
| Hogatza River | | | | |
| Clear Creek | | > 8,000 | | |
| Caribou Creek | | > 9,000 | | |
| Gisasa River | > 600 | | | |
| Chena River | | | | |
| Mainstem from Flood Control Dam to Middle Fork | > 1,700 | | | |
| Salcha River | | | | |
| TAPS to Caribou Creek | > 2,500 | > 3,500 | | |
| Sheenjek River | | | > 64,000 [c] | |
| Fishing Branch River (YT, Canada) | | | 50,000-120,000 [d] | |
| Toklat River | | | > 33,000 [c] | |
| Delta River Index Areas | | | > 11,000 [c] | >9,000 [J] |
| Mainstem Yukon River in Y.T., Canada [b] | 33,000-43,000 [f,g] | | > 80,000 [g,h] | |

[a] Index streams have been designated because of their importance as spawning areas and/or by their geographic location with respect to other unsurveyable salmon spawning streams in the general area. Escapement goals represent the approximate number of desired spawners considered necessary to maintain the historical yield from the stocks and are based upon historical performance, i.e., they are predicated upon some measure of historic average. Unless otherwise indicated, escapement goals are based upon aerial survey index estimates which do not represent total escapement but do reflect annual spawner abundance when using standard survey methods under acceptable survey conditions. These survey goals represent the latest review and revision by ADF&G (March 1992), unless otherwise noted.

[b] Escapement goals of total spawning abundance based upon sonar, weir, mark-and-recapture, or expansions from inseason point estimates.

[c] Escapement goals developed by ADF&G for November 1990 U.S./Canada JTC meeting.

[d] Escapement goals developed by JTC in October 1987. (see page 42 of the October 6-8, 1987 JTC report).

[f] Escapement goals developed by JTC in March 1987. Additionally, a rebuiling step escapement goal for years 1996-2001 of 28,000 chinook salmon has been agreed to by the U.S. and Canada.

[g] Estimated total spawning escapement excluding the Porcupine River (estimated mainstem Yukon River border passage minus Canadian harvests).

[h] Escapement goals developed by JTC in November 1990.

[J] Escapement goals established by ADG&G in March 1993.

Table 5. Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-2000. [a]

| Year | Andreafsky River | | | Anvik River | | Nulato River | | | Gisasa River | | Chena River | | | Salcha River | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | East Fork | | West Fork | River | Index Area | North Fork | South Fork | Mainstem | River | | River | | Index Area | River | | Index Area |
| | Aerial | Tower or Weir | Aerial | Aerial [b] | Aerial [b] | Aerial [c] | Aerial | Tower | Aerial | Weir | Population Estimate [m] | Aerial | Aerial [d] | Population Estimate [m] | Aerial | Aerial [f] |
| 1961 | 1,003 | | | 1,226 | | 376 [g] | 167 | | 266 [g] | | | | | | 2,878 | |
| 1962 | 675 [g] | | 762 [g] | | | | | | | | | 61 [g,h] | | | 937 | |
| 1963 | | | | | | | | | | | | 137 [g] | | | | |
| 1964 | 867 | | 705 | | | | | | | | | | | | 450 | |
| 1965 | | | 344 [g] | 650 [g] | | | | | | | | | | | 408 | |
| 1966 | 361 | | 303 | 638 | | | | | | | | | | | 800 | |
| 1967 | | | 276 [g] | 336 [g] | | | | | | | | | | | | |
| 1968 | 380 | | 383 | 310 [g] | | | | | | | | | | | 739 | |
| 1969 | 274 [g] | | 231 [g] | 296 [g] | | | | | | | | | | | 461 [g] | |
| 1970 | 665 | | 574 [g] | 368 | | | | | | | | 6 [g] | | | 1,882 | |
| 1971 | 1,904 | | 1,682 | | | | | | | | | 193 [g,h] | | | 158 [g] | |
| 1972 | 798 | | 582 [g] | 1,198 | | | | | | | | 138 [g,h] | | | 1,193 | 1,034 |
| 1973 | 825 | | 788 | 613 | | | | | | | | 21 [g] | | | 391 | 352 [i] |
| 1974 | | | 285 | 471 [g] | | 55 [g] | 23 [g] | | 161 | | | 1,016 [h] | 959 [h] | | 1,857 | 1,620 |
| 1975 | 993 | | 301 | 730 | | 123 | 81 | | 385 | | | 316 [h] | 262 [h] | | 1,055 | 950 [i] |
| 1976 | 818 | | 643 | 1,053 | | 471 | 177 | | 332 | | | 531 | 496 | | 1,641 | 1,473 |
| 1977 | 2,008 | | 1,499 | 1,371 | | 286 | 201 | | 255 | | | 563 | | | 1,202 | 1,052 |
| 1978 | 2,487 | | 1,062 | 1,324 | | 498 | 422 | | 45 [g] | | | 1,726 | | | 3,499 | 3,258 |
| 1979 | 1,180 | | 1,134 | 1,484 | | 1,093 | 414 | | 484 | | | 1,159 [g] | | | 4,789 | 4,310 [i] |
| 1980 | 958 [g] | | 1,500 | 1,330 | 1,192 | 954 [g] | 369 [g] | | 951 | | | 2,541 | | | 6,757 | 6,126 |
| 1981 | 2,146 [g] | | 231 [g] | 807 [g] | 577 [g] | | 791 | | | | | 600 [g] | | | 1,237 | 1,121 |
| 1982 | 1,274 | | 851 | | | | | | 421 | | | 2,073 | | | 2,534 | 2,346 |
| 1983 | | | | 653 [g] | 376 [g] | 526 | 480 | | 572 | | | 2,553 | 2,336 | | 1,961 | 1,803 |
| 1984 | 1,573 [g] | | 1,993 | 641 [g] | 574 [g] | | | | | | | 501 | 494 | | 1,031 | 906 |
| 1985 | 1,617 | | 2,248 | 1,051 | 720 | 1,600 | 1,180 | | 735 | | | 2,553 | 2,262 | | 2,035 | 1,860 |
| 1986 | 1,954 | 1,530 [k] | 3,158 | 1,118 | 918 | 1,452 | 1,522 | | 1,346 | | 9,065 | 2,031 | 1,935 | | 3,368 | 3,031 [i] |
| 1987 | 1,608 | 2,011 [k] | 3,281 | 1,174 | 879 | 1,145 | 493 | | 731 | | 6,404 | 1,312 | 1,209 | 4,771 | 1,898 | 1,671 |
| 1988 | 1,020 | 1,339 [k] | 1,448 | 1,805 | 1,449 | 1,061 | 714 | | 797 | | 3,346 | 1,966 | 1,760 | 4,562 | 2,761 | 2,553 |
| 1989 | 1,399 | | 1,089 | 442 [g] | 212 [g] | | | | | | 2,666 | 1,280 | 1,185 | 3,294 | 2,333 | 2,136 |
| 1990 | 2,503 | | 1,545 | 2,347 | 1,595 | 568 [g] | 430 [g,n] | | 884 [g] | | 5,603 | 1,436 | 1,402 | 10,728 | 3,744 | 3,429 |
| 1991 | 1,938 | | 2,544 | 875 [g] | 625 [g] | 767 | 1,253 | | 1,690 | | 3,025 | 1,277 [g] | 1,277 [g] | 5,608 | 2,212 [g] | 1,925 [g] |
| 1992 | 1,030 [g] | | 2,002 [g] | 1,536 | 931 | 348 | 231 | | 910 | | 5,230 | 825 [g] | 799 [g] | 7,862 | 1,484 [g] | 1,436 [g] |
| 1993 | 5,855 | | 2,765 | 1,720 | 1,526 | 1,844 | 1,181 | | 1,573 | | 12,241 [k] | 2,943 | 2,660 | 10,007 [k] | 3,636 | 3,562 |
| 1994 | 300 [g] | 7,801 [p,r] | 213 [g] | | 913 [g] | 843 | 952 | 1,795 [r] | 2,775 | 2,888 [r] | 11,877 [k] | 1,570 | 1,570 | 18,399 [k] | 11,823 | 11,189 |
| 1995 | 1,635 | 5,841 [p] | 1,108 | 1,996 | 1,147 | 968 | 681 | 1,412 | 410 | 4,023 | 9,680 | 3,575 | 3,039 | 13,643 [k] | 3,978 | 3,734 |
| 1996 | | 2,955 [p] | 624 | 839 | 709 | | 100 [n] | 756 | | 1,952 | 6,833 | 2,233 | 2,112 | 7,958 | 4,866 | 4,800 |
| 1997 | 1,140 | 3,186 [p] | 1,510 | 3,979 | 2,690 | | | 4,766 | 144 [g] | 3,764 | 13,390 [k] | 3,495 | 3,303 | 18,396 [k] | 3,457 [g] | 3,457 [g] |
| 1998 | 1,027 | 4,011 [p] | 1,249 [g] | 709 [g] | 648 [g] | 507 | 546 | 1,536 | 889 [g] | 2,356 [v] | 4,745 [k] | 440 [g] | 386 [c] | 5,027 [k] | 2,055 [g] | 1,923 [g] |
| 1999 | | 3,347 [p] | | | 950 [g] | | | 1,932 | | 2,631 [v] | 6,485 [k] | | 2,412 | 9,198 [k] | | 3,608 |
| 2000 [s] | 1,018 | 1,358 [p] | 427 | 1,721 | 1,394 | | | 908 | | 2,089 | 4,707 [m] | 962 [g] | 934 [g] | 3,108 [k] | 2,562 [g] | 2,478 [g] |
| E.O. [t] | >1,500 | | >1,400 | >1,300 [u] | >500 [u] | >800 | >500 | | >600 | | | | >1,700 | | | >2,500 |

continued

Table 3. (page 2 of 2).

[a] Aerial survey counts are peak counts only. Survey rating was fair or good unless otherwise noted.
[o] From 1961-1970, river count data are from aerial surveys of various segments of the mainstem Anvik River. From 1972-1979, counting tower operated; mainstem aerial survey counts below the tower were added to tower counts. From 1980-present, aerial survey counts for the river are best available minimal estimates for the entire Anvik River drainage. Index area counts are from the mainstem Anvik River between the Yellow River and McDonald Creek.
[c] Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted.
[q] Chena River index area for assessing the escapement objective is from Moose Creek Dam to Middle Fork River.
[r] Salcha River index area for assessing the escapement objective is from the TAPS crossing to Caribou Creek.
[g] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
[n] Boat survey.
[j] Data unavailable for index area. Calculated from historic (1972-91) average ration of index area counts to total river counts (0.90:1.0).
[k] Tower counts.
[m] Mark-recapture population estimate.
[n] Mainstem counts below the confluence of the North and South Forks Nulato River included in the South Fork counts.
[p] Weir counts.
[r] Incomplete count because of late installation and/or early removal of project.
[s] Data are preliminary.
[t] Interim escapement goals. Established March, 1992.
[u] Interim escapement goal for the entire Anvik River drainage is 1,300 salmon. Interim escapement objective for mainstem Anvik River between the Yellow River and McDonald Creek is 500 salmon.
[v] Estimate is expanded for missing data caused by high water. Actual count in published agency reports may vary.

Table 4. Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1991-2000.

| Year | Tincup Creek [a] | Tatchun Creek [b] | Little Salmon River [a] | Big Salmon River [a,c] | Nisutlin River [a,d] | Ross River [a,t] | Wolf River [a,g] | Whitehorse Fishway | | Canadian Mainstem | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Count | Percent Hatchery Contribution | Border Passage Estimate | Harvest | Spawning Escapement Estimate [l] |
| 1961 | | | | | | | | 1,068 | 0 | | | |
| 1962 | | | | | | | | 1,500 | 0 | | | |
| 1963 | | | | | | | | 483 | 0 | | | |
| 1964 | | | | | | | | 595 | 0 | | | |
| 1965 | | | | | | | | 903 | 0 | | | |
| 1966 | | 7 [k] | | | | | | 563 | 0 | | | |
| 1967 | | | | | | | | 533 | 0 | | | |
| 1968 | | | 173 [k] | 857 [k] | 407 [k] | 104 [k] | | 414 | 0 | | | |
| 1969 | | | 120 | 286 | 105 | | | 334 | 0 | | | |
| 1970 | | 100 | | 670 | 615 | | 71 [k] | 625 | 0 | | | |
| 1971 | | 130 | 275 | 275 | 650 | | 750 | 856 | 0 | | | |
| 1972 | | 80 | 126 | 415 | 237 | | 13 | 391 | 0 | | | |
| 1973 | | 99 | 27 [k] | 75 [k] | 36 [k] | | | 224 | 0 | | | |
| 1974 | | 192 | | 70 [k] | 48 [k] | | | 273 | 0 | | | |
| 1975 | | 175 | | 153 [k] | 249 | | 40 [k] | 313 | 0 | | | |
| 1976 | | 52 | | 86 [k] | 102 | | | 121 | 0 | | | |
| 1977 | | 150 | 408 | 316 [k] | 77 | | | 277 | 0 | | | |
| 1978 | | 200 | 330 | 524 | 375 | | | 725 | 0 | | | |
| 1979 | | 150 | 489 [k] | 632 | 713 | | 183 [k] | 1,184 | 0 | | | |
| 1980 | | 222 | 286 [k] | 1,436 | 975 | | 377 | 1,383 | 0 | | | |
| 1981 | | 133 | 670 | 2,411 | 1,626 | 949 | 395 | 1,555 | 0 | | | |
| 1982 | | 73 | 403 | 758 | 578 | 155 | 104 | 473 | 0 | 36,598 | 16,808 | 19,790 |
| 1983 | 100 | 264 | 101 [k] | 540 | 701 | 43 [k,t] | 95 | 905 | 0 | 47,741 | 18,752 | 28,989 |
| 1984 | 150 | 153 | 434 | 1,044 | 832 | 151 [k] | 124 | 1,042 | 0 | 43,911 | 16,295 | 27,616 |
| 1985 | 210 | 190 | 255 | 801 | 409 | 23 [k] | 110 | 508 | 0 | 29,881 | 19,151 | 10,730 |
| 1986 | 228 | 155 | 54 [k] | 745 | 459 [k] | 72 [n] | 109 | 557 | 0 | 36,479 | 20,064 | 16,415 |
| 1987 | 100 | 159 | 468 | 891 | 183 | 180 [k] | 35 | 327 | 0 | 30,823 | 17,563 | 13,260 |
| 1988 | 204 | 152 | 368 | 765 | 267 | 242 | 66 | 405 | 16 | 44,445 | 21,327 | 23,118 |
| 1989 | 88 | 100 | 862 | 1,662 | 695 | 433 [p] | 146 | 549 | 19 | 42,620 | 17,419 | 25,201 |
| 1990 | 83 | 643 | 665 | 1,806 | 652 | 457 [k] | 188 | 1,407 | 24 | 56,679 | 18,980 | **37,699** [q] |
| 1991 | | | 326 | 1,040 | | 250 | 201 [r] | 1,266 [n] | 51 [h] | 41,187 | 20,444 | **20,743** [q] |
| 1992 | 73 | 106 | 494 | 617 | 241 | 423 | 110 [r] | 758 [n] | 84 [h] | 43,185 | 17,803 | **25,382** [q] |
| 1993 | | 183 | 184 | 572 | 339 | 400 | 168 [r] | 668 [n] | 73 [h] | 45,027 | 16,469 | **28,558** [q] |
| 1994 | 101 [k] | 477 | 726 | 1,764 | 389 | 506 | 393 [r] | 1,577 [h] | 54 [n] | 46,680 | 20,790 | **25,890** [q] |
| 1995 | 121 | 397 | 781 | 1,314 | 274 | 253 [k] | 229 [r] | 2,103 | 57 | 52,353 | 20,091 | **32,262** [q] |
| 1996 | 150 | 423 | 1,150 | 2,565 | 719 | 102 [k] | 705 [r] | 2,958 | 35 | 47,955 | 19,546 | **28,409** [q] |
| 1997 | 193 | 266 [k] | 1,025 | 1,345 | 277 | | 322 [r] | 2,084 | 24 | 53,400 | 15,717 | **37,683** [q] |
| 1998 | 53 | 189 | 361 | 523 | 146 | | 66 | 777 | 95 | 22,588 | 5,838 | 16,750 [q] |
| 1999 | 2 [k] | 250 | 495 | 372 | 337 | | 146 | 1,118 | 90 | 23,608 | 12,455 | 11,153 [q] |
| 2000 [s] | | | 46 [k] | 113 | 20 | | 32 | 693 | | 18,360 | 3,562 | 14,798 [q] |
| E.O. | | | | | | | | | | | | 28,000 [q] |

continued

Table 4. (page 2 of 2).

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Survey rating is fair to good, unless otherwise noted.
[b] All foot surveys except 1978 (boat survey) and 1986 (aerial survey).
[c] For 1968, 1970, and 1971 counts are from mainstem Big Salmon River. For all other years counts are from the mainstem Big Salmon River between Big Salmon Lake and the vicinity of Souch Creek.
[d] One Hundred Mile Creek to Sidney Creek.
[f] Big Timber Creek to Lewis Lake.
[g] Wolf Lake to Red River.
[h] Counts and estimated percentages may be slightly exaggerated. In some or all of these years a number of adipose-clipped fish ascended the fishway, and were counted more than once. These fish would have been released into the fishway as fry between 1989 and 1994, inclusive.
[j] Estimated total spawning escapement excluding Porcupine River (estimated border escapement minus the Canandian catch).
[k] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
[m] Estimate derived by dividing the annual 5-area (Whitehorse Fishway, Big Salmon, Nisutlin, Wolf, Tatchun) count by the average proportion of the annual 5-area index count to the estimated spawning escapement from the DFO tagging study for years 1983, and 1985-1989.
[n] Information on area surveyed is unavailable.
[p] Counts are for Big Timber Creek to Sheldon Lake.
[q] Interim escapement objective. Stabilization escapement objective for years 1990-1995 was 18,000 salmon. Rebuilding step escapement objective for years 1996-2001 is 28,000 salmc
[r] Counts are for Wolf Lake to Fish Lake outlet.
[s] Data are preliminary.

Table 5. Alaskan catch of Yukon River chinook salmon, 1961-2000

| Year | Estimated Subsistence Use[a] | Harvest | | | |
|---|---|---|---|---|---|
| | | Subsistence [b] | Commercial [c] | Sport [d] | Total |
| 1961 | 21,488 | 21,488 | 119,664 | | 141,152 |
| 1962 | 11,110 | 11,110 | 94,734 | | 105,844 |
| 1963 | 24,862 | 24,862 | 117,048 | | 141,910 |
| 1964 | 16,231 | 16,231 | 93,587 | | 109,818 |
| 1965 | 16,608 | 16,608 | 118,098 | | 134,706 |
| 1966 | 11,572 | 11,572 | 93,315 | | 104,887 |
| 1967 | 16,448 | 16,448 | 129,656 | | 146,104 |
| 1968 | 12,106 | 12,106 | 106,526 | | 118,632 |
| 1969 | 14,000 | 14,000 | 91,027 | | 105,027 |
| 1970 | 13,874 | 13,874 | 79,145 | | 93,019 |
| 1971 | 25,684 | 25,684 | 110,507 | | 136,191 |
| 1972 | 20,258 | 20,258 | 92,840 | | 113,098 |
| 1973 | 24,317 | 24,317 | 75,353 | | 99,670 |
| 1974 | 19,964 | 19,964 | 98,089 | | 118,053 |
| 1975 | 13,045 | 13,045 | 63,838 | | 76,883 |
| 1976 | 17,806 | 17,806 | 87,776 | | 105,582 |
| 1977 | 17,581 | 17,581 | 96,757 | 156 | 114,494 |
| 1978 | 30,297 | 30,297 | 99,168 | 523 | 129,988 |
| 1979 | 31,005 | 31,005 | 127,673 | 554 | 159,232 |
| 1980 | 42,724 | 42,724 | 153,985 | 956 | 197,665 |
| 1981 | 29,690 | 29,690 | 158,018 | 769 | 188,477 |
| 1982 | 28,158 | 28,158 | 123,644 | 1,006 | 152,808 |
| 1983 | 49,478 | 49,478 | 147,910 | 1,048 | 198,436 |
| 1984 | 42,428 | 42,428 | 119,904 | 351 | 162,683 |
| 1985 | 39,771 | 39,771 | 146,188 | 1,368 | 187,327 |
| 1986 | 45,238 | 45,238 | 99,970 | 796 | 146,004 |
| 1987 | 53,124 | 53,124 | 134,760 [f] | 502 | 188,386 |
| 1988 | 46,032 | 46,032 | 101,445 | 944 | 148,421 |
| 1989 | 51,062 | 51,062 | 105,491 | 1,053 | 157,606 |
| 1990 | 51,594 | 51,181 | 97,708 | 544 | 149,433 |
| 1991 | 48,311 | 46,773 | 107,105 | 773 | 154,651 |
| 1992 | 46,553 | 45,626 | 122,134 | 431 | 168,191 |
| 1993 | 66,261 | 65,701 | 95,682 | 1,695 | 163,078 |
| 1994 | 55,266 | 54,563 | 115,471 | 2,281 | 172,315 |
| 1995 | 50,258 | 48,934 | 126,204 | 2,525 | 177,663 |
| 1996 | 43,827 | 43,521 | 91,890 | 3,151 | 138,562 |
| 1997 | 57,060 | 56,291 | 116,421 | 1,913 | 174,625 |
| 1998 | 54,171 | 54,090 | 44,625 | 654 | 99,369 |
| 1999 | 52,699 | 52,525 | 69,562 | [h] | 122,087 |
| 2000 [g] | [h] | [h] | 9,115 | [h] | 9,115 |
| Average | | | | | |
| 1961-89 | 27,102 | 27,102 | 109,866 | 771 | 137,314 |
| 1990-99 | 52,600 | 51,921 | 98,680 | 1,552 | 151,997 |
| 1995-99 | 51,603 | 51,072 | 89,740 | 2,061 | 142,461 |

a Includes salmon harvested for subsistence purposes, and an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence. These data are only available since 1990.

b Includes salmon harvested for subsistence and personal use.

c Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

d Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage (see Schultz et al. 1993: 1992 Yukon Area AMR).

f Includes 653 and 2,136 chinook salmon illegally sold in District 5 and 6 (Tanana River), respectively.

g Data are preliminary.

h Data are unavailable at this time.

Table 6. Canadian catch of Yukon River chinook salmon, 1961-2000.

| Year | Mainstem Yukon River Harvest | | | | | | | Porcupine River Aboriginal Fishery Harvest | Total Canadian Harvest |
|---|---|---|---|---|---|---|---|---|---|
| | Commercial | Domestic | Aboriginal Fishery | Sport[a] | Test Fishery | Combined Non-Commercial | Total | | |
| 1961 | 3,446 | | 9,300 | | | 9,300 | 12,746 | 500 | 13,246 |
| 1962 | 4,037 | | 9,300 | | | 9,300 | 13,337 | 600 | 13,937 |
| 1963 | 2,283 | | 7,750 | | | 7,750 | 10,033 | 44 | 10,077 |
| 1964 | 3,208 | | 4,124 | | | 4,124 | 7,332 | 76 | 7,408 |
| 1965 | 2,265 | | 3,021 | | | 3,021 | 5,286 | 94 | 5,380 |
| 1966 | 1,942 | | 2,445 | | | 2,445 | 4,387 | 65 | 4,452 |
| 1967 | 2,187 | | 2,920 | | | 2,920 | 5,107 | 43 | 5,150 |
| 1968 | 2,212 | | 2,800 | | | 2,800 | 5,012 | 30 | 5,042 |
| 1969 | 1,640 | | 957 | | | 957 | 2,597 | 27 | 2,624 |
| 1970 | 2,611 | | 2,044 | | | 2,044 | 4,655 | 8 | 4,663 |
| 1971 | 3,178 | | 3,260 | | | 3,260 | 6,438 | 9 | 6,447 |
| 1972 | 1,769 | | 3,960 | | | 3,960 | 5,729 | | 5,729 |
| 1973 | 2,199 | | 2,319 | | | 2,319 | 4,518 | 4 | 4,522 |
| 1974 | 1,808 | 406 | 3,342 | | | 3,748 | 5,556 | 75 | 5,631 |
| 1975 | 3,000 | 400 | 2,500 | | | 2,900 | 5,900 | 100 | 6,000 |
| 1976 | 3,500 | 500 | 1,000 | | | 1,500 | 5,000 | 25 | 5,025 |
| 1977 | 4,720 | 531 | 2,247 | | | 2,778 | 7,498 | 29 | 7,527 |
| 1978 | 2,975 | 421 | 2,485 | | | 2,906 | 5,881 | | 5,881 |
| 1979 | 6,175 | 1,200 | 3,000 | | | 4,200 | 10,375 | | 10,375 |
| 1980 | 9,500 | 3,500 | 7,546 | 300 | | 11,346 | 20,846 | 2000 | 22,846 |
| 1981 | 8,593 | 237 | 8,879 | 300 | | 9,416 | 18,009 | 100 | 18,109 |
| 1982 | 8,640 | 435 | 7,433 | 300 | | 8,168 | 16,808 | 400 | 17,208 |
| 1983 | 13,027 | 400 | 5,025 | 300 | | 5,725 | 18,752 | 200 | 18,952 |
| 1984 | 9,885 | 260 | 5,850 | 300 | | 6,410 | 16,295 | 500 | 16,795 |
| 1985 | 12,573 | 478 | 5,800 | 300 | | 6,578 | 19,151 | 150 | 19,301 |
| 1986 | 10,797 | 342 | 8,625 | 300 | | 9,267 | 20,064 | 300 | 20,364 |
| 1987 | 10,864 | 330 | 6,069 | 300 | | 6,699 | 17,563 | 51 | 17,614 |
| 1988 | 13,217 | 282 | 7,178 | 650 | | 8,110 | 21,327 | 100 | 21,427 |
| 1989 | 9,789 | 400 | 6,930 | 300 | | 7,630 | 17,419 | 525 | 17,944 |
| 1990 | 11,324 | 247 | 7,109 | 300 | | 7,656 | 18,980 | 247 | 19,227 |
| 1991 | 10,906 | 227 | 9,011 | 300 | | 9,538 | 20,444 | 163 | 20,607 |
| 1992 | 10,877 | 277 | 6,349 | 300 | | 6,926 | 17,803 | 100 | 17,903 |
| 1993 | 10,350 | 243 | 5,576 | 300 | | 6,119 | 16,469 | 142 | 16,611 |
| 1994 | 12,028 | 373 | 8,089 | 300 | | 8,762 | 20,790 | 428 | 21,218 |
| 1995 | 11,146 | 300 | 7,945 | 700 | | 8,945 | 20,091 | 796 | 20,887 |
| 1996 | 10,164 | 141 | 8,451 | 790 | | 9,382 | 19,546 | 66 | 19,612 |
| 1997 | 5,311 | 288 | 8,888 | 1,230 | | 10,406 | 15,717 | 811 | 16,528 |
| 1998 | 390 | 24 | 4,687 | 0 | 737 | 5,448 | 5,838 | 99 | 5,937 |
| 1999 | 3,160 | 213 | 8,804 | 278 | | 9,295 | 12,455 | 114 | 12,569 |
| 2000 [b] | 0 | 0 | 3,717 | 0 | 761 | 4,478 | 4,478 | [c] | 4,478 |
| Average | | | | | | | | | |
| 1961-89 | 5,588 | 633 | 4,762 | 335 | | 5,227 | 10,815 | 233 | 11,023 |
| 1990-99 | 8,566 | 233 | 7,491 | 450 | | 8,248 | 16,813 | 297 | 17,110 |
| 1995-99 | 6,034 | 193 | 7,755 | 600 | | 8,695 | 14,729 | 377 | 15,107 |

[a] Sport fish harvest unknown prior to 1980.

[b] Data are preliminary.

[c] Data are unavailable at this time.

Table 7. Estimated chinook salmon subsistence harvest by fishing district and by community of residence, Yukon Area, 1988-1999. a

| Community | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 1989-1993 Average | 1994-1998 Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hooper Bay | 1,099 b | 14 b | | | 503 | 230 | 157 | 1,500 | 1,127 | 613 | 13 | 173 | 462 c | 882 |
| Scammon Bay | 489 b | 2 b | | | 948 | 1,199 | 668 | 585 | 1,238 | 526 | 378 | 938 | 660 c | 679 |
| **Coastal District Subtotal** | 1,588 | 16 | | | 1,451 | 1,429 | 825 | 2,085 | 2,365 | 1,139 | 391 | 1,111 | 1,121 | 1,361 |
| Sheldon Point | 302 | 165 | 758 | 445 | 388 | 581 | 608 | 459 | 450 | 970 | 527 | 855 | 483 | 602 |
| Alakanuk | 738 | 820 | 871 | 1,044 | 623 | 2,562 | 1,045 | 1,191 | 662 | 2,058 | 1,930 | 1,236 | 1,184 | 1,377 |
| Emmonak | 1,786 | 1,598 | 1,873 | 1,311 | 2,336 | 4,372 | 2,384 | 1,711 | 702 | 3,080 | 2,396 | 3,337 | 2,298 | 2,055 |
| Kotlik | 1,112 | 1,982 | 3,119 | 3,125 | 1,794 | 2,913 | 2,505 | 2,599 | 1,832 | 1,442 | 2,389 | 1,420 | 2,587 | 2,153 |
| Retained From Commercial | | | | | | 15 | 114 | | | | | | | |
| *District 1 Subtotal* | 3,938 | 4,565 | 6,619 | 5,925 | 5,141 | 10,423 | 6,654 | 5,960 | 3,646 | 7,550 | 7,242 | 6,848 | 6,532 | 6,188 |
| Mountain Village | 740 | 2,001 | 1,792 | 1,171 | 1,249 | 3,217 | 1,511 | 1,542 | 1,315 | 2,081 | 2,533 | 2,162 | 1,886 | 1,796 |
| Pitkas Point | 387 | 592 | 391 | 852 | 851 | 1,001 | 469 | 559 | 762 | 793 | 817 | 632 | 697 | 680 |
| St. Marys | 1,011 | 1,592 | 2,085 | 1,836 | 1,753 | 2,042 | 2,722 | 2,031 | 1,766 | 2,592 | 2,679 | 2,150 | 1,862 | 2,358 |
| Pilot Station | 674 | 1,498 | 3,786 | 2,681 | 1,818 | 2,661 | 1,977 | 1,614 | 1,811 | 2,373 | 1,715 | 2,715 | 2,489 | 1,898 |
| Marshall | 1,031 | 1,464 | 1,492 | 1,277 | 1,403 | 2,592 | 2,277 | 3,291 | 2,126 | 1,511 | 1,711 | 2,780 | 1,646 | 2,183 |
| Retained From Commercial | | | | | | 3 | 78 | | | | | | | |
| *District 2 Subtotal* | 3,823 | 7,147 | 9,546 | 7,617 | 7,074 | 11,516 | 9,034 | 9,037 | 7,780 | 9,350 | 9,455 | 10,439 | 8,579 | 8,916 |
| Russian Mission | 1,850 | 2,367 | 1,684 | 1,349 | 1,282 | 3,273 | 1,793 | 2,450 | 2,709 | 1,459 | 1,314 | 2,722 | 1,993 | 1,945 |
| Holy Cross | 2,593 | 2,378 | 2,337 | 1,849 | 3,491 | 3,191 | 4,040 | 2,808 | 3,953 | 3,472 | 2,648 | 4,581 | 2,609 | 3,384 |
| Shageluk | 104 | 32 | 62 | 189 | 218 | 128 | 291 | 161 | 121 | 1,380 | 552 | 412 | 126 | 501 |
| Retained From Commercial | | | | | | 10 | 25 | | | | | | | |
| *District 3 Subtotal* | 4,547 | 4,778 | 4,083 | 3,187 | 4,991 | 6,602 | 6,149 | 5,419 | 6,783 | 6,311 | 4,514 | 7,715 | 4,728 | 5,830 |
| **Lower Yukon River Total** | 12,308 | 16,490 | 20,258 | 16,729 | 17,206 | 28,541 | 21,837 | 20,416 | 18,209 | 23,211 | 21,211 | 25,002 | 19,839 | 20,933 |
| Anvik | 211 | 418 | 481 | 619 | 389 | 663 | 424 | 450 | 768 | 951 | 1,025 | 776 | 514 | 724 |
| Grayling | 1,571 | 1,082 | 144 | 874 | 1,074 | 1,045 | 1,843 | 1,340 | 1,036 | 2,391 | 2,177 | 2,476 | 844 | 1,757 |
| Kaltag | 1,168 | 1,306 | 2,244 | 1,866 | 1,084 | 1,260 | 1,653 | 1,890 | 994 | 1,036 | 1,870 | 2,051 | 1,552 | 1,489 |
| Nulato | 1,986 | 2,079 | 2,788 | 2,500 | 1,596 | 1,660 | 1,735 | 1,533 | 1,461 | 1,576 | 4,147 | 1,799 | 2,125 | 2,090 |
| Koyukuk | 711 | 1,003 | 876 | 885 | 510 | 853 | 589 | 146 | 402 | 851 | 800 | 506 | 825 | 558 |
| Galena | 1,982 | 1,374 | 3,134 | 2,574 | 1,870 | 1,732 | 1,834 | 1,336 | 2,770 | 2,350 | 1,668 | 2,539 | 2,137 | 1,992 |
| Ruby/Kokrines | 1,402 | 1,016 | 811 | 971 | 498 | 3,263 | 1,539 | 1,435 | 557 | 2,260 | 3,891 | 777 | 1,312 | 1,936 |
| Retained From Commercial | | | | | | 978 | 203 | | | | | | | |
| *District 4 Yukon River Subtotal (Excluding the Koyukuk River)* | 9,031 | 8,278 | 10,478 | 10,289 | 7,021 | 11,454 | 9,820 | 8,130 | 7,988 | 11,415 | 15,578 | 10,924 | 9,308 | 10,546 |
| Huslia | 89 | 177 | 198 | 198 | 751 | 232 | 239 | 932 | 87 | 57 | 23 | 90 | 311 | 264 |
| Hughes | 29 | 181 | 90 | 146 | 29 | 88 | 107 d | 77 | 54 | 34 | 91 | 105 | 107 | 73 |
| Allakaket | 339 | 438 f | 284 | 446 | 395 | 135 | 338 d | 321 | 82 | 423 | 85 | 108 | 320 g | 250 |
| Alatna | 27 | - f | 72 | 5 | 42 | 4 | 26 d | 10 | 2 | 38 | 4 | 10 | 30 g | 16 |
| Bettles | 0 | 0 | 0 | 16 | 53 | 1 | 0 | 4 | 0 | 39 | 20 | 1 | 14 | 13 |
| *Koyukuk River Subtotal* | 484 | 796 | 644 | 811 | 1,270 | 460 | 710 | 1,344 | 205 | 591 | 223 | 314 | 782 | 615 |
| *District 4 Subtotal* | 9,515 | 9,074 | 11,122 | 11,100 | 8,291 | 11,914 | 10,530 | 9,474 | 8,193 | 12,006 | 15,801 | 11,238 | 10,090 | 11,160 |

-Continued-

Table 7. (page 2 of 2)

| Community | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 1989-1993 Average | 1994-1998 Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tanana | 3,537 | 3,008 | 2,284 | 2,483 | 2,477 | 3,362 | 2,999 | 2,398 | 2,741 | 3,596 | 5,212 | 3,388 | 2,723 | 3,389 |
| Rampart | 3,145 | 3,177 | 1,481 | 988 | 2,802 | 1,956 | 1,354 | 1,461 | 1,751 | 2,203 | 885 | 2,018 | 2,081 | 1,531 |
| Fairbanks h j | 0 | 200 | 420 | 982 | 1,394 | 1,514 | 1,920 | 1,447 | 1,166 | 955 | 1,231 | 851 | 902 | 1,344 |
| Stevens Village | 2,845 | 3,101 | 1,295 | 2,035 | 1,887 | 1,754 | 2,814 | 2,674 | 681 | 2,070 | 1,232 | 1,214 | 2,014 | 1,894 |
| Birch Creek | 0 b | 0 | 0 | 196 | 44 | 0 | 119 | 93 | 0 | 373 | 48 | 24 | 48 | 127 |
| Beaver | 940 | 1,694 | 721 | 713 | 1,564 | 1,557 | 850 | 1,021 | 888 | 1,859 | 470 | 473 | 1,250 | 1,017 |
| Fort Yukon | 2,245 | 4,898 | 4,051 | 5,585 | 4,122 | 6,361 | 4,727 | 3,132 | 4,957 | 3,145 | 1,771 | 2,539 | 5,003 | 3,548 |
| Circle j | 1,773 | 1,785 k | 1,767 | 1,720 | 1,585 | 745 | 1,377 | 1,145 | 1,781 | 1,091 | 685 | 524 | 1,518 g | 1,216 |
| Central j | 261 | - k | 184 | 151 | 167 | 210 | 240 | 171 | 131 | 148 | 170 | 91 | 195 g | 172 |
| Eagle j | 2,333 | 2,385 | 1,742 | 1,193 | 1,040 | 753 | 1,234 | 1,886 | 1,092 | 1,534 | 2,473 | 2,558 | 1,423 | 1,644 |
| Other j m | | | 615 | 374 | 571 | 437 | 602 | 1,004 | 377 | 763 | 446 | 488 | 499 n | 838 |
| Retained From Commercial | | | | | | 746 | 868 | | | | | | | |
| *District 5 Yukon River Subtotal (Excluding Chandalar/Black Rivers)* | 17,079 | 20,248 | 14,560 | 16,420 | 17,653 | 19,395 | 19,104 | 16,432 | 15,563 | 17,735 | 14,623 | 14,168 | 17,656 | 16,518 |
| Venetie | 121 | 88 | 29 | 9 | 35 | 2,716 | 524 | 434 | 134 | 314 | 168 | 127 | 575 | 315 |
| Chalkyitsik | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 30 | 0 | 11 | 35 | 1 | 8 |
| *Chandalar/Black Rivers Subtotal* | 121 | 88 | 29 | 9 | 38 | 2,716 | 524 | 434 | 164 | 314 | 179 | 162 | 576 | 323 |
| *District 5 Subtotal* | 17,200 | 20,336 | 14,589 | 16,429 | 17,691 | 22,111 | 19,628 | 16,866 | 15,727 | 18,049 | 14,802 | 14,330 | 17,225 | 18,090 |
| Manley j | 572 | 992 | 1,189 | 401 | 551 | 238 | 480 | 335 | 134 | 242 | 209 | 136 | 670 | 280 |
| Minto j | 466 | 366 | 100 | 134 | 142 | 468 | 316 | 535 | 523 | 1,208 | 275 | 317 | 242 | 571 |
| Nenana j | 3,846 | 1,188 | 1,265 | 1,599 | 1,267 | 693 | 759 | 607 | 423 | 1,062 | 1,187 | 975 | 1,202 | 812 |
| Fairbanks j p | 0 | 0 | 84 | 378 | 402 | 273 | 775 | 285 | 97 | 176 | 230 | 195 | 227 | 313 |
| Other j r | 0 | 0 | 0 | 3 | 76 | 0 | 40 | 17 | 0 | 4 | 18 | 1 | 16 | 16 |
| Retained From Commercial | | | | | | 1,037 | 198 | | | | | | | |
| *District 6 Tanana River Subtotal* | 4,884 | 2,546 | 2,818 | 2,515 | 2,438 | 2,709 | 2,568 | 1,779 | 1,177 | 2,712 | 1,919 | 1,624 | 2,358 | 1,991 |
| **Upper Yukon River Total** | 31,599 | 31,956 | 28,329 | 30,044 | 28,420 | 36,734 | 32,728 | 28,119 | 25,097 | 32,767 | 32,522 | 27,192 | 29,673 | 31,241 |
| **Alaska, Yukon River Total s** | 43,907 | 48,446 | 48,587 | 46,773 | 45,628 | 65,275 | 54,563 | 48,535 | 43,306 | 55,978 | 53,733 | 52,194 | 49,512 | 52,175 |
| **Alaska, Yukon Area Total** | 45,495 | 48,462 | 48,587 | 46,773 | 47,077 | 66,704 | 55,388 | 50,620 | 45,671 | 57,117 | 54,124 | 53,305 | 50,633 | 53,536 |

a Historic estimated subsistence harvests are available in each year's respective Yukon Area Annual Management Report (1961 to 1998). Beginning in 1988 subsistence salmon harvest estimates have been generated from a stratified random sample of village households. Estimates include test fish catches given away. Blanks indicate harvest information was not collected.
b The community was not surveyed, harvest estimates were calculated from calendar and post card replies.
c Average harvest includes 1988, 1989, 1992 and 1993.
d Due to floods in 1994, Hughes, Allakaket, and Alatna were not surveyed. The 1994 chinook salmon harvest is estimated based on a five-year-average, 1989-1993.
f Alatna and Allakaket harvests combined in 1989.
g Average harvest includes 1988 and 1990 through 1993.
h Harvests by Fairbanks subsistence permit holders who fished in District 5 near the Yukon River bridge crossing.
j In 1988 and 1989, permit and household interview data were expanded for permits not returned. Beginning in 1990, reported harvest is from returned permits only.
k Circle and Central harvests are combined in 1989.
m Other permit holders who fished in District 5 but did not reside in the villages listed.
n Average harvest includes 1990 through 1993.
p Harvests by Fairbanks subsistence permit holders who fished in the Tanana River.
r Other permit holders who fished in District 6 but did not reside in the villages listed.
s Does not include the Coastal District.

Appendix 1. Historic Yukon Area Chinook and Summer Chum Salmon Management Actions

| YEAR | EVENT |
|---|---|
| 1918 | • First commercial fishery. |
| 1960 | • Harvest quota eliminated. |
| 1961 | • Fishery regulated by scheduled weekly fishing periods with the season opened by a published regulatory date. (1961-1980)<br>• Chinook commercial fishing periods 4 days per week in lower Yukon. (1961-1967) |
| 1968 | • Chinook commercial fishing periods reduced to 3.5 days per week in lower Yukon.<br>• |
| 1974 | • Chinook commercial fishing periods reduced to 3 days per week in lower Yukon.<br>• District 4 was redefined creating Districts 5 and 6.<br>• Commercial chinook salmon quotas for Districts 3, 4, 5, and 6 established. |
| 1977 | • Chinook commercial fishing periods reduced to 2.5 days per week in lower Yukon. (1977-1981) |
| 1979 | • Commercial chinook salmon guideline harvest ranges (GHR) replaced quotas.<br>• Chinook GHR: District 3 (1,800 – 2,200), District 4 (900 – 1,100), District 5 (2,700 – 3,300), District 6 (900 – 1,100).<br>• Anvik River sonar established. (1979-present) |
| 1980 | • Development of chum salmon roe fishery in upper Yukon.<br>• Two 48-hour commercial fishing periods per week – District 4 and District 6 (reduced from 5 days per week)<br>• 630 hours fished commercially in Districts 1 and 2. Harvest = 136,891 chinook, 691,395 summer chum.<br>• Emmonak test fish project initiated. |
| 1981 | • Districts 1 & 2 commercial chinook salmon guideline harvest range established (60,000 –120,000)<br>• District 4 GHR (2,250-2,850), Subdistricts 5-ABC GHR (2,400-2,800), Subdistrict 5-D GHR (300-500), District 6 GHR (600-800).<br>• 600 hours fished commercially in Districts 1 and 2. Harvest = 144,521 chinook, 859,087 summer chum.<br>• Very early breakup, atypical warm spring and summer. |
| 1982 | • Chinook commercial fishing periods reduced to two 24-hour periods per week in lower Yukon. (1982-1986)<br>• DFO initiated mark/recapture study to estimate abundance of chinook and chum salmon entering Canadian portion of the mainstem Yukon River.<br>• 492 hours fished commercially in Districts 1 and 2. Harvest = 113,583 chinook, 431,736 summer chum. |
| 1985 | • Regulation eliminated specific dates and implemented emergency order authority for establishing restricted mesh periods in Districts 1, 2, and 3.<br>• Board of Fish issued directive to the Department to provide for summer chum salmon directed fishing periods prior to the end of chinook salmon season if summer chum salmon run was average or better in strength.<br>• 324 hours fished commercially in Districts 1 and 2. Harvest = 138,376 chinook, 435,585 summer chum.<br>• Extremely late ice breakup, cold spring temperatures. |
| 1986 | • Severe flooding on Chena and Salcha Rivers in August.<br>• Pilot Station sonar project initiated. (1986-1991, 1993-present)<br>• East Fork Andreasfky River tower initiated. (1986-1988)<br>• 384 hours fished commercially in Districts 1 and 2. Harvest = 94,884 chinook, 669,554 summer chum. |

-continued-

| YEAR | EVENT |
|---|---|
| 1987 | • Commercial fishing periods of 12-hours introduced.<br>• Reduced frequency of fishing periods and closed commercial season on July 10 prior to regulatory closure date of July 15 due to low summer chum salmon run size.<br>• 276 hours fished commercially in Districts 1 and 2. Harvest = 124,101 chinook, 397,774 summer chum.<br>• Large scale illegal salmon and salmon roe sales documented in portions of Districts 5 & 6. |
| 1988 | • Two 42-hour commercial fishing periods per week – District 6 (reduced from two 48-hour periods per week)<br>• Extended closed waters area at the mouth of the Andreasfky River to enhance summer chum escapement to Andreasfky River.<br>• 312 hours fished commercially in Districts 1 and 2. Harvest = 92,297 chinook, 1,073,370 summer chum.<br>• Manley test fish wheel project initiated. (1988-1994)<br>• Nenana test fish wheel project initiated. (1988-1992, 1995-present)<br>• Extremely cold 1988-89 winter temperatures for 3-4 weeks beginning January 22, 1989, extended period of high barometric pressure (Omega Block). |
| 1989 | • Commercial fishing periods of 6, 9 and 12-hours implemented. (1989-present)<br>• 234 hours fished commercially in Districts 1 and 2. Harvest = 92,378 chinook, 891,593 summer chum. |
| 1990 | • Summer chum salmon guideline harvest ranges established (River-wide 400,000 to 1,200,000)<br>• 111 hours fished commercially in Districts 1 and 2. Harvest = 84,374 chinook, 281,418 summer chum.<br>• Only 3 fishing periods were allowed with gillnets restricted to 6 inch maximum mesh size. No restricted mesh size fishing periods allowed after June 29. Season closed in July 5 prior to the regulatory closure date of July 15.<br>• Near record snowfall for Fairbanks area winter of 1990-91. |
| 1991 | • Delayed season opening in upper Yukon<br>• Early season closures due to low summer chum run.<br>• 144 hours fished commercially in Districts 1 and 2. Harvest = 92,567 chinook, 313,290 summer chum. |
| 1992 | • 123 hours fished commercially in Districts 1 and 2. Harvest = 110,926 chinook, 324,336 summer chum.<br>• Fishing period duration was reduced from 12 hours to 6 hours due to decreasing summer chum salmon abundance.<br>• Late ocean ice breakup; cold ocean water temperatures in springtime. Early, heavy snowfall in mid-September, 1992. Near record snowfall for Fairbanks area. |
| 1993 | • Regulations adopted to separate the subsistence and commercial fishing times in Districts 1, 2, and 3 and subdistrict 4-A. (1993-1994)<br>• 90 hours fished commercially in Districts 1 and 2. Harvest = 86,579 chinook, 92,991 summer chum.<br>• Chena and Salcha River tower projects initiated. (1993-present)<br>• Chum salmon returns critically weak.<br>• To protect summer chum salmon in lower Yukon, 6-hour unrestricted mesh periods were used and only one commercial period restricted to 6 inch maximum mesh size gillnets was allowed. |
| 1994 | • Anvik River Chum Salmon Management Plan adopted.<br>• To protect summer chum salmon in lower Yukon, conservative management allowed only 8-inch or greater mesh size commercial gillnets most of the season and only one commercial period restricted to 6 inch maximum mesh size gillnets was allowed<br>• 69 hours fished commercially in Districts 1 and 2. Harvest = 103,933 chinook, 55,201 summer chum.<br>• East Fork Andreasfky weir, Gisasa weir, Kaltag tower, and Nulato tower projects initiated.<br>• Overall good chinook and summer chum salmon escapements in the Yukon area.<br>• Severe flooding in Koyukuk River drainage in August. |

-continued-

| YEAR | EVENT |
|---|---|
| 1995 | • Tanana mark/recapture study and Clear Creek tower project initiated.<br>• 117 hours fished commercially in Districts 1 and 2. Harvest = 117,436 chinook, 226,083 summer chum.<br>• Poor summer chum salmon flesh markets affect lower Yukon Area harvests.<br>• Overall good chinook and summer chum salmon escapements in the Yukon area.<br>• Very low snow pack through most of Alaskan portion of drainage from November 1995 through February 1996; high overflow and freezing conditions. Very warm weather throughout September and into October 1995, with very high water levels in Delta and Toklat Rivers. |
| 1996 | • Regulations reducing gillnet depth went into effect for lower Yukon.<br>• Pilot Station sonar operated for training of personnel.<br>• South Fork Koyukuk River and Beaver Creek weir projects initiated.<br>• Roe cap of 100,000 lbs. of summer chum salmon roe from Anvik River established.<br>• 129 hours fished commercially in Districts 1 and 2. Harvest = 86,851 chinook, 123,233 summer chum.<br>• Poor summer chum salmon flesh markets affect lower Yukon Area harvests.<br>• Extremely early chinook and summer chum run timing. 5-yr. old chinook make up large portion of the run.<br>• Overall good chinook and summer chum salmon escapements in the Yukon area.<br>• Relatively low water level in Yukon River mainstem and Delta and Toklat Rivers; warm ocean water temperature anomalies. |
| 1997 | • Ichthyophonus hoferi fish protist in chinook salmon reported in Districts 1-5.<br>• 110 hours fished commercially in Districts 1 and 2. Harvest = 105,747 chinook, 78,157 summer chum.<br>• Poor summer chum salmon flesh markets affect lower Yukon Area harvests.<br>• Extremely low water levels and high water temperature in lower and middle Yukon River tributaries (including Tanana River drainage); warm ocean water temperature anomalies. |
| 1998 | • BOF prohibits the sale of chinook salmon roe in subdistrict 4-A.<br>• No commercial periods in the Anvik River management area and District 4.<br>• Yukon River declared an economic disaster area due to low chinook returns, and harvests.<br>• 60 hours fished commercially in Districts 1 and 2. Harvest = 42,219 chinook, 28,118 summer chum.<br>• Chatanika tower project initiated.<br>• Increased reports of Ichthyophonus hoferi fish protist in chinook salmon from District 1 though District 5.<br>• Extremely unusual chinook salmon run timing and migration entry pattern into the Yukon River.<br>• Warm ocean water temperature anomalies;<br>• Yukon Territory, Canada, reported extremely low water level and probable higher water temperatures in tributaries during July and August. |
| 1999 | • Federal government assumes control of subsistence fishery management in federal waters on October 1.<br>• Chinook and summer chum salmon runs continued to exhibit the decline in productivity observed in recent years. Five and six-year-old chinook salmon abundance was much less than would be expected based on parent year escapements. Summer chum salmon abundance has been below average to poor since 1997, although parent year escapements were very good from 1994 through 1996.<br>• 63 hours fished commercially in Districts 1 and 2. Harvest = 64,294 chinook, 27,883 summer chum.<br>• Chinook salmon harvest of 69,483 was the third lowest commercial harvest since statehood.<br>• No summer chum salmon commercial periods in the Anvik River management area and District 4.<br>• Big Eddy drift project, Marshall drift project, and Henshaw Creek tower project initiated.<br>• Decreased reports of Ichthyophonus hoferi fish protist in chinook salmon but still prevalent.<br>• Cooler ocean water temperatures return, late ocean ice breakup; Yukon Territory, Canada, reported extremely low water level and probable higher water temperatures in tributaries during July and August; |

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| YEAR | EVENT |
|---|---|
| 2000 | • Chinook and summer chum salmon runs continued to exhibit the decline in productivity observed in recent years.<br>• 18 hours fished commercially in Districts 1 and 2. Harvest = 8,518 chinook, 6,624 summer chum.<br>• Lowest commercial chinook salmon harvest since 1937.<br>• Restricted subsistence harvest opportunities for chinook and summer chum salmon.<br>• No commercial periods in District 3 and upper Yukon River districts.<br>• Ichthyophonus hoferi fish protist in chinook salmon still prevalent. |

# SECTION II

# DEVELOPMENT OF MANAGEMENT/ACTION PLAN OPTIONS FOR YUKON RIVER CHINOOK SALMON STOCK OF CONCERN AS OUTLINED IN THE SUSTAINABLE FISHERIES POLICY

**SECTION II**

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## SECTION II

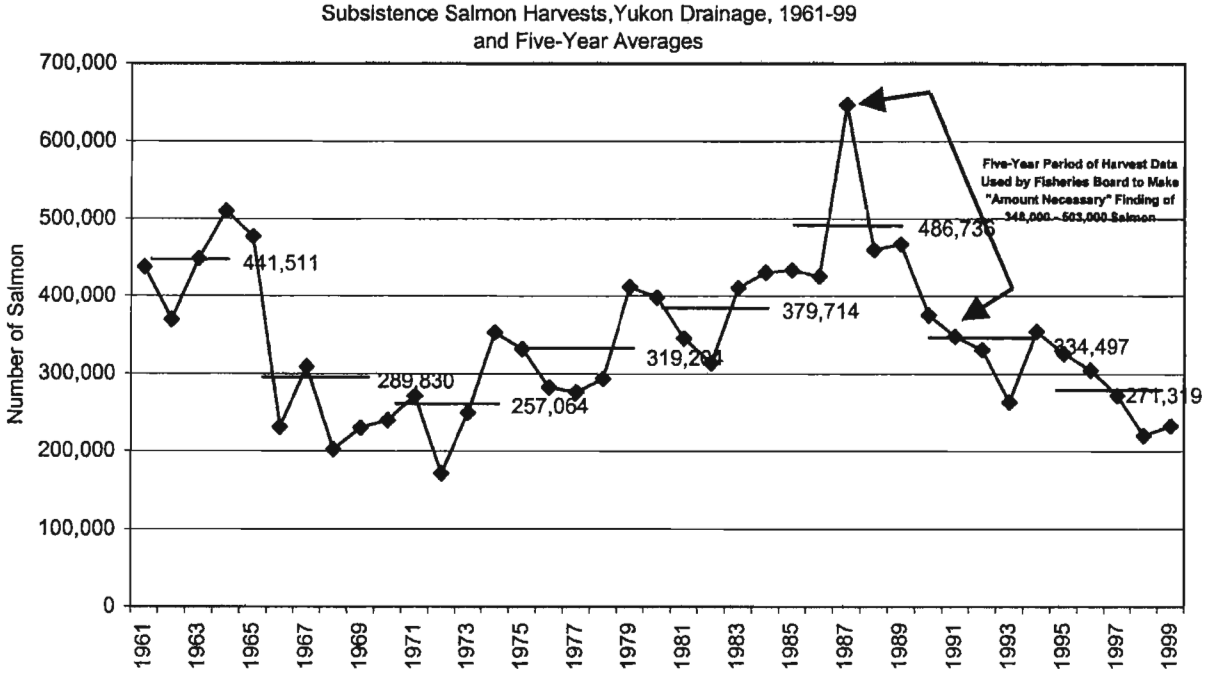
## *YUKON RIVER CHINOOK SALMON MANAGEMENT/ACTION PLAN REVIEW AND DEVELOPMENT*

### Current Stock Status

In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the Board of Fisheries classified the Yukon River chinook salmon stock as a yield concern during the September 28-29, 2000 work session. This determination was based on the inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above the stock's escapement needs since 1998 and the anticipated low harvest level in 2001.

### C&T Use Finding And The Amount Necessary

In 1993, the Board of Fisheries made a positive finding for Customary and Traditional Use for all salmon in the Yukon-Northern Area. The Amount Necessary for Subsistence was determined to be 348,000 – 503,000 salmon (all species combined). This ANS was based on subsistence harvests from 1987 through 1991.




### *Revision of Amount Necessary for Subsistence Finding*

The department recommends that the Board amend 5 AAC 01.236 to include a revised finding of the amount necessary for subsistence (ANS) for the Yukon Area using updated subsistence harvest data. In establishing the ANS range, the Board should use harvest information that represents the pattern of use in the subsistence fishery. One approach that may capture the dynamic pattern of use within the recent decade is to use the low and mean subsistence harvests for the most recent ten years, rounded to the nearest 500 fish. The Board may also consider amending 5 AAC 01.236 to include a finding of the ANS for the Yukon Area, by species, and/or by district or district groups.

*Objective*

The objective of this recommendation is to reassess the previous Board's determination of ANS in the Yukon Area using updated harvest information and a broader range of data to better represent the pattern and level of use in the subsistence fishery.

*Options for defining the Amount Necessary for Subsistence range*

In amending 5 AAC 01.236 to define the ANS range for the Yukon Area, the following options may be considered:

**Option A.**

Status Quo. The current ANS range for the Yukon-Northern Area (348,000 – 503,000 salmon) is not amended.

The department does not recommend this option. The ANS finding for Yukon Area salmon made in February 1993 was based on inaccurate subsistence harvest information. At that time, the subsistence harvests included salmon carcasses left over from commercial roe sales and some harvests of illegally-sold commercial fish. Therefore the subsistence harvest information resulted in an inflated ANS that is greater than actual subsistence harvest patterns. The department revised the subsistence harvest survey methodology starting in 1989 to be able to determine other sources of fish available for subsistence uses. Utilizing revised subsistence harvest data would aid in developing an ANS that more accurately depicts the amount necessary for subsistence. Maintaining the status quo may prematurely trigger a Tier II permit system for the Yukon Area because the current ANS is based on inaccurate, inflated subsistence harvests.

***(The following table is used to calculate ANS range for options B & C)***

Yukon River Subsistence Salmon Harvests, Coastal District and Districts 1-6, 1990-99

| Year | Chinook | Summer Chum | Fall Chum | Coho | Total salmon |
|---|---|---|---|---|---|
| 1990 | 48,587 | 115,609 | 167,900 | 43,460 | 375,556 |
| 1991 | 46,773 | 118,540 | 145,524 | 37,388 | 348,225 |
| 1992 | 47,077 | 142,192 | 107,808 | 51,980 | 349,057 |
| 1993 | 66,704 | 125,574 | 76,882 | 15,812 | 284,972 |
| 1994 | 55,388 | 124,807 | 123,565 | 41,775 | 345,535 |
| 1995 | 50,620 | 136,083 | 130,860 | 28,377 | 345,940 |
| 1996 | 45,669 | 124,735 | 129,258 | 30,404 | 330,066 |
| 1997 | 57,117 | 112,820 | 95,141 | 23,945 | 289,023 |
| 1998 | 54,124 | 87,366 | 62,901 | 18,121 | 222,512 |
| 1999 | 53,132 | 83,784 | 89,938 | 20,885 | 247,739 |
| Max 1990-99 | 66,704 | 142,192 | 167,900* | 51,980* | 375,556* |
| Min 1990-99 | 45,669 | 83,784 | 89,938* | 20,885* | 247,739* |
| Mean 1990-99 | 52,519 | 117,151 | 123,749* | 34,777* | 313,863* |

**Excluding harvests in 1993 and 1998 because regulations restricted subsistence harvests*

**Option B.**

Establish the ANS range for the Yukon River drainage, all species combined, using updated harvest information and a broader range of data: **247,500 – 314,000 salmon.**

## Option C.

Establish the ANS range for the Yukon River drainage by species.

- Chinook salmon: 45,500 – 52,500
- Summer chum salmon: 83,500 – 117,500
- Fall chum salmon: 89,500 – 124,000
- Coho salmon: 20,500 – 35,000

Total salmon: 239,000 – 329,000

- Other grouping: Combine fall chum and coho salmon since harvests for one species drastically affects the other as they overlap in run timing and are inseparable by the majority of gear types used.

***(The following table is used to calculate ANS range for option D)***

Yukon River Subsistence Salmon Harvests, 1990-99

| | ALL SALMON | | | |
|---|---|---|---|---|
| Year | Coastal & Districts 1-3 | District 4 | District 5 | District 6 |
| 1990 | 119,480 | 60,511 | 126,481 | 69,084 |
| 1991 | 87,390 | 71,695 | 119,526 | 69,614 |
| 1992 | 131,704 | 73,764 | 88,380 | 55,209 |
| 1993 | 134,379 | 43,989 | 82,945 | 23,659 |
| 1994 | 118,953 | 54,874 | 102,028 | 69,680 |
| 1995 | 129,661 | 50,549 | 84,320 | 81,410 |
| 1996 | 128,875 | 43,871 | 97,297 | 60,023 |
| 1997 | 118,208 | 51,724 | 81,410 | 37,681 |
| 1998 | 97,061 | 44,338 | 51,348 | 29,765 |
| 1999 | 106,371 | 37,800 | 74,427 | 29,141 |
| Max 1990-99* | 131,704 | 73,764 | 126,481 | 81,410 |
| Min 1990-99* | 87,390 | 37,800 | 74,427 | 29,141 |
| Mean 1990-99* | 117,580 | 55,599 | 96,734 | 58,980 |

**Excluding harvests in 1993 and 1998 because regulations restricted subsistence harvests*

## Option D.

Establish the ANS range by Yukon River district or district groupings for all salmon combined:

1. Coastal District & Districts 1-3: 87,000 – 118,000 salmon
2. District 4: 37,500 – 56,000 salmon
3. District 5: 74,000 – 97,000 salmon
4. District 6: 29,000 – 59,000 salmon

Total salmon: 227,500 – 330,000

5. Other grouping.

*(The following table is used to calculate ANS range for option E)*

**Subsistence Salmon Harvests, Yukon Area Districts, 1990-99 Mean, Maximum, and Minimum**

| | | Coastal | District 1 | District 2 | District 3 | Coastal, Districts 1-3 | District 2 and Upper River | District 5 | District 6 | Total River |
|---|---|---|---|---|---|---|---|---|---|---|
| **Chinook** | **Max 1990-99** | 2,363 | 10,423 | 11,516 | 7,715 | 29,970 | 15,801 | 22,111 | 2,712 | 66,704 |
| **Chinook** | **Min 1990-99** | 391 | 3,646 | 7,074 | 3,187 | 16,729 | 8,193 | 14,330 | 1,177 | 45,669 |
| **Chinook** | **Mean 1990-99** | 1,328 | 6,601 | 9,085 | 5,576 | 22,324 | 10,967 | 17,022 | 2,206 | 52,519 |
| **Summer Chum** | **Max 1990-99** | 22,235 | 36,999 | 28,453 | 12,143 | 91,683 | 35,812 | 24,164 | 11,661 | 125,497 |
| **Summer Chum** | **Min 1990-99** | 1,362 | 20,169 | 20,703 | 5,545 | 54,038 | 15,339 | 2,276 | 2,654 | 70,323 |
| **Summer Chum** | **Mean 1990-99** | 15,316 | 30,074 | 25,510 | 8,674 | 79,510 | 24,432 | 9,778 | 6,431 | 104,899 |
| **Fall Chum** | **Max 1990-99** | 392 | 7,770 | 7,382 | 2,706 | 15,162 | 21,232 | 90,513 | 49,168 | 167,900 |
| **Fall Chum** | **Min 1990-99*** | 0 | 3,132 | 3,094 | 415 | 8,599 | 7,898 | 31,393 | 9,853 | 89,938 |
| **Fall Chum** | **Mean 1990-99*** | 207 | 4,879 | 4,880 | 1,448 | 11,373 | 14,515 | 58,167 | 28,922 | 123,749 |
| **Coho** | **Max 1990-99** | 349 | 5,426 | 6,587 | 1,549 | 13,621 | 8,429 | 12,376 | 26,489 | 51,980 |
| **Coho** | **Min 1990-99*** | 0 | 1,730 | 1,695 | 279 | 4,357 | 1,167 | 2,205 | 4,304 | 20,885 |
| **Coho** | **Mean 1990-99*** | 105 | 2,657 | 3,494 | 767 | 7,001 | 3,397 | 5,848 | 14,968 | 34,777 |

*Source: Annual harvest surveys and permits, ADF&G*

**Excluding harvests in 1993 and 1998 in Districts 4-6 because regulations restricted subsistence harvests.*

**Ranges for Discussion of Amount Necessary for Subsistence (ANS)***

| | | Coastal | District 1 | District 2 | District 3 | Coastal, Districts 1-3 | District 4 | District 5 | District 6 | Total River |
|---|---|---|---|---|---|---|---|---|---|---|
| **Chinook** | **Low Range** | 350 | 3,500 | 7,000 | 3,000 | 16,500 | 8,000 | 14,000 | 1,000 | 45,500 |
| **Chinook** | **High Range** | 11,500 | 7,000 | 9,000 | 5,500 | 22,500 | 11,000 | 17,500 | 2,500 | 52,500 |
| **Summer Chum** | **Low Range** | 1,000 | 20,000 | 20,500 | 5,500 | 54,000 | 15,000 | 2,000 | 2,500 | 83,000 |
| **Summer Chum** | **High Range** | 15,500 | 30,500 | 26,500 | 9,000 | 76,500 | 24,500 | 10,000 | 6,500 | 117,500 |
| **Fall Chum** | **Low Range** | 0 | 3,000 | 3,000 | 500 | 8,500 | 7,500 | 31,000 | 9,500 | 89,500 |
| **Fall Chum** | **High Range** | 200 | 5,000 | 5,000 | 1,500 | 11,500 | 15,000 | 58,500 | 29,000 | 124,000 |
| **Coho** | **Low Range** | 0 | 1,500 | 1,500 | 500 | 4,000 | 1,000 | 2,000 | 4,000 | 20,500 |
| **Coho** | **High Range** | 100 | 3,000 | 3,500 | 1,000 | 7,000 | 3,500 | 6,000 | 15,000 | 35,000 |

** Rounding Min 1990-99 down to nearest 500 salmon for low range and rounding Mean 1990-99 up to nearest 500 salmon for high range.*

## Option E.

Establish the ANS range by Yukon River district or district groupings for each species.

1. Coastal District and Districts 1-3
   - Chinook salmon: 16,500 – 22,500
   - Summer chum salmon: 54,000 – 76,500
   - Fall chum salmon: 8,500 – 11,500
   - Coho salmon: 4,000 – 7,000
2. District 4
   - Chinook salmon: 8,000 – 11,000
   - Summer chum salmon: 15,000 – 24,500
   - Fall chum salmon: 7,500 – 15,000
   - Coho salmon: 1,000 – 3,500
3. District 5
   - Chinook salmon: 14,000 – 17,500
   - Summer chum salmon: 2,000 – 10,000
   - Fall chum salmon: 31,000 – 58,500
   - Coho salmon: 2,000 – 6,000

4. District 6
    - Chinook salmon: 1,000 – 2,500
    - Summer chum salmon: 2,500 – 6,500
    - Fall chum salmon: 9,500 – 9,000
    - Coho salmon: 4,000 – 15,000

    Total salmon: 180,500 – 316,500
5. Other grouping: Combine fall chum and coho salmon since harvests for one species drastically affects the other as they overlap in run timing and are inseparable by the majority of gear types used.

**Option F.**

Establish an ANS range for subsistence harvests for human consumption and an ANS range for subsistence harvests for transportation (dog food).

The department does not recommend this option for chinook salmon. The harvest of chinook salmon for dog food is defined in a Board policy statement and also has a related proposal before the Board (Proposal #156).

*Benefits of the various options*

**Options B and C:** An ANS range for the entire drainage provides the department a realistic goal that can be managed for in the absence of inseason subsistence harvest information.

**Options B and D:** An ANS finding grouping all salmon takes into account that households substitute among species, although summer and fall species are managed separately. Grouping of species might avoid a Tier II permit system for a particular species if low harvests are being supplemented by other species.

**Options C to E:** An ANS range specific to the stock of concern and/or district grouping provides indices for measuring the extent to which reasonable opportunity was provided in the subsistence fishery, using postseason harvest data. A harvest above the lower bound of the ANS range indicates that there was a reasonable opportunity for subsistence uses during the previous season in the area. Harvests below the lower bound of the ANS may indicate, with other evidence, that there was not a reasonable opportunity for subsistence uses during the previous season in the area. Harvests consistently below the lower bound of the ANS directs the board to consider whether additional actions, such as establishing regulations for Tier II management actions, are necessary.

**Options D and E:** An ANS range specific to a district or district grouping allows for coarse management actions within that district or district grouping, without involving other areas where there may or may not be management problems. For example, a Tier II permit system might be established within one district with chronically depressed harvests to allocate harvests among subsistence households while leaving harvests in other districts without problems on a Tier I system. Grouping Coastal District and Districts 1-3 reflect the shared gear and harvest patterns in these districts. Some families live in one district but fish in another district within the lower river.

**Option E:** This option requires the most refinement of findings. This level of detail may provide a measure of reasonable opportunity for each species by district or district grouping using postseason subsistence harvest data.

*Detriments of the various options*
**All Options:** If the ANS range is not set to appropriately represent the normal between-year fluctuations in subsistence harvests, a Tier II fishery may be unnecessarily triggered, thus reducing subsistence opportunity for subsistence users.

**Options A, B and D:** An ANS finding for all salmon grouped together may not allow for measuring reasonable opportunity directed toward a specific stock of concern. Reasonable opportunity for subsistence would continue to be measured by harvests of a mixed set of stocks.

**Options D and E:** Although the ranges are not designed for inseason management, establishing ANS by district or district groupings may create unrealistic management goals because the subsistence harvest is unknown inseason. The department cannot manage for a specific level by district inseason. Measurement of success of meeting management actions within a district can only be accomplished using postseason harvest assessments.

*Preferred Option*
**Option C:** The department prefers the Board establish an ANS range by species for the entire Yukon River using the low and mean subsistence harvests for the most recent ten years, rounded to the nearest 500 fish.

Establishing an ANS range for the entire river would be less complicated than the other options. The department cannot manage for an ANS range by district in the absence of inseason subsistence harvest information. Measuring success of providing reasonable opportunity can only be accomplished using postseason harvest information. In the absence of commercial fishing, the Yukon River district boundaries that were established for commercial fishing have little application for subsistence guidelines.

**Habitat Factors Adversely Affecting The Stock**
Yukon River salmon stocks have generally remained healthy due primarily to undisturbed spawning, rearing, and migration habitat although there are some habitat issues adversely impacting the production of salmon in the Yukon River drainage. A detailed discussion of these issues is found in the Yukon River Comprehensive Salmon Plan for Alaska. This plan discusses mining, logging, and flood control (with these topics briefly discussed below) as well as potential pollution and habitat changes related to urban development, rural sanitation, increased traffic along tributaries, and agriculture.

*Mining*
The first habitat threats to salmon that were caused by human presence in the Yukon River drainage began in the early 1900s with mine exploration and development. Mining activity was, and continues to be, an important economic industry within the drainage. Fortunately, most historical mining activity occurred on localized, discrete, headwater

streams using manual labor that helped to minimize impacts on spawning habitat. However, in the 1920s mining practices expanded to include use of hydraulic mining methods and large scale dredges. Both of these mining practices disturbed extensive acreage, much of which remains un-reclaimed today. Hydraulic mining methods in particular, washed large quantities of overburden and fine sediment into downstream spawning and rearing habitats. A thorough discussion of mining activity and salmon presence in the Yukon River Area can be found in the report entitled "A History of Mining in the Yukon River Basin of Alaska" (Higgs, 1995). As is noted in the report, major mining activity has occurred on the following tributaries: the Iditarod, and Innoko River drainages in the Lower Yukon; American Creek, Eureka Creek, Minook Creek, and upper Sulatna River in the Middle Yukon; Birch Creek, Woodchopper Creek, Coal Creek, Nome Creek, Beaver Creek, and the Fortymile River in the Upper Yukon; Middle and South Forks of the Koyukuk River and Hogatza River in the Koyukuk River drainage; and Goldstream Creek, Chatanika River, Chena River, Livengood Creek, Salcha River, Goodpasture River, in the Tanana River drainage. Northern mining operations had to cope with short operating seasons, difficult transportation conditions, and high freight and labor costs. Both small and large mining operations exist today. However, more rigid enforcement of environmental regulations since the mid-1980s, has resulted in mining operations which are far less detrimental to fisheries habitat than in the past. Today, all mining operations must obtain numerous environmental permits prior to initiating or continuing mining activity. Wastewater discharge must comply with Alaska's Water Quality Standards and all mines permitted since October 14, 1991 must comply with Alaska's Mining Reclamation Regulations. Currently, two large hard rock mines are operating; the Illinois Creek mine in the Upper Innoko drainage and the Fort Knox mine near Fairbanks with a third being assessed for development near Pogo Creek of the Goodpasture River near Delta. Additional satellite hard rock mines are under assessment at Fort Knox for the Gil, Ryan Lode, and True North deposits. Some of these mines are located in potential acid-generating deposits for which strict wastewater controls will be necessary.

*Logging*

Logging has become a potential threat to fisheries habitat in the Tanana River drainage. With the transfer of large tracts of federal land into private native corporation and state ownership, logging activity is increasing to meet both local and export timber demands. Current concerns relate to insufficient buffer or setback zones to protect tributaries from increased runoff, increased temperature fluctuations, loss of spawning and rearing habitat, increased siltation and turbidity, and other effects which can all be stabilized or moderated with sufficient streamside vegetation. Riparian buffer standards have been developed by a Region III Forestry/Fisheries Science and Technical Committee and await statutory enactment by the Alaska Legislature.

*Flood Control and Other Dams*

Chena River Lakes Flood Control Project: ADF&G, YRDFA, and local sport and subsistence fishermen have raised concerns about the dam's effects on springtime emigration of salmon fry and immigration of adults. In flood years such as 1985, 1991, and 1992, the dam's gates were closed to slow the Chena River's flow to manageable levels. This caused the river to back up and spread throughout the willow and spruce brush in the Chena River valley floodway. In some of these flood event years, seagulls

and other birds were seen feeding off salmon fry at several locations. Three locations noted were; above the dam in the backed up waters, below the dam's chutes where smolt were dumped via small waterfalls, and in pools of water above the dam when the flood waters receded. The exact effects of these events upon salmon returns are unknown.

Chatanika River (Davidson Ditch) Dam: The dam was severely damaged by the 1967 flood, with the top half destroyed and washed downstream. The remainder is a sheet pile structure approximately 100 feet (30 m) long and 4 feet (1.2 m) high and blocks the entire river channel. The flow diversion gates are inoperable and the overflow apron has been completely removed by ice and flood waters. The dam has trapped sediment behind it since its construction and is believed to be a barrier to upstream fish migration. Only two species of fish (Arctic grayling and sculpin) are documented above the dam (Al Townsend, ADF&G, Fairbanks, personal communication). Three species of salmon (chinook, chum, and coho salmon), three species of whitefish, sheefish, Arctic grayling, northern pike, burbot, suckers, and sculpin are documented in the Chatanika River downstream of the dam. [1]

*Habitat Projects Needed*

1. Continued monitoring of Illinois Creek Mine in the Innoko River drainage.
2. Continued restoration of Birch Creek and enhancements to allow fish passage in historical mining areas. Restoration of Birch Creek tributaries whose fish habitat still remains highly impaired due to mining. Much of this mining predated the 1991 Mining Reclamation Regulations.
3. Continued restoration of Nome Creek from damage due to historic mining.
4. Continued evaluation, and possibly implementation, of modifications to the Chena River Lakes Flood Control Project to reduce salmon mortality.
5. Removal of Chatanika River Dam or construction of a bypass channel around the dam.
6. Survey and assessment of critical salmon spawning and rearing habitats in the Tanana River drainage. Continued restoration of Tanana River tributaries from historic mining damage.
7. Advanced identification of previously undocumented anadromous fish streams in the Yukon Watershed. An estimated 50% of all water bodies in the Yukon watershed have not been evaluated for distribution of anadromous species. An estimated 70% of the first and second order tributaries similarly have not been surveyed. Consequently these streams are not afforded legal protection under ADF&G's AS 16.05.870 permitting program.

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[1] Literature sources:

Townsend, Alan H. 2000. Personal communication. Alaska Department of Fish and Game, Fairbanks.

Higgs, Andrew S. 1995. A history of mining in the Yukon River Basin of Alaska. Northern Land Use Research, Inc. Fairbanks, AK.

Holder, R.R. and D. Senecal-Albrecht, compilers. 1998. Yukon River comprehensive salmon plan for Alaska. Alaska Department of Fish and Game. 162 pp.

**Do New Or Expanding Fisheries On This Stock Exist?**
There are no new or expanding fisheries on this stock. However, several proposals before the Board of Fisheries would increase subsistence fishing time in particular areas or allow the use of new subsistence fishing gear types potentially effecting historic harvest levels. The issues to be debated during Yukon River chinook salmon stock of concern discussions include the following by proposal number: 120,134, 156, 157, 158, 159, 160, 161, 162, 163, 164, 167, 168, 169, 170,171, 172, 178, 179, 181, 183 and 272.

**Draft Yukon River Chinook Salmon Management Plan**
In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the department recommended to the Board of Fisheries during the November 4-6, 2000 work session that elements of existing regulations and management strategies be incorporated in the present management plan. The added sections (Underlined) are similar to some sections already used in the Yukon River Fall Chum Management Plan and reflect current management strategies during the summer season. ***(Related proposals: 170, 171, and 172)***

5 AAC 05.360
YUKON RIVER KING SALMON MANAGEMENT PLAN.
The objective of the management plan contained in this section is to provide for the sustained yield of the Yukon River chinook salmon resource and to provide management guidelines to the department. The commissioner shall implement this plan during the chinook salmon fishing season each year, as follows:

The department shall use the best available data, including preseason projections, test fisheries indices, age and sex composition, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects to assess the run size for the purpose of implementing this plan;

(a) The department shall manage the Yukon River commercial king salmon fishery for a guideline harvest range of 67,350 to 129,150 king salmon, distributed as follows:
(1) Districts 1 and 2: 60,000 to 120,000 king salmon;
(2) District 3: 1,800 to 2,200 king salmon;
(3) District 4: 2,250 to 2,850 king salmon;
(4) District 5
(A) Subdistricts 5-B and 5-C: 2,400 to 2,800 king salmon;
(B) Subdistrict 5-D: 300 to 500 king salmon;
(5) District 6: 600 to 800 king salmon.
(b) A person may not sell king salmon roe taken in Subdistrict 4-A.
(c) When the commercial harvest is expected to fall below the guideline harvest range, the department shall endeavor to manage so that each district's harvest is proportionally similar to their respective guideline harvest range.
(d) The department may open the chinook salmon directed commercial fishery when increasing subsistence and/or test net catches of chinook salmon have occurred over a seven – to ten-day period.

**Escapement Goal Review**

The Department is undertaking a review of escapement goals for several Yukon River chinook salmon stocks where long-term escapement, catch, and age composition data exist that enable the development of biological escapement goals based on analysis of production consistent with the department's escapement goal policy. These stocks include the Salcha and Chena River chinook salmon. The intent of the review is to recommend scientifically defensible biological escapement goals for these stocks. A detailed report will be published for each of these stocks, documenting the available data, methods for reconstruction of long term age specific runs and recruits from parent escapement, estimation and analyses of the relationship between parent spawning stock and recruitment, and recommended biological escapement goals. These reports will be prepared and, following an internal review and approval by the AYK Biological Escapement Goal review committee, will be provided for public review by December 20, 2000.

At this time, the public review drafts of Chena and Salcha River chinook salmon BEG's have been prepared and reviewed by the AYK BEG review committee. New biological escapement goals will be recommended for Salcha River and Chena River chinook salmon. In addition, the AYK BEG review committee recommends that the remaining Yukon River chinook salmon aerial surveys BEG's will now be referred to as "preliminary Sustainable Escapement Goals (SEG)".

***List Of Current And Proposed BEG, Or SEG's For Chinook Salmon.***

| Stream | Current Goal | Proposed Goal |
|---|---|---|
| East Fork Andreafsky River Aerial | > 1,500 BEG | > 1,500 SEG |
| West Fork Andreafsky River Aerial | > 1,400 BEG | > 1,400 SEG |
| Anvik River Index Aerial | > 500 BEG | > 500 SEG |
| Nulato River Aerial | > 1,300 BEG | > 1,300 SEG |
| Gisasa River Aerial | > 600 BEG | > 600 SEG |
| Chena River Index Aerial | > 1,700 BEG | |
| Chena River Tower | | 2,800-5,700 BEG |
| Salcha River Index Aerial | > 2,500 BEG | |
| Salcha River Tower | | 3,300-6,500 BEG |
| Canada Mainstem Tagging Rebuilding Goal | > 28,000 | |

The Yukon River Canadian mainstem rebuilding step goal of 28,000 chinook salmon is part of a rebuilding plan established by an interim Yukon River Salmon Agreement between the U.S. and Canadian governments. In April of 1996, the U.S./Canada Yukon River Panel (Panel) agreed to the first six years of a rebuilding plan for Canadian mainstem chinook salmon stocks. Recognizing the desirability of rebuilding stocks, the Panel agreed to an interim minimum spawning escapement objective for Canadian mainstem Yukon River of 28,000 chinook salmon for six years beginning in 1996. The interim agreement expired in 1998.

**Identify Research On Yukon River Chinook Salmon Stock**

At this time, the Yukon River does not have a comprehensive research plan similar to the plan that has been developed for the Copper River and is being developed for the

Kuskokwim River. Attachment (1) provides a list of past, current, and proposed projects that have collected data pertaining to Yukon River chinook salmon.

## *ACTION PLAN DEVELOPMENT*

**Yukon River Chinook Salmon Rebuilding Goal**
Reduce fishing mortality in order to meet spawning escapement goals, to provide for subsistence levels within the ANS range, and to reestablish historic range of harvests levels by other users.

**Action Plan Alternatives**

*ACTION #1.*
***Amend 5AAC 05.310(1) to delete reference to dates and open commercial fishery by emergency order.***

*Objective*
The objective of this recommended action is of a housekeeping nature designed to correspond with current management practices which open the commercial fishing season based on run timing and avoid unnecessary closures to subsistence fishing.

*Specific action recommended to implement the objective*
Amend the existing regulation to delete reference to dates, which would correspond with current management practices that open the commercial fishery based on run timing and not on a range of calendar dates.

*Benefits*
The recommended action would avoid unnecessary closures to subsistence fishing.

*Detriments*
There appears to be no detriments associated with the recommended action.

*Subsistence issues/considerations*
The recommended action is consistent with state subsistence law requirements and would benefit subsistence fishers by eliminating unnecessary subsistence fishing closures.

*Performance measures*
Performance measures are not applicable to this proposed action.

*Research plan to address stock of concern*
A research plan is not applicable to this proposed action.

*ACTION #2.*
***When very low runs occur or are anticipated, determine when commercial, sport, and personal use fisheries are closed in relation to one another (Related proposal #120).***

*Objective*
Develop a policy or regulation that would inform the public and the department the appropriate management actions to take by fishery during a very poor run.

*Specific action recommended to implement the objective*
Determine when commercial, sport, and personal use fisheries are closed in relation to one another. Take appropriate action to limit sport fish and personal use harvests (fishing time, reduce bag limits, catch and release, closure) of chinook salmon when the commercial fishery is closed to conserve chinook salmon. Appropriate action could depend on whether commercial fishing is closed for an extended period of time or for the season.

*Benefits*
The general public, commercial fishers, subsistence fishers, sport fishers, sport fishing guides, and personal use fishers are informed when and why management actions are to be taken. The department is provided guidelines as to how to manage the various fisheries of equal priority in the Yukon River drainage.

*Detriments*
Sport fishing guides could be adversely affected if their ability to attract clients is diminished by closure or restriction of sport fishing opportunities.

*Subsistence issues/considerations*
Chinook salmon harvest by any one of these uses (commercial, sport, and personal use) during a very low run may affect the reasonable opportunity of subsistence fishers.

*Performance measures*
Performance measures are not applicable to this proposed action.

*Research plan to address stock of concern*
A research plan is not applicable to this proposed action.

***ACTION #3.***
***When the preseason projection is for very low runs and commercial fishing is likely to remain closed, reduce subsistence fishing time early in the run to help ensure that subsistence harvests do not impair meeting escapement needs or reasonable opportunity for all subsistence users.***

*Objectives*
Reduce harvest early in the run when there is a much higher level of uncertainty in projecting total run abundance, spread the harvest throughout the run to reduce the impact on any particular component of the run, and spread subsistence harvest opportunity among users.

*Specific action recommended to implement the objective*
Yukon River Drainage Fisheries Association (YRDFA), Fish and Game Advisory Committees, and Regional Advisory Councils will be used by the department to gather

information for establishing what is reasonable subsistence fishing opportunity relative to run size for different areas/districts/subdistricts. To spread harvest opportunity among all subsistence users, management of the subsistence fishery would use time and/or area and gear restrictions to provide for opportunity throughout the drainage while allowing chinook salmon to pass through districts and meet escapement goals. Management would establish subsistence fishing periods, and implement gear specifications by emergency order based upon inseason run assessment (lower river test fish indices and escapement projects) and reasonable opportunity as developed through the Board and public process.

| Example of the subsistence fishing schedule implemented on July 19 2000. | |
|---|---|
| District | Sample Fishing Schedule |
| Y-1, Y-2, Y-3 | one 12-hour period/week |
| Y-4 | two 24-hour periods/week |
| Y-5 | two 12-hour periods/week and one 24-hour period/week |
| Y6 | one 18-hour period/week |

A subsistence fishing schedule should take into account the relative efficiency of subsistence fishing gear used in the area with consideration for the species to be conserved. Based on run assessment information, fishing time would be allowed proportionally based on what is defined as reasonable subsistence fishing opportunity relative to run size for different areas/districts/subdistricts.

Inseason chinook salmon run assessment will be based on lower river test fisheries, subsistence catch reports, age and sex composition, and preliminary escapement monitoring information. Lower river test fish indices provide inseason data on relative abundance and run timing, which is compared to test fish indices from other similar years in addition to results from fishery performance and escapement. The department will participate in Yukon River Drainage Fisheries Association and Federal Yukon River Coordinating Fisheries Committee teleconferences inseason to gather information from the public and to discuss run status and management actions.

*Benefits*

Salmon run outlooks in the Yukon River are qualitative in nature due to the lack of adequate information with which to develop more rigorous forecasts. Consequently, the harvest outlooks are qualitative and typically based upon available parent year spawning escapement indicators, age composition information, and the likely level of harvest that can be expected to be available from such indicators. While the harvest outlooks provide for a general level of expectation, the fisheries are managed based upon inseason assessments of the actual runs. When a very poor run is projected and commercial fishing is likely to be closed, there is the potential that typical subsistence harvests may not provide for adequate spawning escapements. Managing the subsistence fishery using similar strategies developed for the commercial fisheries under such circumstances would provide the flexibility necessary to react in a timely manner to inseason run assessment information.

Based on preseason or inseason run projections, when it appears that there will be a surplus for commercial fishing, subsistence fishing restrictions can be relaxed without having to go through a lengthy Board process.

*Detriments*
Currently subsistence harvest levels cannot be determined inseason. Management of the subsistence fishery could be overly restrictive or too lenient prior to obtaining complete run abundance information. Subsistence fishermen could be required to forego a surplus that was not identified until it had already passed through their area or the harvest of fish needed for escapement may occur.

*Subsistence issues/considerations*
Potential subsistence harvest allocation issues may arise in trying to establish an equitable subsistence fishing schedule.

*Performance measures*
Subsistence harvest levels would continue to be determined postseason through the Yukon Area subsistence survey and fishing permit program. The department encourages fishermen to keep track of their subsistence salmon harvest on household subsistence catch calendars or subsistence fishing permits. Postseason surveys are voluntary and they are used by the department to collect harvest information from a large number of households within the drainage. A postseason analysis of subsistence salmon harvests will be conducted to determine if the objective was achieved.

Another measure of performance would be meeting established chinook salmon escapement goals. Additional measures of performance could not be obtained due to the lack of reporting requirements for subsistence fishermen. The objective of the action would be met by preventing salmon from being caught continuously and spreading the harvest by regulating fishing time. Allowing pulses of fish to move through various areas while controlling fishing time would be a qualitative measure.

*Research plan to address stock of concern*
A research plan may be developed if applicable, should the Board accept this action.

***ACTION #4.***
***Provide Department authority to restrict subsistence harvest of salmon to nets of 6-inch mesh or smaller by emergency order when necessary to reduce harvest rate on chinook salmon.***

*Objective*
Reduce the harvest of chinook salmon to provide for adequate spawning escapement while allowing the harvest of other species for subsistence needs.

*Specific action recommended to implement the objective*
During times when the Commissioner determines it to be necessary for the conservation of chinook salmon, the Commissioner, by emergency order, may close the fishing season in the Yukon-Northern Area and immediately reopen the season in that area during which a six-inch or less mesh gillnet gear limitation apply.

Inseason chinook salmon run assessment will be based on lower river test fisheries, subsistence catch reports, age and sex composition, and preliminary escapement

monitoring information. Lower river test fish indices provide inseason data on relative abundance and run timing, which is compared to test fish indices from other similar years in addition to results from fishery performance and escapement. The department will participate in Yukon River Drainage Fisheries Association and Federal Yukon River Coordinating Fisheries Committee teleconferences inseason to gather information from the public and to discuss run status and management actions.

*Benefits*
When a low chinook salmon run is projected and commercial fishing is likely to be closed, there is the potential that typical chinook salmon subsistence harvests may not provide for adequate spawning escapements. If a harvestable surplus of summer chum salmon was identified, a reduction in gear size could allow for summer chum salmon subsistence harvest to occur while conserving chinook salmon.

Current subsistence regulations allow subsistence gear limitations when the Commissioner determines it to be necessary for the conservation of chum salmon. The recommended action would extend this management tool to chinook salmon.

*Detriments*
This would not be a viable tool to use when it is also necessary to conserve summer chum salmon. Subsistence harvest levels cannot be determined inseason. Management of the subsistence fishery could be overly restrictive or too lenient prior to obtaining complete run abundance information. Subsistence fishermen could be required to forego a surplus that was not identified until it had already passed through their area.

Subsistence fishermen who do not have six-inch mesh gillnets would have to purchase new gillnets or be unable to participate in a restricted mesh subsistence fishing period.

*Subsistence issues/considerations*
Subsistence fishermen who do not have the required gear type would incur considerable expense to purchase new gear. Chinook salmon harvest would be adversely impacted.

*Performance measures*
A measure of performance would be meeting establishing chinook salmon escapement goals. Harvest levels would be determined through postseason subsistence surveys. The department encourages fishermen to keep track of their subsistence salmon harvest on household subsistence catch calendars or subsistence fishing permits. A postseason analysis of subsistence salmon harvests and escapement monitoring projects will be conducted to determine if the objective was achieved.

*Research plan to address stock of concern*
A research plan may be developed if applicable, should the Board accept this action.

***ACTION #5.***
***Limit maximum mesh size in commercial and subsistence fisheries to reduce harvest of large chinook salmon (Related proposal #272).***

*Objective*

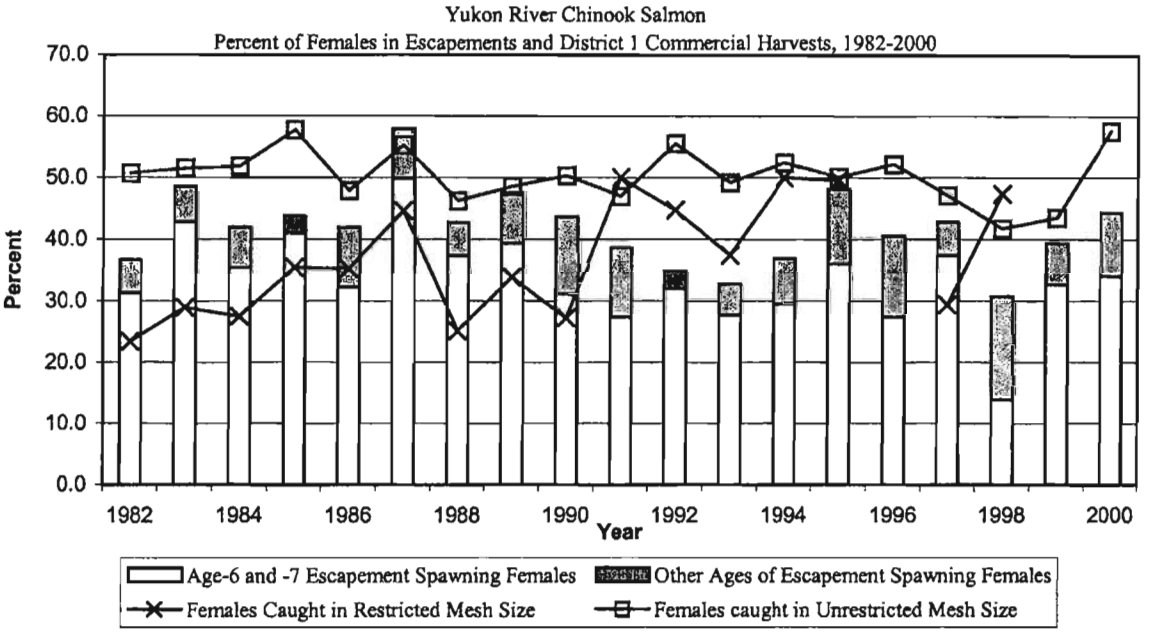
Reduce the potential harvest rate of large, older, female chinook salmon while continuing to allow a directed chinook salmon fishery without severely impacting summer chum salmon harvests.

*Specific action recommended to implement the objective*

Require by regulation that commercial and subsistence gill net mesh size be limited to a maximum mesh size that would continue to allow for a directed chinook salmon harvest but also provide some measure of conservation towards older, larger, predominately female chinook salmon. The Board would determine if this action should be in place permanently or used only in years when a very poor run is projected.

*Benefits*

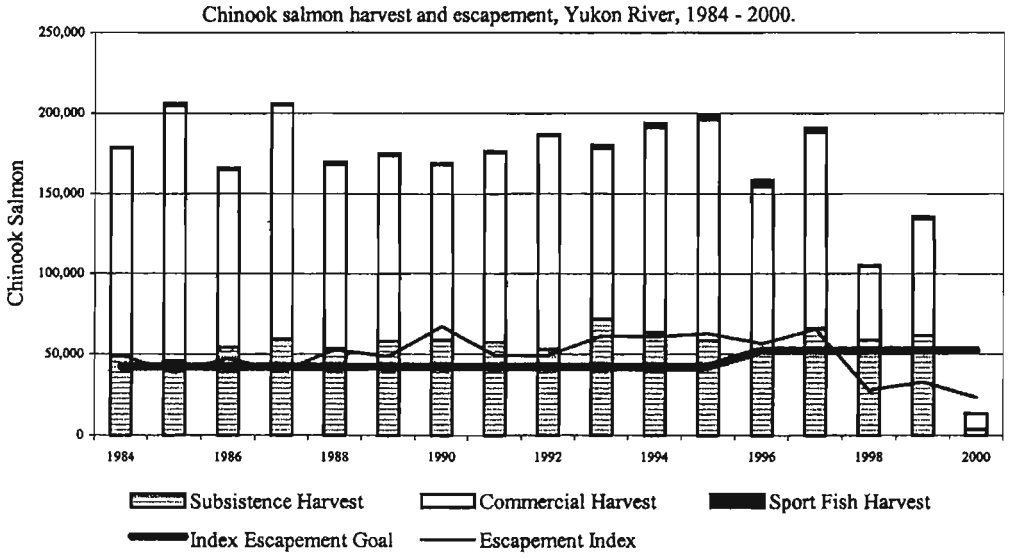
A reduction in maximum mesh size may decrease the percentage of female chinook salmon caught in gill nets.




Yukon River chinook salmon average percent female from escapements, and percent females from that have been sampled throughout the Yukon River drainage. Long-term sampled escapements include Anvik and Andreafsky Rivers for the Lower Yukon Area, Chena and Salcha Rivers for the Middle Yukon Area and Canadian escapement samples, and Whitehorse Fishway for the Upper Yukon Area.

*Detriments*

Historically, there have been harvestable surpluses of larger chinook salmon (figure below). If the maximum mesh size was restricted to a size that targeted summer chum salmon, no fishing could be allowed during a poor summer chum salmon run even if a harvestable surplus of chinook salmon was available.




The escapement index includes Canadian border passage estimates and aerial survey estimates from the Andreafsky, Anvik, Chena, and Salcha Rivers.

The index escapement goal is the sum of those goals used in the index. Prior to 1996, Canadian border passage was a stabilization goal of 33,000. In 1996, the Canadian border passage changed to a rebuilding goal of 44,000.

Summer chum salmon harvest levels would be significantly impacted if the maximum mesh size were restricted to a size that is selective for chum salmon. A mesh size of less than 7.5 inches would catch a significant number of Yukon River summer chum salmon (table below). The Yukon River summer chum salmon stock has been determined by the Board to be a management concern. Any change to a mesh size requirement for commercial and subsistence fishermen must consider the impact to summer chum salmon. The department has conducted only one directed summer chum salmon fishing period in the lower river since 1996 due to poor summer chum runs (1998 – 2000) and poor summer chum salmon market conditions (1997).

Commercial catches of chinook and summer chum salmon by mesh size, Districts 1 and 2, Lower Yukon Area, 1981-2000. [a]

| | Unrestricted Mesh Size [b] | | | | 6 inch Maximum Mesh Size [c] | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Number Fishermen | Hours Fished | Chinook Districts 1 and 2 | Summer Chum Districts 1 and 2 | Number Fishermen | Hours Fished | Chinook Districts 1 and 2 | Summer Chum Districts 1 and 2 |
| 1981 | 696 | 216 | 125,698 | 163,979 | 574 | 384 | 18,648 | 758,767 |
| 1982 | 696 | 264 | 106,399 | 225,106 | 484 | 228 | 6,887 | 217,563 |
| 1983 | 700 | 192 | 107,078 | 121,927 | 578 | 336 | 31,002 | 590,329 |
| 1984 | 613 | 168 | 94,456 | 242,076 | 554 | 246 | 16,394 | 287,531 |
| 1985 [f] | 666 | 144 | 114,300 | 170,345 | 523 | 180 | 22,445 | 265,240 |
| 1986 | 672 | 192 | 79,525 | 231,372 | 521 | 192 | 15,307 | 438,182 |
| 1987 | 659 | 180 | 102,274 | 128,017 | 575 | 96 | 21,827 | 269,757 |
| 1988 | 678 | 72 | 52,801 | 225,049 | 638 | 240 | 39,469 | 848,321 |
| 1989 [g] | 687 | 60 | 53,674 | 126,360 | 684 | 174 | 38,548 | 765,233 |
| 1990 [g] | 679 | 81 | 66,092 | 99,588 | 640 | 30 | 18,147 | 281,418 |
| 1991 [g] | 678 | 114 | 88,364 | 108,986 | 571 | 30 | 4,145 | 205,610 |
| 1992 [g] | 679 | 66 | 83,248 | 81,458 | 661 | 57 | 27,678 | 242,878 |
| 1993 | 682 | 84 | 84,377 | 47,488 | 396 | 6 | 2,202 | 45,503 |
| 1994 [h] | 659 | 60 | 103,325 | 39,832 | 241 | 9 | 608 | 15,369 |
| 1995 | 661 | 77 | 114,434 | 113,860 | 361 | 36 | 3,098 | 112,223 |
| 1996 | 627 | 129 | 86,851 | 123,233 | 0 | 0 | 0 | 0 |
| 1997 | 639 | 93 | 102,114 | 49,953 | 276 | 17 | 3,611 | 28,204 |
| 1998 | 641 | 57 | 41,008 | 20,314 | 239 | 3 | 1,211 | 7,804 |
| 1999 | 627 | 63 | 64,264 | 27,883 | 0 | 0 | 0 | 0 |
| 2000 | 562 | 18 | 8,518 | 6,624 | 0 | 0 | 0 | 0 |
| 10 Yr. Avg. 1981-1990 | 675 | 157 | 90,230 | 173,382 | 577 | 211 | 22,867 | 472,234 |
| 10 Yr. Avg. 1991-2000 | 646 | 76 | 77,650 | 61,963 | 275 | 16 | 4,255 [k] | 65,759 |

a ADF&G test fishery sales included, 1961-1990. ADF&G test fishery sales not included, 1991-1993.
b Primarily 8 to 8-1/2 inch mesh size used during early June to early July.
c Catch through July 15-20, relatively few chinook and summer chum salmon taken after these dates.
f Six inch maximum mesh size regulation by emergency order during commercial fishing season became effective in 1985.
g Only includes information from fish ticket database; does not include salmon purchased illegally.
h 8 inch or greater mesh size restriction was in effect until June 27 and fishers were requested to take chum salmon home for subsistence use until June 22 in order to reduce the harvest of chums.
k The 10 year average includes those years when there were restricted openings.

Commercial fishermen would likely see a decrease in the average weight of their catch using a mesh smaller than what they currently use. If the reduction of overall harvest weight is not spread evenly throughout all districts and Canada, allocation issues will need to be considered.

Fishermen indicate there is a high amount of chinook salmon dropout when small mesh gear, 6-inch mesh, is used during a fishing period. The amount of dropout cannot be

measured, but should be considered as a possible detriment when determining a maximum mesh size.

The approval of this proposed action is expected to result in additional direct cost for a private person to participate in chinook salmon commercial and subsistence fisheries since an unknown number of participants would have to purchase new nets.

*Subsistence issues/considerations*
The approval of this proposed action for subsistence fishing gillnets is expected to result in additional direct cost for a private person to participate in subsistence fisheries since an unknown number of participants would have to purchase new nets.

*Performance measures*
An analysis of age and sex composition data obtained from commercial harvests, escapement projects, Canadian border passage projects, and Canadian escapement projects would be used to determine the effectiveness of the proposed action. Unless all users of the chinook salmon stock reduced the maximum mesh size it may not be possible to measure the effectiveness of the proposed action.

*Research plan to address stock of concern*
A research plan may be developed if applicable, should the Board accept this action.

*ACTION #6.*
***Amend or adopt regulations creating a Tier II subsistence fishery and Tier II permit scoring system for the stock of concern, or segments of a stock of concern, when there is a chronic inability of subsistence harvests to meet the lower bounds of the Amount Necessary for Subsistence (ANS) range established by the Board. A "chronic inability" means the continuing or anticipated inability to meet the ANS range over a four to five year period, which is approximately equivalent to the generation time of most salmon species.***

*Objective*
The objective of this action is to create a Tier II system consistent with the sustainable fisheries policy and AS 16.05.258(b)(4), when the harvestable portion of the stock has a chronic inability to provide a reasonable opportunity for subsistence uses.

*Specific action recommended to implement the objective*
The language of the action option may be included as a provision of a management plan. When the threshold conditions are met, the department will bring to the board options for a Tier II system. Proposals from the public requesting Tier II management may require provisions be developed and implemented before threshold conditions are met.

*Benefit*
The action creates a process for the development of Tier II system when consistently poor subsistence harvests have occurred. The Tier II system may be tailored to the stock of concern, with input by the public during a noticed board meeting. Clear, measurable

conditions for consideration and initiation of Tier II provisions allows the public time to discuss and develop effective Tier II factors to ensure compliance with statutory criteria.

*Detriments*
Failure to achieve harvest levels within the ANS range may involve other factors that are unrelated to low run abundance. Examples of factors effecting subsistence harvest may include: river conditions affecting harvest efficiency; changes in employment (ex. firefighting); owner of a large dog lot moves or gets rid of his dogs; changes in the reporting of subsistence harvests. It should be clearly established that the chronic inability to meet the ANS range is primarily due to poor salmon runs.

There may be a time lag between the development and implementation of Tier II regulations, during which opportunity by all subsistence users are restricted, rather than distinguishing among subsistence users based on statutory criteria.

Administration of a Tier II process would be very expensive and difficult on the Yukon River and would not be possible to implement inseason. There are over 1,400 identified subsistence salmon fishing households in the Yukon River drainage. Enforcement of this process would be very difficult given the immense size of the Yukon River drainage and the large potential number of subsistence fishers. Development of the ranking system would be a very long and hard process given the large number of potential applicants and the many factors involved with subsistence use and the subsistence lifestyle.

*Performance measures*
Performance measures of a Tier II system would be the number of persons receiving Tier II permits and the amounts of fish being harvested under a Tier II system. The intent of the law is that the harvestable portion is harvested by the fishers with the greatest dependency and fewest alternatives for obtaining human food.

*Research plan to address stock of concern*
A research plan is not applicable to this proposed action.

## Attachment 1. Research projects associated with Yukon River chinook salmon.

| Past Projects | Description |
|---|---|
| Tanana River Sonar | Determine the feasibility to estimate chinook, summer and fall chum salmon passage returning to the Tanana River. |
| Yukon River Sonar at Eagle | Determine the feasibility to estimate chinook and fall chum salmon passage returning to Canada in the mainstem Yukon River. |
| Norton Sound Tagging Study | 2-year tagging program (1978-79) to identify the amount of stock interception within the Norton Sound Districts and between the adjacent districts of Kotzebue, Port Clarence, and the Yukon River. |
| South Fork Koyukuk River Weir | Estimate daily escapement of chinook and summer chum salmon into South Fork Koyukuk River. Estimate age, sex, and size composition of the summer chum salmon in the escapement. Project was moved to Henshaw Creek in 2000 due to susceptibility to flooding. |
| Anvik River Tower | Estimate daily escapement of chinook and summer chum salmon into the Anvik River. Estimate age, sex, and size composition of the summer chum salmon in the escapement. Project was changed to a sonar project in 1979 and moved to a location lower in the river. |

| Current Projects (United States) | Description |
|---|---|
| Commercial Catch and Effort Assessment | Document and estimate catch and associated effort of the Alaska Yukon River commercial salmon fishery via fish tickets of commercial sales of salmon or salmon roe. |
| Commercial Catch Sampling and Monitoring | Determine age, sex, and size of salmon harvested in Alaskan Yukon River commercial fisheries and to monitor Alaskan commercial fishery openings and closures. |
| Subsistence and Personal Use Catch and Effort Assessment | Document and estimate the catch and associated effort of the Alaskan Yukon River subsistence salmon fishery via interviews, catch calendars, mail-out questionnaires, telephone interviews, and subsistence fishing permits, and of the personal use fishery personal use fishery permits. |
| Sport Catch, Harvest and Effort Assessment | Document and estimate the catch, harvest, and associated effort of the Alaskan Yukon 'River sport fishery via post-season mail-out questionnaires. |
| Yukon River Salmon Stock Identification | Estimate chinook salmon stock composition of the various Yukon River drainage harvests through analyses of scale patterns, age compositions, and geographical distribution of catches and escapements. |
| Yukon River Salmon Escapement Surveys and Sampling | Estimate population size, or index the relative abundance, of chinook, chum, and coho salmon spawning escapements by aerial, foot, and boat surveys. Estimate the age, sex and size of selected tributary chinook, chum, and coho salmon spawning populations. |
| Hooper Bay Subsistence Fishing Monitoring | Evaluate the feasibility of determining summer chum and chinook salmon run timing and abundance using subsistence catch data. |
| Lower Yukon River Set Gillnet Test Fishing | Index chinook, summer and fall chum, and coho salmon run timing and abundance using set gillnets. Sample captured salmon for age, sex and size composition information. |
| Yukon River Chinook Salmon Tagging and Telemetry Study | Provide information on run characteristics, including stock composition, run timing and migration patterns of chinook salmon. |
| Marshall Drift Gillnet Test Fishing | Determine feasibility of using drift gillnets to index timing and relative abundance of chinook salmon run. |
| East Fork Andreafsky Weir | Estimate daily escapement, with age, sex and size composition of chinook, summer chum, and coho salmon into the East Fork Andreafsky River. Determine the feasibility of using video and time-lapse photography to improve escapement monitoring. |
| Yukon River Sonar | Estimate chinook, summer and fall chum salmon passage past Pilot Station in the mainstem Yukon River. |
| Kaltag Creek Tower | Estimate daily escapement of chinook and summer chum salmon into the Kaltag River. Estimate age, sex, and size composition of the summer chum salmon in the escapement. |
| Nulato River Tower | Estimate daily escapement of chinook and summer chum salmon into the Nulato River. Estimate age, sex, and size composition of the summer chum salmon in the escapement. |
| Gisasa River Weir | Estimate daily escapement of chinook and summer chum salmon into the Gisasa River. Estimate age, sex, and size composition of the summer chum salmon in the escapement. |
| Clear Creek Tower | Estimate daily escapement of chinook and summer chum salmon into Clear Creek. Estimate age, sex, and size composition of the summer chum salmon in the escapement. |
| Henshaw Creek Weir | Estimate daily escapement of chinook and summer chum salmon into Henshaw Creek. Estimate age, sex, and size composition of the summer chum salmon in the escapement. |
| Middle Yukon River Chinook Sampling Project | Estimate age, sex and size composition of chinook salmon harvested in middle Yukon River subsistence fisheries. |
| Tanana River Fishwheel Test Fishing | Index the run timing of chinook, summer chum, fall chum and coho salmon runs using test fishwheels. |
| Beaver Creek Weir | Estimate the daily escapement of chinook and chum salmon into the upper portion of Beaver Creek. |
| Chena River Tower | Estimate the daily escapement of chinook and summer chum salmon returning to the Chena River. |
| Salcha River Tower | Estimate the daily escapement of chinook and summer chum salmon returning to the Salcha River. |
| Effects of *Ichthyophonus hoferi* on Yukon River Chinook Salmon Fecundity and Survival | Estimate the prevalence of *Ichthyophonus hoferi* in chinook salmon, and changes in disease severity during upstream migration |
| Database Development Project | Inventory and integrate complete complement of historical salmon abundance and ASL data to support the process of determining data shortfalls and needs, and to enhance access to historic data for inseason management purposes. |

| Current Projects (Canada) | Description |
|---|---|
| Yukon Mark-Recapture and Chinook Test Fishery | Inseason run forecasting using population, escapement and harvest rate estimates of chinook and chum salmon in the Canadian section of the mainstem Yukon River, and to collect scales for stock identification, age, size, sex composition. |
| Commercial Catch Monitoring | Determine weekly catches and effort in the Canadian commercial fishery, and to recovery of tags. |
| Aboriginal Catch Monitoring | Determine weekly catches and effort in the aboriginal fishery, recovery of tags and implement components of the UFA. |
| Harvest Sampling | Obtain age, size, sex composition of commercial, aboriginal and test fish catches, and to sample for coded wire tags. Sample salmon for *Icthyophonus hoferi* in Dawson area. |
| DFO Escapement Index Surveys | Obtain escapement counts in index spawning areas. |
| Escapement Surveys | Conduct mobile surveys (on foot or by helicopter) to count chinook salmon returns to Flat Creek, Tincup Creek, Jennings, Gladys, Swift and Morley Rivers and other tributaries. |
| **Current Projects (Canada) Cont.** | **Description** |
| Whitehorse Rapids Fishway | Enumerate wild and hatchery reared chinook returns to the Whitehorse area, and to obtain age, size composition, and tag recovery data. |
| Chandindu River Weir | Enumerate chinook returns to Chandindu River and obtain age, size and sex composition, and tag recovery data. |
| Tatchun Creek Weir | Enumerate chinook returns to Tatchun Creek and obtain age, size and sex composition, and tag recovery data. |
| Blind Creek Weir | Enumerate chinook returns to Blind Creek and obtain sex and tag recovery data. |
| Escapement Sampling | Obtain age and size composition and to sample for *Icthyophonus hoferi* in hatchery samples. |
| Whitehorse Rapids Fish Hatchery and Coded-wire Tag Project | Incubate ~200K chinook eggs obtained at the Whitehorse Fishway; rear fry until spring, then mark, tag and release upstream of Whitehorse hydroelectric facility. |
| MacIntyre Incubation Box and Coded-wire Tag Project | Incubate up to 120K chinook fry obtained from the Takhini River and/or Tatchun Creek; rear fry, then mark, tag, and release at natal site. |
| Mayo Area Pilot Incubation Boxes | Identify a location for a small scale egg incubation project near Mayo. |

| Proposed Future Projects | Description |
|---|---|
| Chinook and Summer Chum Salmon Distribution in the Innoko River Drainage | For three years, investigate the distribution of chinook and summer chum salmon in the Innoko River drainage using radio telemetry techniques. Fish will be monitoring by remote receiver stations and aircraft. |
| Locate Salmon Weir Sites in the Innoko River Drainage for Future Installation | During summer 2001, survey streams in the Innoko River drainage for a future resistance board weir site to monitor chinook and summer chum salmon. |
| Nulato River Weir | Replace the current tower project on the Nulato River with a weir to estimate the daily escapement, and to collect age, sex and size composition of the chinook and summer chum salmon return. |
| Locate Salmon Weir Sites in the Nowitna River Drainage for Future Installation | During summer 2001, survey streams in the Nowitna River drainage for a future resistance board weir site to monitor chinook and summer chum salmon. |
| West Fork Andreafsky Weir | Estimate daily escapement, with age, sex and size composition of chinook, summer chum, and coho salmon into the West Fork Andreafsky River. |
| Yukon River Chinook Salmon Inseason Run of Origin Assessment | Estimate chinook salmon run of origin composition of test fish, subsistence and commercial harvests inseason in a timely manner. |
| Lower Yukon River Cooperative Salmon Drift Test Fishing Project | Determine feasibility of using drift gillnets to index timing and relative abundance of chinook and summer chum salmon run in the Lower Yukon River. |
| Atcheulinguk River Subsistence Fisheries Study | |
| Yukon River Salmon Traditional Ecological Knowledge | |
| Abundance and Run Timing of Adult Salmon in the Kateel River | Install a resistance board weir on the Kateel River to monitor daily passage of chinook and summer chum salmon. |